REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY

VOLUME II - APPENDICES A TO F

VANADIUM CORPORATION OF AMERICA SITE
TOWN OF NIAGARA, NEW YORK

MARCH 2006
REF. NO. 019867 (4)
This report is printed on recycled paper.

APPENDIX A

BOREHOLE AND MONITORING WELL STRATIGRAPHIC LOGS

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	A-0
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**599.7**				
0 - 5"	Topsoil - dark brown sandy topsoil with small roots, moist	48" recovery				0
5 - 24"	brown silty clay with brown mottling, small roots					0
24 - 48"	brown silty clay with grey mottling					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	A-1
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	G. May	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**600.9**				
0 - 4"	topsoil	3.3' recovery				0
4 - 48"	brown silty clay moist to wet, many rootlets. Lighter brown silty clay with orange and grey mottling, moist, stiff. Grading to reddish brown silty clay with multi-colored mottling, less moist, vertical dessication cracks.					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	A-2
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**601.5**				
0 - 5"	dark/black sandy topsoil with roots Surface soil sample #B081-02 collected (0-3")	42" core recovery				0
5 - 12"	brown silty clay, moist, very stiff with small roots					0
12 -48"	reddish brown silty clay w/ grey mottling very stiff, dry					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	A-3
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	G. May	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**602.3**				
0 - 8"	topsoil	full recovery				
8 - 48"	medium brown silty clay, moist, many rootlets. This soil grades to a lighter brown silty clay, moist, with reddish brown mottling. Few rootlets near top. Grades to reddish brown silty clay, less moist, vertical dessication cracks with grey mottling along cracks. No stones observed.					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	A-4
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**602.8**				
0 -6"	dark/black sandy topsoil with roots	36" recovery				0
6 - 24"	brown silty clay with roots, very stiff					0
24 - 48"	red silty clay, very stiff with grey mottling					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▽

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	A-5
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	G. May	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**603.1**				
0 -8"	Topsoil surface soil sample # B081-01 collected (0-3")					0
8 - 48"	Brown sitly clay, moist, grey and orange mottling, rootlets near surface. Grading to reddish brown at depth with grey mottling and vertical dessication cracks					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	A-6
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**602.8**				
0 - 4"	dark/black sandy topsoil	full recovery				0
4 - 24"	brown silty clay, very stiff, small roots and stones w/ grey mottling					0
24 - 48"	reddish brown silty clay, very stiff w/ small stones and grey mottling					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	A-7
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	G. May	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**602.4**				
0 -6"	brown silty clay topsoil, moist w/ rootlets	full recovery				0
6 -48"	brown to reddish brown silty clay, moist, stiff, grey mottling extensive near top of core. No mottling at bottom. Few small rock fragments, rounded.					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	A-8
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**601.8**				
0 - 6"	black/dark brown sandy topsoil w/ roots	full recovery				0
6 - 48"	very stiff brown silty clay, small roots in 6 -12" zone, small stones and grey mottling					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▽

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	A-9
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	G. May	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**601.2**				
0 - 6"	brown sitly clay, moist, rootlets, small amount of topsoil on surface					
6 - 48"	yellow brown, moist, stiffsilty clay with mottling grading to reddish brown silty clay with extensive mottling and vertical dessication cracks					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	A-10
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**601.0**				
0 -1"	dark/black topsoil	recovery 46"				0
1 -48"	very stiff brown sitly clay with small stones and grey mottling					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	A-11
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	G. May	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**600.8**				
0 - 7"	topsoil	full recovery				
7 - 48"	brown silty clay with wood and rootlets. Rest of core is reddish brown silty clay with roots, mottling, moist, native, very stiff.					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	A-12
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**601.3**				
0 -6"	topsoil, dark brown to black	full recovery				0
4 -48"	brown sitly clay with grey mottling, small roots in 4 -16" zone, small stones					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	B-0
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**601.4**				
0 -6"	dark/black gravely topsoil	42" recovery				0
6 -10"	red brick					0
10 -12"	dark black fill material(coal/carbon)					0
12 -48"	grey silty clay with reddish brown mottling, deep roots					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	B-1
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	G. May	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**602.1**				
0 - 3"	mainly plant material with some soil, moist. Surface soil sample collected B081-04	38' recovery				
3 - 7"	fill consisting of glass, slag some gypsum(?), brick, rootlets Sample B081-05 collected composite of B-1 & B-2 fill material					
7 - 48"	reddish brown silty clay, moist, black and orange mottling. Grey and greenish grey mottling near bottom of core and drier. Native silty clay is stiff and dense. Sample collected of native soil, sample # B081-06					

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	B-2
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**602.7**				
0 - 3"	gravelly dark topsoil w/ small stones	full recovery				0
3 - 12"	fill, brown to red, pieces of glass, ash type material. Sample # B081-05 composite with B-1					0
12 -18"	concrete pieces					0
18 -48"	very stiff brown silty clay with grey mottling, sample #B081-07					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	B-3
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	G. May	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**603.4**				
0 - 4"	thin zone of black topsoil	43" recovery				
4 -48"	fill containing silty clay, glass, slag, ceramic with rootlets, moist. Silty clay with grey, rusty orange, black and brown mottling. So mottled it is difficult to determine color of soil. Moist and stiff. Bottom of core is reddish brown silty clay, less moist w/ grey mottling and grey mottled vertical cracks					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	B-4
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**603.3**				
0 -8"	dark grey topsoil, PID response is in area with ants and evidence of fill material at 7 - 8"	full recovery				3
8 -24"	brown silty clay w/ grey mottling, very fine grained					0
24 -48"	reddish brown silty clay with grey mottling, very firm, vertical dessication cracks					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	B-4A
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface					
	Soil mound					
0 -24"	brown silty clay pushed into pile, some mottling evident surface soil collected sample #B081-03	full recovery				0
24 -48"	reddish brown silty clay w/ grey mottling and some roots. Native soil, suspect near original surface					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	B-5
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	G. May	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**602.8**				
0 - 5"	grey silty clay, moist, rootlets, some orange mottling					
5 -48"	reddish brown silty clay, moist, orange and grey mottling, stiff. Vertical dessication cracks. Grades to silty dlay that is brown, less moist and mottled, red and grey.					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	B-6
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**602.7**				
0 - 6"	dark brown silty clay, some roots	full recovery				0
6 -26"	reddish brown silty clay, very firm, moist, some roots w/ rusty to grey mottling					0
26 - 48"	reddish brown silty clay, soft, dry with grey mottling					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▽

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	B-7
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	G. May	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**602.2**				
0 - 6"	topsoil	38" recovery				
6 - 48"	brown silty clay, moist, rootlets, grading to stiff brown silty clay, moist w/ grey mottling and vertical dessication cracks. Bottom of core is more reddish brown with grey and pinkish brown mottling					

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	B-8
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**601.8**				
0 - 5"	dark sandy topsoil w/ roots and small stones	full recovery				0
5 - 48"	reddish brown silty clay with rusty to grey mottling, vertical fractures and roots full depth					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	B-9
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	G. May	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**601.2**				
0 - 5"	topsoil, dark brown silty clay, moist rootlets.	47" recovery				
5 - 48"	Grey silty clay, moist, brown mottling grading into reddish brown silty clay with little or no mottling w/ few rock fragments.					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	B-10
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**601.0**				
0 - 9"	dark brown sandy silty topsoil with roots and small stones	full recovery				0
9 - 48"	brown silty clay with reddish to grey mottling and roots, very firm.					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	B-11
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	G. May	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**600.8**				
0 - 7"	dark brown silty clay moist soft, rootlets	44" recovery				
7 - 48"	silty clay mottled orange, brown, black and grey, rootlets near top of core, moist. Grades to very stiff, brown silty clay, some grey and pink mottling, moist. Bottom of core is much drier.					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	B-12
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**600.8**				
0 - 7"	dark brown topsoil sandy with roots	full recovery				0
7 - 48"	brown sitly clay, very firm, moist reddish to grey mottling					0

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	C-0
Site Number:	No Number Assigned	**Date Completed:**	11/23/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	120"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**605.6**				
0 -4"	dark grey topsoil surface soil sample #B081-12 collected					0
4 -14"	red brick and slag					0
14 - 23"	sandy dark grey dry					0
23 - 27"	red slag, dry					0
27 - 48"	black carbon, moist					0
48 - 69"	black carbon w/ red slag					0.3
69 - 75"	yellow slag waste sample #B081-08 collected					0.5
75 - 96"	black carbon material, moist					0.1
96 - 120"	black carbon, very wet, core refusal					0.1

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	C-1
Site Number:	No Number Assigned	**Date Completed:**	11/24/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	D. King/M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	228" (19")	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**606.2**				
0 - 3"	sandy loam topsoil	30" recovery				0
3 - 10"	red granular slag					0
10 - 15"	yellowish brown slag, stone					0
15 - 19"	blue grey slag					0
19 - 26"	clayey soil					0
26 - 48"	carbon					0
48 - 57"	black carbon, slag, firm	full recovery				0
57 - 83"	grey paste like material					0
83 - 88"	carbon slag					0
88 - 91"	red brick					0
91 - 96"	carbon slag					0
96 - 99"	carbon slag	14" recovery				0
99 - 109"	slag fill, broken concrete					0
109 - 110"	grey paste					0
144" - 192"		Zero recovery				
192 - 198"	very wet silty clay w/ roots, small stones, suspect native soil	6" recovery				0
228"	core refusal					

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	C-2
Site Number:	No Number Assigned	**Date Completed:**	11/24/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	D. King/M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	192" (16')	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**607.6**				
0 - 3"	Topsoil	33" recovery				0
3 - 13"	clayey soil w/ broken brick and stone					
13 - 24"	clayey soil w/ red slag					
24 - 29"	brown silty clay					
29 - 33"	black carbon					
48 - 60"	black carbon	35" recovery				0
60 - 83"	moist granular fill of carbon, brick, glass, ash and clayey soil					
96 - 103"	red stone/slag w/carbon	23" recovery				0
103 - 119"	wood, carbon					
144 - 151"	reddish brown silty clay w/ grey mottling	7" recovery				0
192"	Boring completed in native soil					

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	C-3
Site Number:	No Number Assigned	**Date Completed:**	11/24/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	D. King	**Drilling Method:**	Direct Push
Total Depth:	144" (12 feet)	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**604.8**				
0 - 2"	black topsoil	30" recovery				0
2 - 24"	fill, brown w/ black streaking, glass, stone, firm					
24 - 30"	fill grey w/ white glass, stone ,firm					
48 - 49"	black gravelly like material, moist	1" recovery				0
96 - 97"	black fill material w/ metal shards and stone, very wet	12" recovery				0
97 - 108"	reddish brown silty clay, soft, very wet					0
144"	boring completed in native soil					
	Note: Sample location offset from grid point 10' west due to rubble					

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	C-4
Site Number:	No Number Assigned	**Date Completed:**	11/24/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	D. King	**Drilling Method:**	Direct Push
Total Depth:	144" (12 feet)	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**603.1**				
0 - 5"	dark grey clay soil, moist	19" recovery, metal shards in shoe				0
5 - 19"	brown to grey fill w/ white glass, metal shards and stones					
48 - 96"		Zero recovery				
96 - 102"	fill, black w/ small stones, moist	20" recovery				0
102 - 116"	grey to brown silty clay w/ shale shards					
144"	boring completed in native soil					
	Note: sample location offset from grid point C-4 20' to the east					

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	C-5
Site Number:	No Number Assigned	**Date Completed:**	11/24/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	D. King	**Drilling Method:**	Direct Push
Total Depth:	132" (11 feet)	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**603.4**				
0 - 3"	dark brown moist sandy topsoil. Sample collected from surface soil (0-3") Sample #A8081-11	29" recovery				0
3 - 48"	fill, grey to brown ash to black carbon, moist. Sample collected from fill material Sample # B081-10					
48 - 96"		Zero recovery				
120 -132"	reddish brown silty clay, very stiff w/ small stones, soil sample collected sample #A8081-09	10" recovery				0
132"	refusal, boring completed in native soil					

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	C-6
Site Number:	No Number Assigned	**Date Completed:**	11/24/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	96" (8 feet)	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**603.5**				
0 - 7"	dark grey sandy topsoil	24" recovery				0
7 - 24"	slag, ash, pieces of metal, carbon fines, red to black in color					0
48 - 51"	carbon fines, black, moist	15" recovery				0
51 - 63"	red sandy silty clay with small stones, very firm, moist					0
96"	boring completed in native soil					

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	C-7
Site Number:	No Number Assigned	**Date Completed:**	11/25/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	D. King	**Drilling Method:**	Direct Push
Total Depth:	102" (8.5 feet)	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**603.4**				
0 -1"	black, moist topsoil	14" recovery				0
1" - 14"	brown to grey fill, slightly moist, firm					
48 - 96"	possible core blockage 95 - 96" black moist shale subsoil, metal shards and small stones.	1" recovery				0
96 - 102"	Black rock fragments	1" recovery				0
102"	refusal					

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	C-8
Site Number:	No Number Assigned	**Date Completed:**	11/24/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	D. King	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**601.3**				
0 - 5"	topsoil	42" recovery				0
5 - 48"	mottled firm brown clay					

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	C-9
Site Number:	No Number Assigned	**Date Completed:**	11/24/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	D. King	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**600.5**				
0 - 3"	dark brown to black topsoil w/ plant material	46" recovery				0
3 - 48"	med brown clay, tight and moist w/ some grey to orange (rust) mottling					

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	C-10
Site Number:	No Number Assigned	**Date Completed:**	11/24/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	D. King	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**600.5**				
0 - 4"	dark brown to black topsoil w/ plant material	46" recovery				
4 - 46"	tan to brown clay, some rust and grey mottling, firm					

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	C-11
Site Number:	No Number Assigned	**Date Completed:**	11/24/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	D. King	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**600.3**				
0 - 5"	dark grey to black topsoil, moist	47" recovery				0
5 - 48"	tan to brown to reddish brown clay, firm, moist					

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	C-12
Site Number:	No Number Assigned	**Date Completed:**	11/24/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	D. King	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface	**600.2**				
0 -4 "	dark grey sandy soil, moist Surface soil (0-3") sample #A8081-16 collected	44" recovery				0
4 - 48"	tan to brown to reddish brown clays, tight/firm, moist some grey mottling					

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	Mound North
Site Number:	No Number Assigned	**Date Completed:**	11/24/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	D. King	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface					
0 - 19"	topsoil	43" recovery				0
19 - 48"	brown mottled clay Surface soil sample collected (0-3") #A8081-13 composite from Mound North, Mound Center and Mound South locations. Waste (topsoil) sample collected sample #A8081-14 composite sample from Mound North, Mound Center and Mound South Locations. Sub-soil sample (native soil) collected #A8081-15 composite sample collected from Mound North, Mound Center and Mound South locations.					

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	Mound Center
Site Number:	No Number Assigned	**Date Completed:**	11/24/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	D. King/ M. J. Hinton	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface					
0 - 2"	topsoil, dark brown	33" recovery				0
2 - 26"	brown sandy re-worked soil					
26 - 33"	native brown silty clay w/ rusty to yellow mottling					
	Surface soil sample collected (0-2") #A8081-13 composite from Mound North, Mound Center and Mound South locations.					
	Waste (topsoil 2 -26") sample collected sample #A8081-14 composite sample from Mound North, Mound Center and Mound South Locations.					
	Sub-soil sample (native soil) collected #A8081-15 composite sample collected from Mound North, Mound Center and Mound South locations.					

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

NYSDEC - Region 9 - Division of Environmental Remediation
Stratigraphic Log (Overburden)

Project Name:	Niagara Mohawk ROW	**Hole Designation:**	Mound South
Site Number:	No Number Assigned	**Date Completed:**	11/24/99
Location:	(T) Niagara, Niagara County	**Drilling Company:**	Zebra Environmental
Logged By:	D. King	**Drilling Method:**	Direct Push
Total Depth:	48"	**Sampling Method:**	Macro Core

Depth (bgs)	Stratigraphic Description & Remarks	Elevation (ft amsl)	Sample			
			NUMBER	COUNT	N VALUE	HNU
	Ground Surface					
0 -3"	Dark grey sandy silt soil	32" recovery				0
3 - 26"	dark brown re-worked soil, some brick fragments and roots					
26 - 48"	brown silty clay, firm, moist w/ rusty to grey mottling					
	Surface soil sample collected (0-3") #A8081-13 composite from Mound North, Mound Center and Mound South locations.					
	Waste (topsoil 3 -26") sample collected sample #A8081-14 composite sample from Mound North, Mound Center and Mound South Locations.					
	Sub-soil sample (native soil) collected #A8081-15 composite sample collected from Mound North, Mound Center and Mound South locations.					

Notes: Measuring Point Elevations May Change: Refer to Current Elevation Table

Grain Size ◯ Water Found ▽ Static Level ▼

DRILLING LOG FOR MW-2A & 2B

Project Name Vanadium

Site Location

Date Started/Finished 10-23-96

Drilling Company SJB

Driller's Name Randy Steiner

Geologist's Name Glenn M May

Geologist's Signature

Rig Type (s) CME 550X

Drilling Method (s) Rotary

Bit Size (s) 5 7/8" Auger Size (s) 8 1/4" ID

Auger/Split Spoon Refusal 11'

Total Depth of Borehole Is 10' for well MW-2A

Total Depth of Corehole Is

Water Level (TOIC)

Date	Time	Level (Feet)
10-25-96	1240	Dry (12.1')
10-28-96	0840	Dry (11.96')
10-29-96	0710	Dry (11.96')
10-30-96	1030	Dry

Well Location Sketch

Depth (Feet)	Sample Number	Blows on Sampler	Soil Components Rock Profile CL SL S GR	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
1	1	4 0 H 3	Brn. clay soil, roots, rock frag.							
2		6 4	red brn silty clay, mod. pl., dry to moist, native						0	
3	2	4 4 8 8								
4		8 12							0	
5	3	3 5	reddish brn silty clay, gray mottling, varied decomp. rock fragments,							
6		5 7							0	
7	4	13 10								sample sent to lab
8		11 10	Same as above, slightly more moist, more fissile						0	
9	5	2 3								
10		3 2	Same as above, mottling stops and clay becomes redder at about 9' BGS. Saturated at the depth and silt partings						0	
11	6	50/H 1				Top of Rock				Fell in overlying a loose dolostone fragment
12		100/6"								
13										Bedrock reamed to 13'
14					1	5.0' 42.1/55 76%				and casing set.
15										

SCREENED WELL

Stick-up 2.5 ft

Type of Grout 0 ft

Top of Bentonite 3 ft

Top of Sand Pack 4 ft

Top of Screen at 5 ft

Bottom of Screen at 10' ft

Bottom of Hole at 10' ft

Bottom of Sandpack at 10'

Well Number

Inner Casing Material

Inner Casing Inside Diameter ____ inches

GROUND SURFACE

Quantity of Material Used
Bentonite Pellets

Cement

Borehole ____ inches Diameter

Cement/ Bentonite

Grout

Screen Slot Size 10

Screen Type
☒ PVC 2"
☐ Stainless Steel

Pack Type/Size:
☒ Sand
☐ Gravel
☐ Natural

OPEN-HOLE WELL

Stick-up ____ ft

Inner Casing Material

Inner Casing Inside Diameter ____ inches

Outer Casing Diameter ____ inches

Borehole Diameter ____ ft

Bedrock ____ ft

Bottom of Rock Socket/ Outer Casing ____ ft

Bottom of Inner Casing ____ ft

Corehole Diameter ____

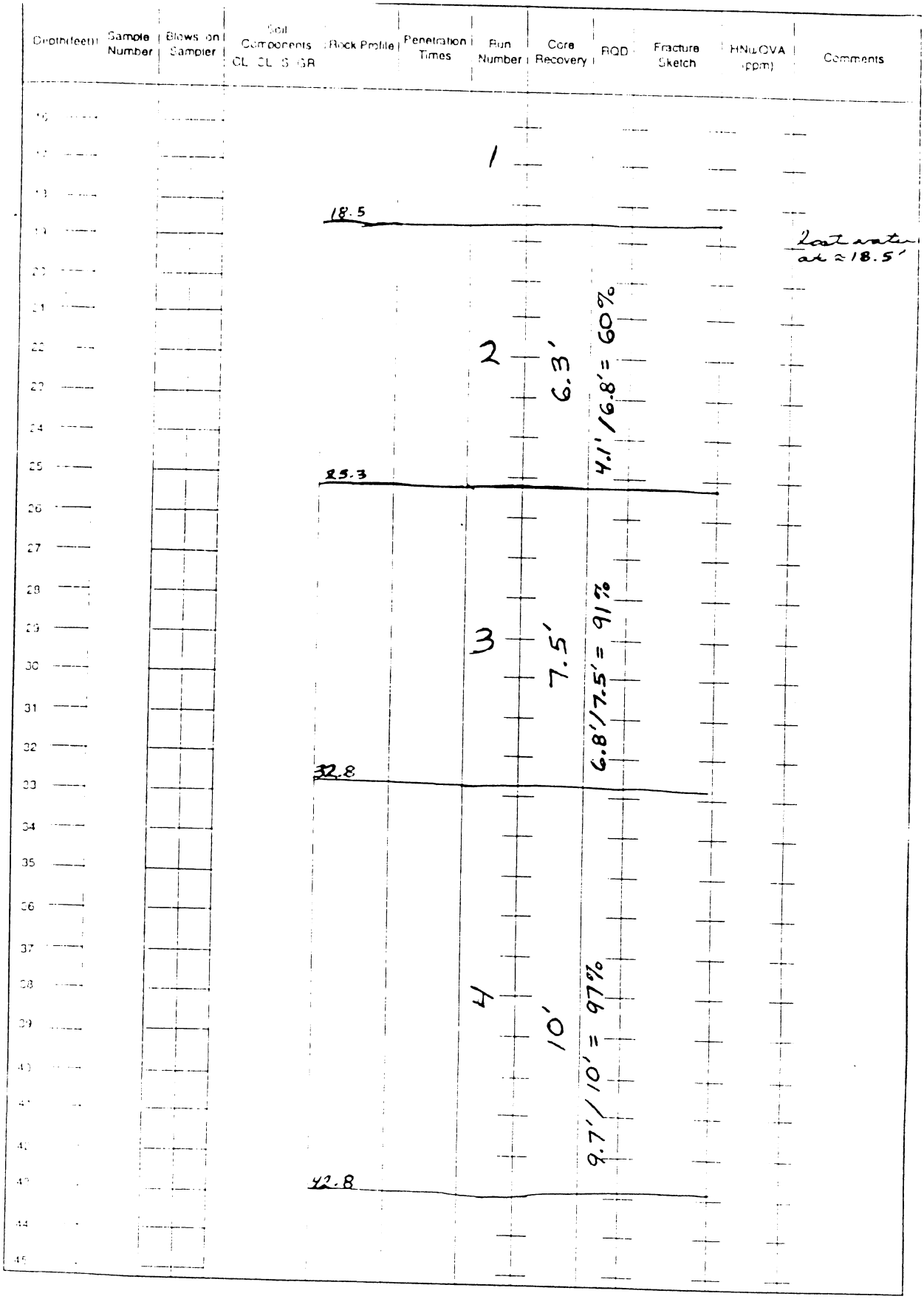
Bottom of Corehole ____ ft

NOTE See pages 136 and 137 for well construction diagrams

BOREHOLE NO. 3

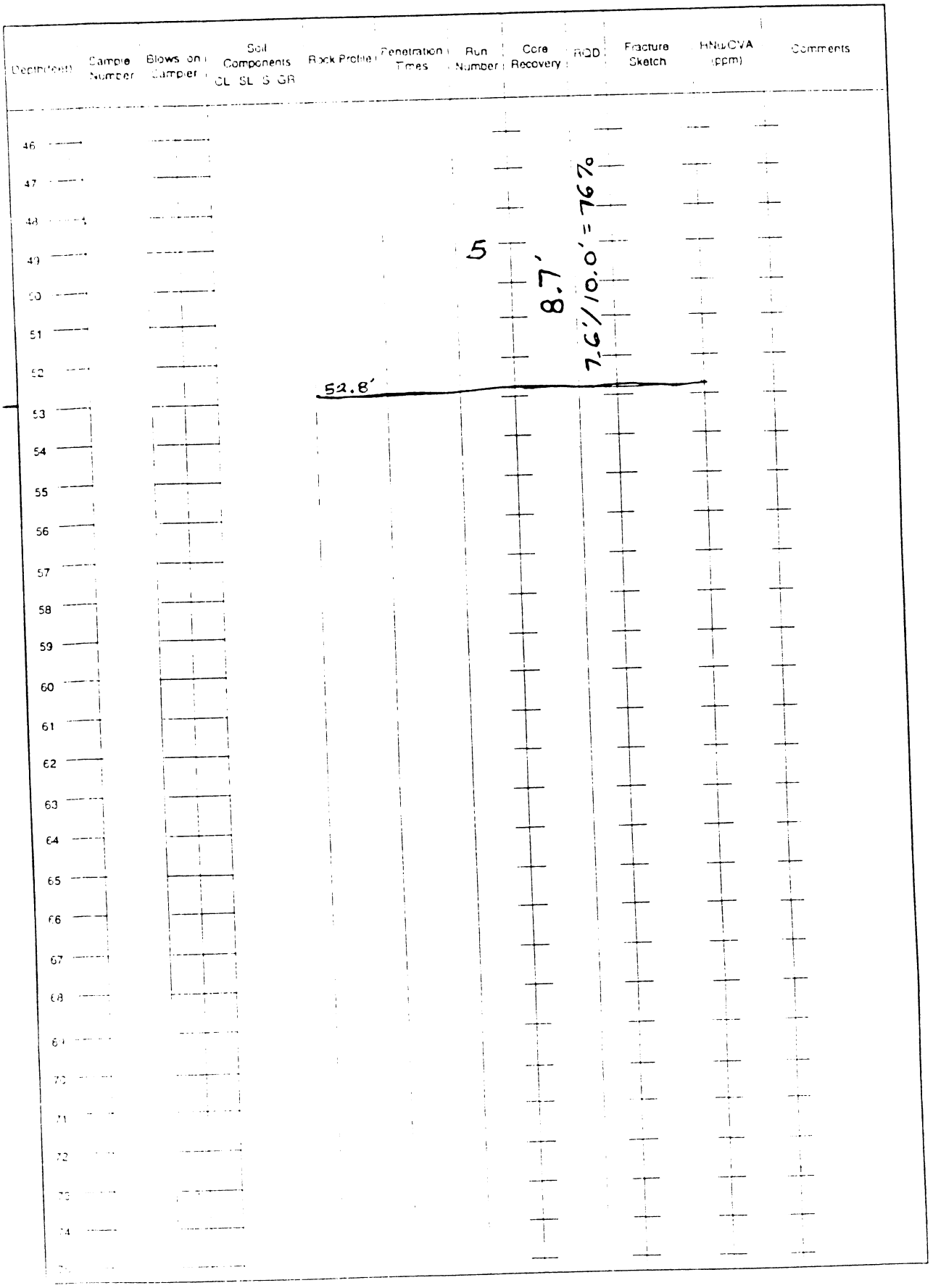
BOREHOLE NO. 4

Depth ft	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
1	Brown silty clay transitional to topsoil, loose, moist, many rootlets, trace angular dolomite fragments	○	●	○
2		○	●	○
3	Reddish brown silty clay, mottled orange and gray, massive, w/ large dolostone fragment, native.	●	●	○
4		●	●	○
5	Same as above with fulled vertical desiccation cracks,	○	●	○
6		○	●	○
7	Same as above with trace small dolostone gravel,	○	●	○
8		○	○	●
9	Same as above without the mottling, still vertical	○	○	●
10	fulled desiccation cracks. Becomes saturated @ 9' BGS, wet	○	○	●
TOR 11	portions at this depth. Spoon and auger refusal at 11' BGS. No sample recovery	○	○	○
12	Bedrock assumed for rock socket. No samples	○	○	○
13				
14	Medium to dark gray dolostone, mostly massive, rock fragments yellowish brown starting at 13.4' to 13.9' with calcite crystal at 14.4'. Large voids from 14.9' to 15.4' with reddish brown silty clay filling and slight petroleum odor. Some	○	○	○
15		○	○	○


Depth(feet)
Sample Number
Blows on Sampler
Soil Components CL CL S GR
Rock Profile
Penetration Times
Run Number
Core Recovery
RQD
Fracture Sketch
HNu/OVA (ppm)
Comments
1
18.5
Last water at ≈18.5'
2
6.3'
4.1'/6.8' = 60%
25.3
3
7.5'
6.8'/7.5' = 91%
32.8
4
10'
9.7'/10' = 97%
42.8

Depth (feet)	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
	Shale partings and calcite vertical filled fractures below 15.6 feet.			
18.5	Medium to dark gray dolostone, blocky to massive, wavy structure from 19.3' to 19.4'. This zone contains several vugs with calcite crystals (small) and fossils. Wavy appearance again from 21.6' to 23.3'. This zone also contains vugs and small calcite crystals. Some shale partings. Wood is present at the partings.			
25.3	Medium to dark gray dolostone, massive, shale partings, small vugs and pinhole porosity to 28.7'. A small void at 28.7 and another at 29.3 with occasional water flow. A sphalerite crystal is in this zone. Massive to the end of the run with numerous pinhole porosity.			
32.8	Medium to dark gray dolostone, massive, numerous vugs and filled pinhole porosity throughout. Calcite crystals in some of the vugs. Vugs filled with calcite crystals at 42.4' – signs of water wear.			
42.8	Medium to dark gray dolostone, mostly massive, numerous vugs with and abundant calcite crystals throughout, numerous pinhole porosity throughout, water wear throughout, shale partings, highly weathered at 47'.			

MW-102A AND MW-102B



NARRATIVE LITHOLOGIC DESCRIPTION

Moisture Content: Dry | Moist | Wet

a vertical open fracture through the core at 48.2'. A large gravel zone at 48.8'. The bottom 2.7' is massive, contains fewer vugs, and is much less weathered.

52.8

BOREHOLE NO. 3

BOREHOLE NO. 4

DRILLING LOG FOR Well MW-3A

Project Name Vanadium Corp

Site Location Town of Niagara

Date Started/Finished 10-24-96

Drilling Company SJB

Driller's Name Randy Steiner

Geologist's Name Glenn M May

Geologist's Signature Glenn M. May

Rig Type (s) CME 550X

Drilling Method (s) Rotary

Bit Size (s) 5 7/8" Auger Size (s) 8 1/4" ID

Auger/Split Spoon Refusal 18.0' / 17.6'

Total Depth of Borehole Is 17.6'

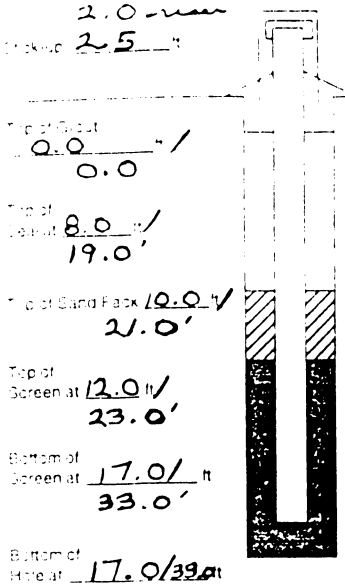
Total Depth of Corehole Is 33.0'

Water Level (TOIC) MW-3A

Date	Time	Level (Feet)
10-28-96	0856	6.62 (18.65
10-29-96	0735	6.75
10-30-96	1245	

Well Location Sketch

Depth (Feet)	Sample Number	Blows on Sampler	Soil Components Rock Profile CL SL S GR	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Commer
1	1	3 2 / 2 3	waste fill						0	
2										
3	2	2 3 / 4 4							0	
4										
5	3	2 6 / 8 11							0	
6										
7	4	11 11 / 13 17							0	
8										
9	5	4 5 / 8 8							0	
10										
	6	6 7 / 7 9							0	Poor re
	7	10 10 / 12 10							0	Sample submitt analys
	8	1 1							0	



SCREENED WELL

Lock Number _____

Inner Casing Material _____

Inner Casing Inside Diameter ___ inches

GROUND SURFACE

Quantity of Material Used
Bentonite Pellets _____
Cement _____
Borehole _____ inches Diameter
Cement/ Bentonite _____
Grout _____
Screen Slot Size 10
Screen Type
☒ PVC 2"
☐ Stainless Steel ____
Pack Type/Size:
☒ Sand _____
☐ Gravel _____
☐ Natural _____

Stickup 2.5 ft

Top of Riser 0.0 ft / 0.0

Top of Seal 8.0 ft / 19.0'

Top of Sand Pack 10.0 ft / 21.0'

Top of Screen at 12.0 ft / 23.0'

Bottom of Screen at 17.0 ft / 33.0'

Bottom of Hole at 17.0/33.0 ft

Bottom of Sandpack at 17.0/33.0

OPEN-HOLE WELL

Stickup _____ ft

Inner Casing Material _____

Inner Casing Inside Diameter _____ inches

Outer Casing Diameter _____ inches

Borehole Diameter _____ ft

Bedrock _____ ft

Bottom of Rock Socket/ Outer Casing _____ ft

Bottom of Inner Casing _____ ft

Corehole Diameter _____

Bottom of Corehole _____ ft

NOTE See pages 136 and 137 for well construction diagrams

Depth-ft	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
1	2" topsoil mixed with wastey many rootlets, wood fragments 5" brown to gray brick-like material, rootlets (Waste)	●	○	○
2	Reddish brown silty clay, cohesive, orange mottling, vertical desiccation cracks, dry to moist, laminated, brown soil(silt) in lower portion of sample.	●	●	○
3	Reddish brown silty clay, laminated, orange mottling and brown staining (mostly from wetland plant decay), cohesive, moist, rootlets, brown and yellow blebs in matrix	○	●	○
4	light brown silty clay, extremely mottled pink and orange, less moist than sample above, less cohesive, laminated.	○	●	○
5		○	●	○
6	Same as above for 6" then grades into reddish brown silty clay, higher silt content than clay, laminated, mottled various colors, trace gravel, filled vertical desiccation cracks, less layering with depth with increase in redness.	○	●	○
7		○	●	○
8	Sample same as above but more moist, decrease in mottling with depth. Laminations still present, silt content increases visible gravel disappears.	○	●	○
9	Sample more brown than clay, mottling again observed, slight increase in cohesiveness, no gravel.	○	●	○
10	Same as above to 13' then becomes a gray clay with red laminations. Moist. Gray silt partings in upper foot, mottled, no vertical filled fractures. The gray clay is extremely cohesive and more moist.	○	●	○
11	Reddish brown silty clay with gray clay laminations, becomes saturated at 15 BGS. Saturated zone contains many dolostone rock fragments, with no laminations. Saturated zone contains clay and silt	○	○	●

MW-103A AND MW-103B

Depth (feet)	Sample Number	Blows on Sampler	Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
16	8	2.1								0	
17	9	12 52								0	
18		50/0.6	bedrock								
19											
20											
21											
22											
23											
24						1	8.2'	9.0' = 100%	5.7'/7.5' = 63%		Water level after first run is ≈ 6' below grade
25											
26											
27											
28											
29											
30						2	4.0'	4.0' = 100%	1.9'/4.0' = 48%		Water level after 2nd run is 5.8' BGS and rising
31											
32											
33											
34											
35											
36											
37											

Depth (feet)	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
		○	○	○
	Sample same as above. The lower 3" appears to be weathered bedrock.	○	○	●
		○	○	○
		○	○	○
	Start of Rock Coring	○	○	○
	Medium to dark grey dolostone, mostly massive, large vug at 21.1' BGS. Slight water wear. Few stylolite parting and short (1") calcite filled vertical fractures. Void from 23.3' - 23.7'. Void from 24.2' - 24.5' contains gravel. Massive from 26.6' - 28.4'. Slight joint at 28.4' with mud & rock flour.	○	○	○
		○	○	○
		○	○	○
		○	○	○
	Medium to dark grey dolostone, blocky, numerous small vugs to 29.6' BGS. Few stylolite partings and calcite filled vertical fractures. A large (1.5") gypsum nodule at the bottom of the core.	○	○	○
		○	○	○
		○	○	○
		○	○	○
		○	○	○
		○	○	○
		○	○	○
		○	○	○
		○	○	○
		○	○	○
		○	○	○
		○	○	○

DRILLING LOG FOR Wells MW-4A & 4B

Project Name: Vanadium Corp

Site Location: Niagara (Town)

Date Started/Finished: 10/25/96

Drilling Company: SJB

Driller's Name: Randy Steiner

Geologist's Name: Glenn M. May

Geologist's Signature: Glenn M May

Rig Type (s): CME 550X

Drilling Method (s): Rotary

Bit Size (s): 5 7/8" Auger Size (s): 8 1/4" ID

Auger/Split Spoon Refusal:

Total Depth of Borehole Is:

Total Depth of Corehole Is:

Water Level (TOIC)		
Date	Time	Level Feet
10-29-96	0740	13.01 (21.09)

Well Location Sketch

Depth Feet	Sample Number	Blows on Sampler	Soil Components Rock Profile CL SL S GR	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
1	1	1 3 / 3 5	Topsoil						0	only 8" recovery
2	2	4 14 / 17 6	WASTE						0	no recovery
3	3	1 4 / 4 5							7	
4	4	5 4 / 8 6	490 ppm on sample						26	
5	5	1 3 / 4 5	Sample OVA @ 80 ppm						500	500 ppm in black zone. Sample collected.
6	6	5 6 / 9 8	Native						30	20 ppm methane
7	7	20 21 / 19 21							0	
8		4 4							0	

BOREHOLE NO. 5 6 7

SCREENED WELL

Lock Number _____

Inner Casing Material _____

Inner Casing Inside Diameter ____ inches

GROUND SURFACE

Quantity of Material Used
Bentonite
Pellets _____
Cement _____
Borehole ____ inches Diameter
Cement/ Bentonite _____
Grout _____

Screen Slot Size 10

Screen Type
☒ PVC
☐ Stainless Steel

Pack Type/Size:
☒ Sand _____
☐ Gravel _____
☐ Natural _____

OPEN-HOLE WELL

Stick-up _____ ft

Inner Casing Material _____

Inner Casing Inside Diameter _____ inches

Outer Casing Diameter _____ inches

Borehole Diameter _____ ft

Bedrock _____ ft

Bottom of Rock Socket/ Outer Casing _____ ft

Bottom of Inner Casing _____ ft

Corehole Diameter _____

Bottom of Corehole _____ ft

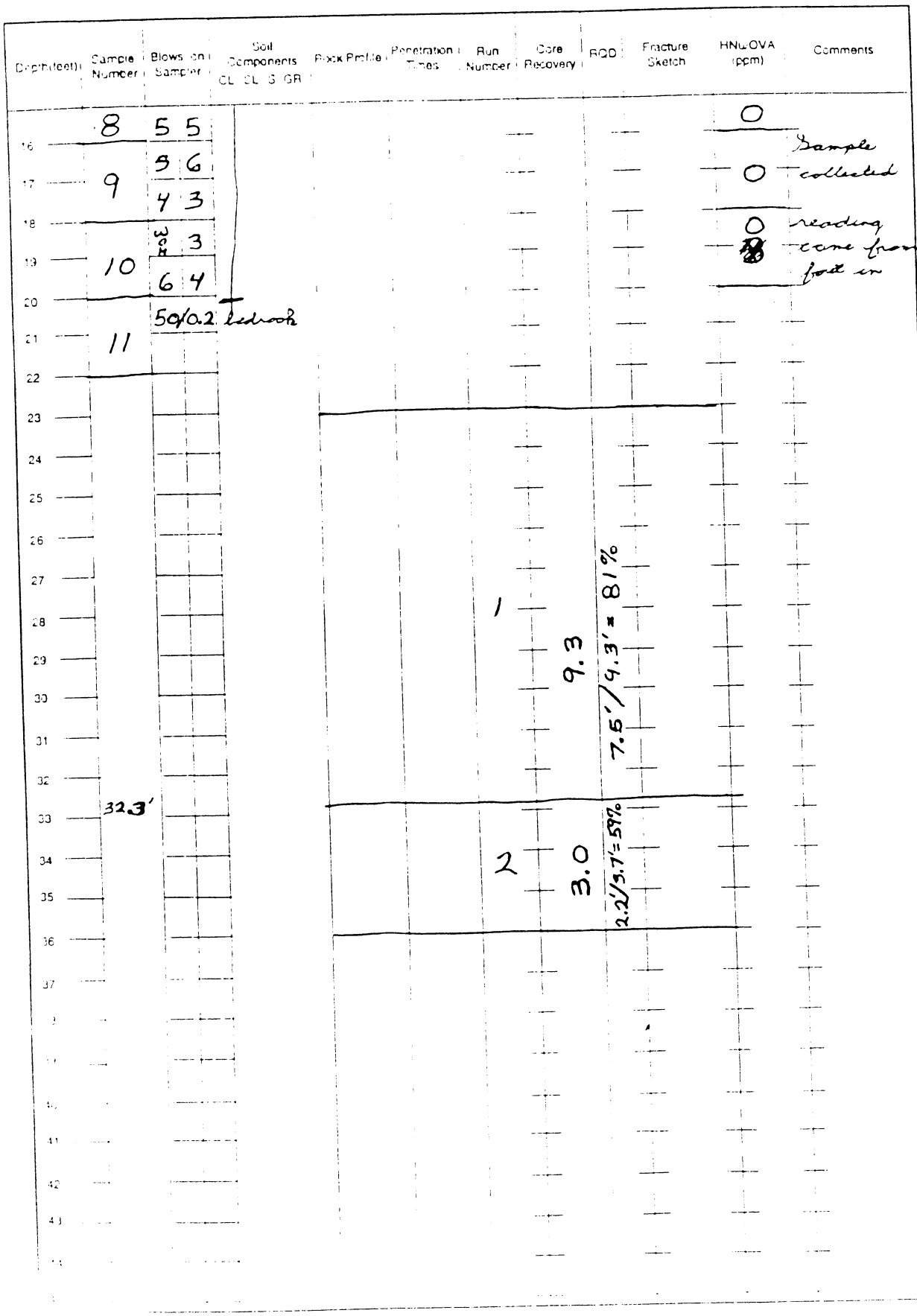
2.0 inches
2.5 ft
0 ft
10 in
Sand Pack 12 ft
Seal at 14 ft
19 ft
Bottom of Seal at 19 ft
Bottom of Sandpack at 19 ft

NOTE: See pages 136 and 137 for well construction diagrams

NARRATIVE LITHOLOGIC DESCRIPTION

	Moisture Content		
	Dry	Moist	Wet
Topsoil, brown, many rootlets, dry. Composed mainly of sandy clay	●	○	○
	○	○	○
White lime-like waste material observed in auger cuttings.	○	○	○
	○	○	○
Waste, gray-white lime-like powder, gravel to pebble size	○	○	●
	○	○	●
	○	○	●
Sample same as above. Rock-like at the bottom	○	○	●
9" of the sample Reddish brown silty clay stained dark brown to black, plant fragments (carbonaceous), laminated dark brown silty clay	●	●	○
Bottom 4" with orange and black mottling. Dry to moist, stiff, laminated	●	●	○
Reddish brown silty clay, gray and orange mottling, several filled desiccation cracks, some pinpoint mottling, trace gravel, stiff, laminated	●	●	○
	●	●	○
Sample same as above. Silt partings near bottom of sample. Some colored (red, yellow) silty clay, stiff, laminated	●	●	
	●		
Sample same as above.			

MW-104A AND MW-104B



Depth (feet)	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
		○	○	●
		○	○	●
	Sample same as above but grades into a redder color and gray lamination bands, no mottling, very cohesive, silt to fine sand particles bottom 6".	○	○	●
	Red silty clay, saturated, numerous dolostone gravel and pebbles.	○	○	●
		○	○	●
		○	○	○
	Bedrock fragments, brown dolostone with black partings.	○	○	○
		○	○	○
	Medium to dark gray dolostone; blocky to massive; shale partings, trace small horizontal vugs at 24.4' with calcite filled fractures, filled partial fractures throughout. Large gypsum nodule at 25.8', calcite filled vugs from 26.7'-27.3', numerous calcite filled vugs above the zone. A large vug (1" x 1/2") with dogtooth calcite at 29.5'. Numerous smaller vugs also in this area. Void at 30.0' with several voids, pinhole porosity, and signs of water wear. Sphalerite and dog tooth calcite crystals at the bottom of the run.	○	○	○
		○	○	○
		○	○	○
		○	○	○
	Medium to dark gray dolostone, massive to 33.6', blocky to massive rest of run. A large sphalerite crystal at 32.4' and a large gypsum nodule at 32.7'. Some pinhole porosity around the gypsum nodules. Few shale partings rest of run with some vertical filled fractures.	○	○	○
		○	○	○
		○	○	○
		○	○	○
		○	○	○
		○	○	○
		○	○	○
		○	○	○

BOREHOLE NO. 5

BOREHOLE NO. 6

BOREHOLE NO. 7

DRILLING LOG FOR Well MW-5A & 5B

Project Name Vanadium Corp

Site Location Town of Niagara

Date Started/Finished 10/28/96

Drilling Company SJB

Driller's Name Randy Steiner

Geologist's Name Glenn M. May

Geologist's Signature Glenn M. May

Rig Type (s) CME 550X

Drilling Method (s) Rotary

Bit Size (s) 5 7/8" Auger Size (s) 8 1/4" ID

Auger/Split Spoon Refusal _____

Total Depth of Borehole Is _____

Total Depth of Corehole Is _____

Water Level (TOIC)		
Date	Time	Level (Feet)
10/30/96	0915	7.34

Well Location Sketch

Depth (Feet)	Sample Number	Blows on Sampler	Soil Components Rock Profile CL SL S GR	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
1	1	2 4 5							0	Poor recovery
2		22 2	Fill							
3	2	4 6	Material						0	Poor recovery
4		5 2								
5	3	4 2							0	Poor recovery
		2 2								
	4	3 3							0	
		5 9								
	5	4 5							0	
		7 13								
	6	7 7	3 1						0	Poor recovery Rock in spoon above
		4 11	2 6							
	7	6 9		Sample for analysis					0	OVA reading (ppm) as methane
		12 11								
8		8 11							4	Likely to be [illegible]

Lock Number _____ Stick-up _____ ft

SCREENED WELL

Inner Casing Material _____

Inner Casing Inside Diameter ___ inches

2.0 cm
Stick-up 2.5 ft

GROUND SURFACE

Top of Grout 0 ft / 0 pt

Top of Gravel at 5 ft /

Top of Sand Pack 7 ft /

Top of Screen at 9' ft /

Bottom of Screen at 14' ft /

Bottom of Hole at 14' / ft

Bottom of Sandpack at 14' /

Quantity of Material Used:
Bentonite Pellets _____
Cement _____
Borehole _____ inches Diameter
Cement/ Bentonite _____
Grout _____
Screen Slot Size 10
Screen Type _____
☒ PVC _____
☐ Stainless Steel ____
Pack Type/Size:
☒ Sand _____
☐ Gravel _____
☐ Natural _____

OPEN-HOLE WELL

Inner Casing Material _____

Inner Casing Inside Diameter _____ inches

Outer Casing Diameter _____ inches

Borehole Diameter _____ ft

Bedrock _____ ft

Bottom of Rock Socket/ Outer Casing _____ ft

Bottom of Inner Casing _____ ft

Corehole Diameter _____

Bottom of Corehole _____ ft

NOTE. See pages 136 and 137 for well construction diagrams

BOREHOLE NO. 6

BOREHOLE NO. 7

BOREHOLE NO. 1 & 2

Depth-ft	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
	0.5' topsoil, brown, many rootlets, ash, slag and concrete fragments. 0.4' concrete fragments over compost felt paper.	●	○	○
1		●	○	○
2	Reworked clay with rock fragments (0.6') overlying block saprolite. Soft material mixed with clay particles.	●	○	○
3	Wood in the bottom of the sample.	●	○	○
4	Reworked brown silty clay, with rock and slag fragments and rootlets. Top of block saprolite looking material at the bottom of the sample. Bottom of sample moist.	●	○	○
		○	●	○
	Reddish brown silty clay with red, orange, and gray mottling, some saprolite, some silt partings.	●	●	○
	Sample same as above, mottled, silt partings, laminated.	●	●	○
	→	●	●	○
	No vertical filled desiccation cracks, very cohesive, stiff.	●	●	○
		○	●	○
	Dolostone fragments with reddish brown silty clay. Sample recollected for MW-5H. Two rock pebbles - one a brown, rounded dolostone; the other a blue green angular limestone.	○	●	○
	Fine to medium grained brown sand with some reddish brown silty clay interbeds. Numerous rock fragments throughout but more prevalent at the bottom 0.4' of sample.	○	○	●
	Reddish brown silty clay (moist) with fine sand in the shoe. Same as above silty clay.	○	○	●
	Fine to medium brown sand with rock fragments and some reddish brown silty clay.			●

MW-105A AND MW-105B

Depth(feet)	Sample Number	Blows on Sampler	Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
16	8	50/.2									
17											
18											
19						1	3.5'	3.0'/4.0'=75%			
20											
21											
22											
23						2	2.7'	0.45'/3.5'=13%			
24											
25											
26											
27						3	5.4'	3.75'/5.5'=68%			
28											
29											
30											
31											
32											
33											
34											
35											
36											
37											
38											
39											
40											
41											
42											
43											

Depth(feet)	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
16		○	○	○
17	Medium to dark gray dolostone, blocky to massive, numerous small vugs from 17.6'-20.2', some calcite filled fractures. Rock fragments at 18.9' and 20.2'. Numerous shale partings thru.	○	○	○
18		○	○	○
19		○	○	○
20		○	○	○
21	Medium to dark gray dolostone, blocky with rock fragments at 21.4' and 23.4'. Some calcite filled fractures. Breaks in rock contain gravel and mud. Shale partings - thin.	○	○	○
22		○	○	○
23		○	○	○
24		○	○	○
25	Medium to dark gray dolostone, blocky to massive, large vug with calcite crystals at 24.6'. Large coral at 25.6'. Few vugs throughout, several shale partings at break in core. Large diagonal vug through the core from 28.3' to 28.6'. Calcite crystals in this zone. Calcite filled fractures throughout core.	○	○	○
26		○	○	○
27		○	○	○
28		○	○	○
29		○	○	○
30		○	○	○
31		○	○	○
32		○	○	○
33		○	○	○
34		○	○	○
35		○	○	○
36		○	○	○
37		○	○	○
38		○	○	○
39		○	○	○
40		○	○	○
41		○	○	○
42		○	○	○
43		○	○	○
44		○	○	○

BOREHOLE NO. 6

BOREHOLE NO. 7

BOREHOLE NO. 1 of 2

FIELD BOREHOLE LOG

MALCOLM PIRNIE

Project Name: Niagara Mohawk ROW
Project No.: 0266-342
Client: NYSDEC
Location: Niagara, NY

Surface Elev.: _____
Reference Elev.: _____
Contractor: SJB Services
Logged By: Daniel E. Riker

Borehole No.: MW-6A
Date Started: 12/16/99
Date Finished: 12/16/99
Method of Boring: 4¼" HSA, 2" SS

Depth (BGS)	Sample Collected	Sample ID	Blows (6")	Recovery (Inches)	Description and Remarks Density/Consistency, Color, Plasticity, Soil Types, Texture, Fabric, Bedding, Moisture, Other Characteristics	Moisture	Soil Classification	HNu (ppm) Scan	HNu (ppm) Headspace
			1	16	0-7 GRAY-BROWN SILTY CLAY			0	
1			1		7-16 TAN & GRAY SILTY CA CLAY, COHESIVE				
			2						
2			3						
			3	14	0-14 RED-BROWN SILTY CLAY, SOME TAN &			0	
3			5		SOME GRAY MOTTLING, COHESIVE.				
			5						
4			4						
			3	18	0-18 SAME AS ABOVE.			0	
5			3						
			4						
6			5						
			5	15	0-15 SAME AS ABOVE			0	
7			5		- SILT CONTENT INCREASES (8-15")				
			4						
8			5						
			1	16	0-16 RED-BROWN SILTY CLAY, MINOR TAN			0	
9			1		MINOR BLACK, AND MINOR GRAY				
			2		MOTTLING. MODERATELY COHESIVE.				
10			3						
			5	12	0-7 SAME AS ABOVE.			0	
11			7		7-12 RED-BROWN CLAYEY SILT, MINOR				
			50/1		VERY FINE SAND.				
12					GRAVEL-SIZED PIECES OF DOLOSTONE IN SHOE.				
					REFUSAL - END OF BORING				
13									
14									

MALCOLM PIRNIE

Project Name: Niagara Mohawk ROW
Project No.: 0266-342
Client: NYSDEC
Location: Niagara, New York

Surface Elev.: _____
Reference Elev.: _____
Contractor: SJB Services
Logged By: Daniel E. Riker

Borehole No.: MW-6B
Date Started: 12/16/99
Date Finished: 12/20/99
Method of Boring: HQ Coring

Depth (BGS)	Core Run Number	Recovery (feet)	RQD	Fractures	Description and Remarks Rock Type, Fractures, Bedding Planes, Other Characteristics	PID (ppm) Scan
					AUGER TO 11', ROLLER BIT TO 13'	
					- OVERBURDEN DESCRIBED IN ADJACENT WELL MW-6A	
					START CORING AT 13 Feet	
	1	9.0	85%		13-23' DARK GRAY DOLOSTONE, COMPETENT, HORIZONTAL BEDDING	0
14					SOME VERTICAL FRACTURES, SOME VUGS (1 MM TO 15 MM IN	
					DIAMETER). PRECIPITATED MINERALS IN SOME FRACTURES & VUGS. BIOTURBATED	
15					- HORIZONTAL JOINTING ALONG BEDDING PLANES AT 2.2, 3.6, 4.0, 4.2,	
				1	4.4, 5.9, 6.0, 6.5, 6.9, 8.0, 8.6 & 8.8 FEET BELOW TOP OF CORE.	
16					- VERTICAL FRACTURES AT 3.4-3.6, 4.0-4.2, 6.0-6.3, & 8.8-9.0	
					30° FRACTURE AT 4.2-4.4, AND 60° AT 6.2. ALL FRACTURES	
17					SMALL (< 3 mm), AND SOME INFILLED.	
				1	- SOLUTION CAVITIES: 0.5-0.8 (< 3 mm), 3.9, 4.4-4.7, 5.4-5.5	
18					(< 3 mm); 6.0 (UP TO 1 cm); 6.9-8.0 MANY	
					SMALL VUGS (< 3 mm) WITH SOME LARGE (UP TO	
19					1.5 cm) VUGS, SOME OF LARGER VUGS INFILLED	
				1	- ITA PRECIPITATED MINERAL.	
20					- STYLOLITES - 0.1-0.2, 0.9, 1.2, 1.9, 2.6, 3.1, 3.9, 5.8,	
					6.4, 6.6-6.7 AND 8.6-8.8	
21						
22				1		
23						
					END OF BORING	

FIELD BOREHOLE LOG

MALCOLM PIRNIE

Project Name: Niagara Mohawk ROW
Project No.: 0266-342
Client: NYSDEC
Location: Niagara, NY

Surface Elev.: _____
Reference Elev.: _____
Contractor: SJB Services
Logged By: Daniel E. Riker

Borehole No.: MW-7A
Date Started: 12/17/99
Date Finished: 12/17/99
Method of Boring: 4¼" HSA, 2" SS

Depth (BGS)	Sample Collected	Sample ID	Blows (6")	Recovery (In)	Description and Remarks Density/Consistency, Color, Plasticity, Soil Types, Texture, Fabric, Bedding, Moisture, Other Characteristics	Moisture	Soil Classification	HNu (ppm) Scan	HNu (ppm) Headspace
			1	5	0-2 DARK GRAY TO BLACK SILTY CLAY	VM		0	
1			2		2-5 GRAY TO TAN COHESIVE SILTY CLAY	M			
			3						
2			5						
			5	13	0-13 RED-BROWN SILTY-CLAY, SOME GRAY	M		0	
3			5		AND SOME TAN MOTTLING, COHESIVE				
			7						
4			7						
			5	21	0-21 SAME AS ABOVE	M		0	
5			6						
			7						
6			8						
			11	16	0-6 SAME AS ABOVE	M		0	
7			9		6-16 RED-BROWN CLAYEY SILT SOME GRAY				
			11		& SOME TAN MOTTLING.				
8			12						
			3	7	0-7 SAME AS ABOVE, WITH SOME ANGULAR	M		0	
9			4		GRAVEL-SIZED PIECES OF DARK GRAY				
			50/3		DOLOSTONE.				
10									
					REFUSAL - END OF BORING				
11									
12									

MALCOLM PIRNIE

Project Name: Niagara Mohawk ROW
Project No.: 0266-342
Client: NYSDEC
Location: Niagara, New York

Surface Elev.: _____
Reference Elev.: _____
Contractor: SJB Services
Logged By: Daniel E. Riker

Borehole No.: MW-7B
Date Started: 12/17/99
Date Finished: 12/20/99
Method of Boring: HQ Coring

Depth (BGS)	Core Run Number	Recovery (feet)	RQD	Fractures	Description and Remarks Rock Type, Fractures, Bedding Planes, Other Characteristics	PID (ppm) Scan
					AUGER TO APPROX 9.5 FEET, ROLLER BIT TO 12.5 FEET	
					- OVERBURDEN DESCRIBED IN ADJACENT WELL MW-7A	
					- CORING INITIATED AT 12.5 FEET	
12	1	10.0	74%		12.5 → 22.5 DARK GRAY DOLOSTONE, COMPETENT, HORIZONTALLY BEDDED, BIOTURBATED, SOME SOLUTION CAVITIES (1 mm TO 15 mm DIAMETER), PRECIPITATED MINERALS IN SOME FRACTURES AND VUGS.	0
13						
14						
15					- HORIZONTAL JOINTING ALONG BEDDING PLANES AT 0.5, 1.1, 1.2, 1.3, 1.6, 2.5, 2.7, 3.8, 3.4, 4.0, 5.9, 6.2, 6.8, 7.0, 7.6, 8.3, 8.4, 8.9, 9.4, 9.6 FEET BELOW TOP OF CORE.	
16						
17					- VERTICAL FRACTURES (SMALL < 5 mm) AT 2.8-3.4, 7.6-7.9, 8.4-9.2 AND 9.4-9.6'. 15° FRACTURE AT 5.6', AND 30° AT 9.8. SOME PARTLY OR COMPLETELY INFILLED.	
18					- GRAVEL - 5-360 PIECES OF BEDROCK / FRACTURE AT 12-13, 7.9-8.1 AND 9.8-10.0'.	
19					- SOLUTION CAVITIES (VUGS) AT 0.4' (< 0.3 cm), 1.3-2.5 (UP TO 1.5 cm, SOME INFILLED), 3.4-4.0 (0.5 cm), 4.5-6.0 (< 0.3 cm), 6.2-6.8 (FEW, UP TO 1.5 cm, INFILLED), 7.4 (UP TO 0.5 cm) AND 8.1-8.3 (UP TO 0.5 cm).	
20						
21					- STYLOLITES - 0.5-1.1, 1.5, 2.6, 2.7-2.8, 3.3, 4-4.2, 5.7, 6.5, 7.1, 7.4, 8.3, 9.1, AND 9.6-9.8.	
22						
23					END OF BORING	

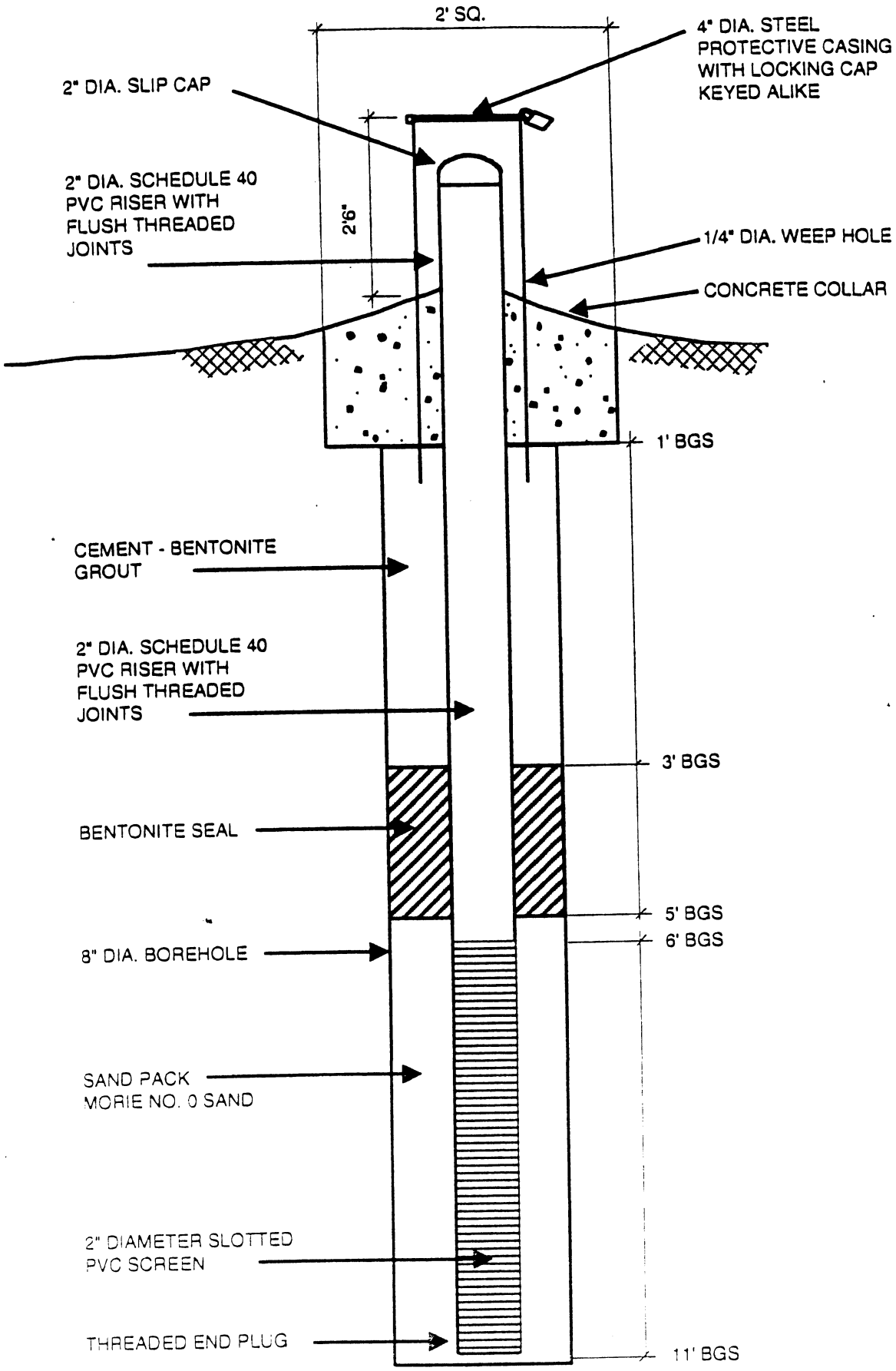


FIGURE B-1
MONITORING WELL MW-6A DETAIL
NIAGARA MOHAWK RIGHT-OF-WAY

MALCOLM PIRNIE

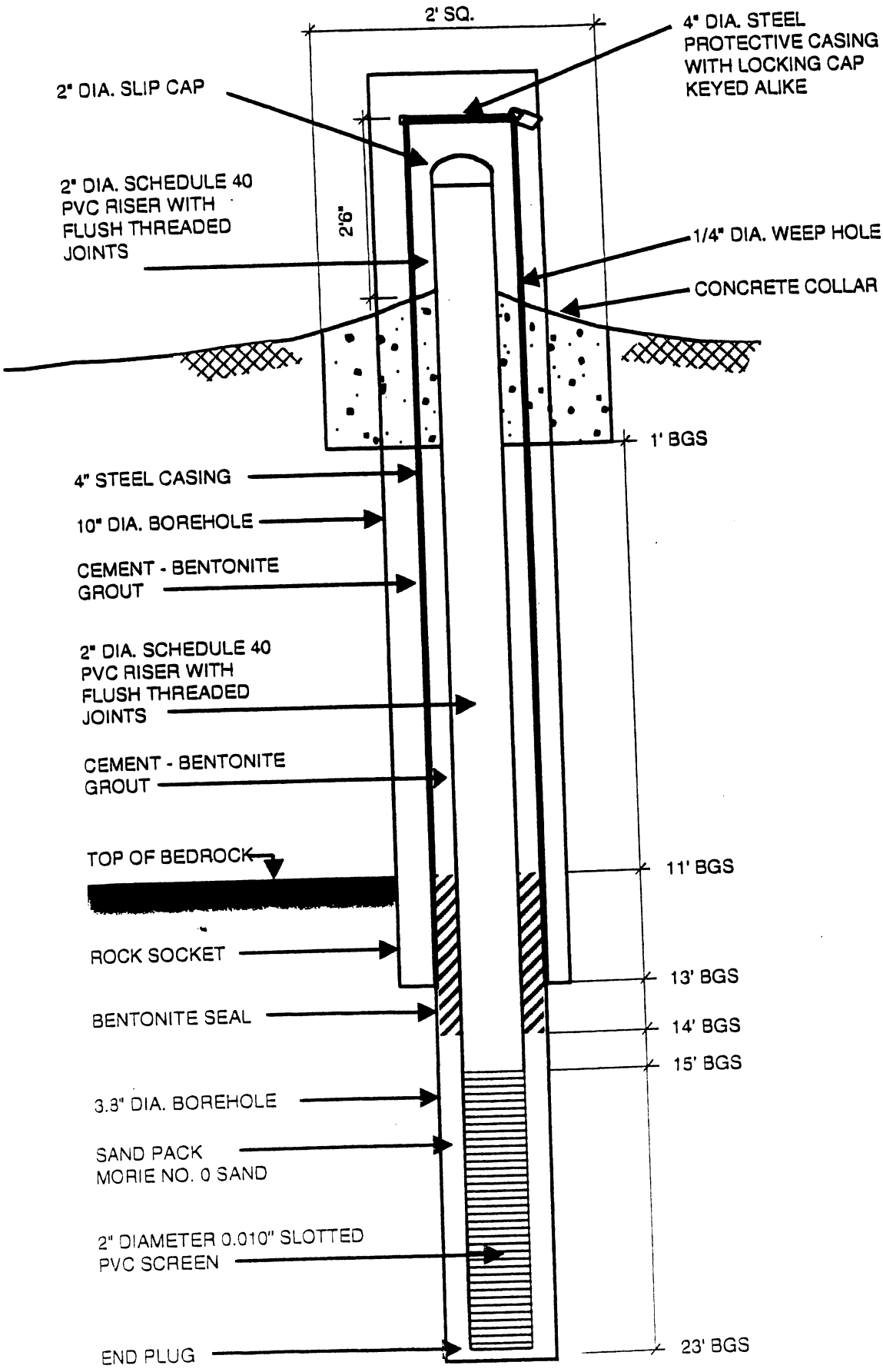


FIGURE B-2
MONITORING WELL MW-6B DETAIL
NIAGARA MOHAWK RIGHT-OF-WAY

MALCOLM PIRNIE

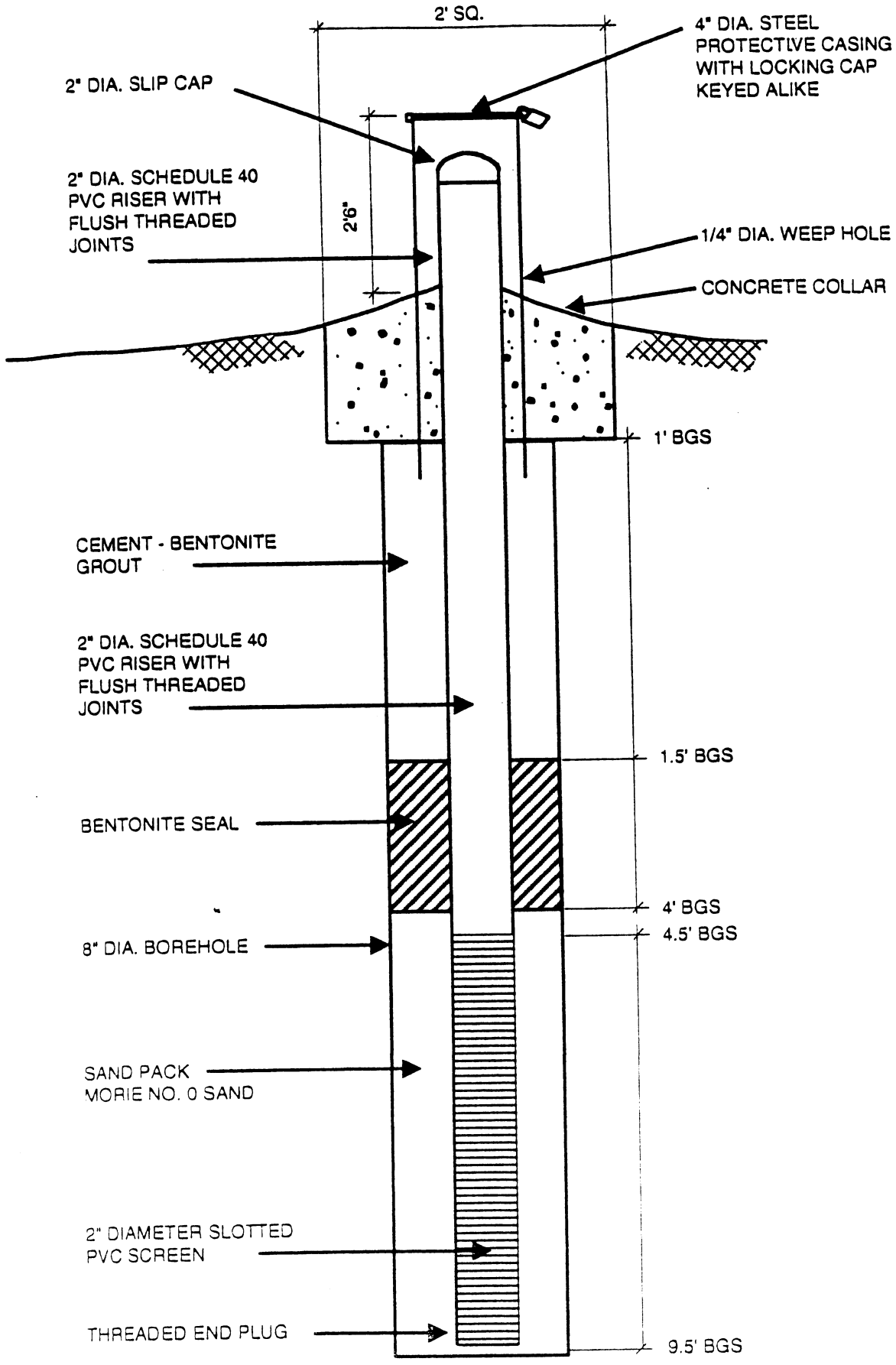


FIGURE B-3
MONITORING WELL MW-7A DETAIL
NIAGARA MOHAWK RIGHT-OF-WAY

MALCOLM PIRNIE

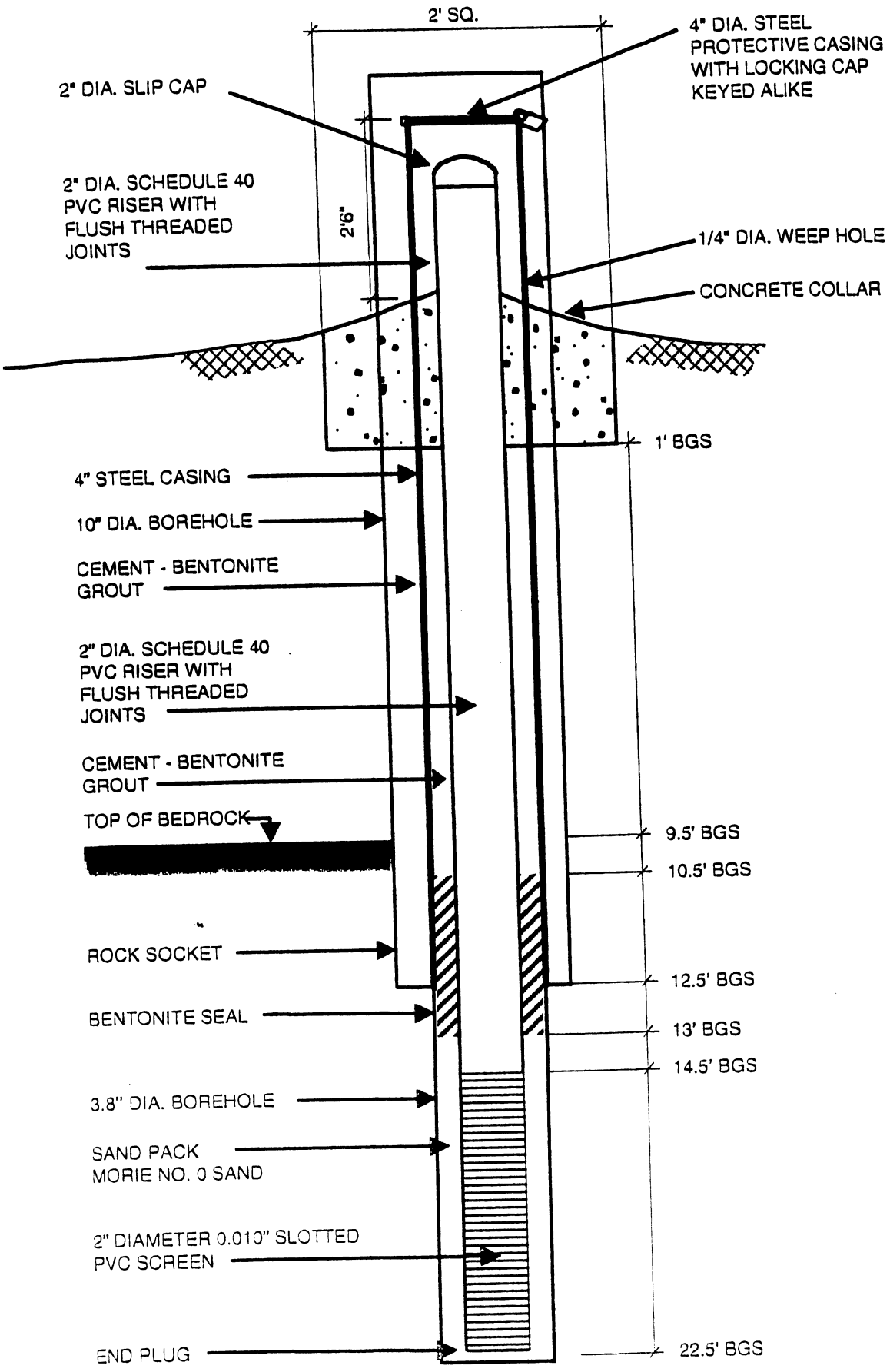


FIGURE B-4
MONITORING WELL MW-7B DETAIL
NIAGARA MOHAWK RIGHT-OF-WAY

MALCOLM PIRNIE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: PHASE I RFI
PROJECT NUMBER: 19867-00
CLIENT: Vanadium Corporation of America
LOCATION: Niagra Falls, New York

HOLE DESIGNATION: BH-12
DATE COMPLETED: July 23, 2003
DRILLING METHOD: 4 1/4 Inch HSA
FIELD PERSONNEL: P. Kryger / C. Simmons

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	Borehole	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOPSOIL - silty material with roots and other organics, non-plastic, slightly cohesive, dark brown, dry, no odor	0.50	8" ∅ Borehole	1		50	10
2	SLAG (FILL) - silt sized particles, fine to coarse grained, non-cohesive, yellow to gray, dry, no odor	2.00		2		29	>50
	FILL - silt to sand sized grains, with clayey silt inclusions, trace fine gravel, dark brown with trace yellow coloring, trace slightly metallic silt	4.00		3		25	43
4	SLAG (FILL) - fine to coarse grained, non-cohesive, medium to dark gray, dry						
6		6.50	Bentonite	4		75	57
	FILL - fine grained, poorly graded, non-cohesive, medium brown, dry, no odor						
8	- silt to coarse gravel sized particles, non-cohesive, dry, fracturing like a shale at 6.8ft BGS			5		46	>50
	- silt with sand, trace fine gravel, non-cohesive, medium brown, very slightly damp at 7.2ft BGS						
10	- trace clay, light to medium brown, very slightly moist, no odor, with pieces of rock at 8.0ft BGS	10.00		6		25	>50
12	END OF BOREHOLE @ 10.0ft BGS						
	Refusal at 10 ft bgs.						
14							
16							
18							
20							
22							
24							
26							
28							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ 7/23/2003
CHEMICAL ANALYSIS ( )

OVERBURDEN LOG 19867.GPJ CRA_CORP.GDT 4/15/05

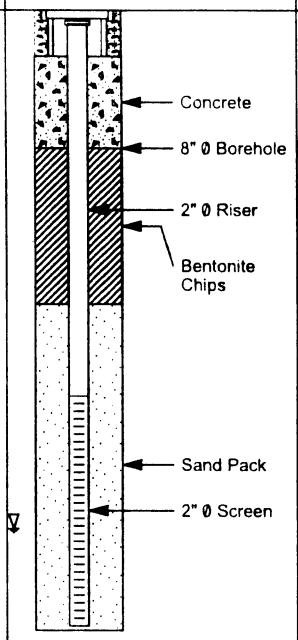
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: PHASE I RFI
PROJECT NUMBER: 19867-00
CLIENT: Vanadium Corporation of America
LOCATION: Niagara Falls, New York

HOLE DESIGNATION: MW-15
DATE COMPLETED: July 24, 2003
DRILLING METHOD: 4 1/4 Inch HSA
FIELD PERSONNEL: P. Kryger/ C. Simmons

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL
	TOP OF CASING	601.51
	GROUND SURFACE	601.35
	TOP OF RISER	601.19
0	CL - SILTY CLAY - trace sand and gravel, non-cohesive, medium brown, slightly moist, no odor, trace organics	
2	- no trace sand or gravel, slightly plastic, cohesive, light to medium brown at 0.5ft BGS	
4	CL - SILTY CLAY - slightly plastic, cohesive, medium to reddish brown with gray mottling, very slightly moist, no odor	597.35
6	CL - CLAY - plastic, cohesive, light to medium reddish brown with gray mottling, slightly moist, no odor, malleable	595.35
8		
10	- very plastic, trace organics at 10.0ft BGS	
12	CH - SANDY CLAY - with gravel, plastic, cohesive, medium brown with gray mottling, very moist, no odor	590.05
	- wet at 12.0ft BGS	
14	- with fractured bedrock, dark brown, non-plastic, non-cohesive at 12.5ft BGS	587.35
	END OF BOREHOLE @ 14.0ft BGS	
16		
18		
20		
22		
24		
26		
28		

Monitoring Well



WELL DETAILS
Screened interval:
592.95 to 587.95ft AMSL
8.40 to 13.40ft BGS
Length: 5ft
Diameter: 2in
Slot Size: 10
Material: PVC
Seal:
598.35 to 594.95ft AMSL
3.00 to 6.40ft BGS
Material: Bentonite Chips
Sand Pack:
594.95 to 587.85ft AMSL
6.40 to 13.50ft BGS
Material: #2 Sand

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
1		42	7
2		50	29
3		100	14
4		100	22
5		33	3
6		100	7
7		50	28

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND @ 07/24/2003
CHEMICAL ANALYSIS

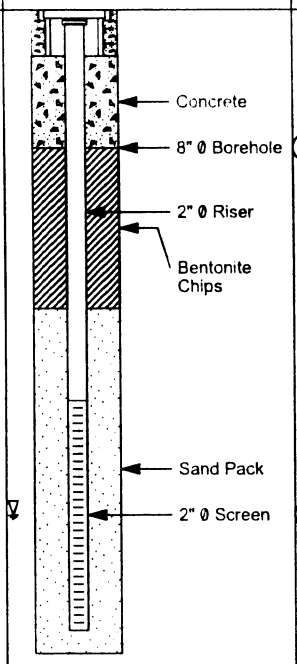
SOIL BORE LOG 19867 BH AND MW.GPJ CRA_CORP.GDT 7/15/04

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: PHASE I RFI
PROJECT NUMBER: 19867-00
CLIENT: Vanadium Corporation of America
LOCATION: Niagara Falls, New York

HOLE DESIGNATION: MW-16
DATE COMPLETED: July 23, 2003
DRILLING METHOD: 4 1/4 Inch HSA
FIELD PERSONNEL: P. Kryger

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL
	TOP OF CASING	601.06
	GROUND SURFACE	600.94
	TOP OF RISER	600.09
0	TOPSOIL - clay with silt, trace fine gravel, plastic, medium brown, very slightly moist, no odor, trace organics	
2	CL - SILTY CLAY - trace very fine gravel, slightly plastic, cohesive, light to medium brown with gray mottling, dry, no odor	598.94
4	CL - CLAY - with silt, very slightly plastic, cohesive, light to medium brown with light beige to gray mottling, very slightly moist, no odor - slight plasticity at 6.0ft BGS	596.94
6		
8	- slighly moist at 7.5ft BGS - trace silt, trace gray mottling at 8.0ft BGS	
10	- moist at 9.5ft BGS	
12	CH - CLAY - plastic, cohesive, medium reddish brown with trace faint mottling, moist, no odor - with bedrock pieces at 12.3ft BGS	590.44
14	END OF BOREHOLE @ 14.0ft BGS	586.94
16		
18		
20		
22		
24		
26		
28		



WELL DETAILS
Screened interval:
592.44 to 587.44ft AMSL
8.50 to 13.50ft BGS
Length: 5ft
Diameter: 2in
Slot Size: 10
Material: PVC
Seal:
597.94 to 594.44ft AMSL
3.00 to 6.50ft BGS
Material: Bentonite Chips
Sand Pack:
594.44 to 586.94ft AMSL
6.50 to 14.00ft BGS
Material: #2 Sand

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
1		25	6
2		37.5	10
3		83	12
4		87.5	20
5		83	8
6		75	8
7		42	26

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽
CHEMICAL ANALYSIS

OVERBURDEN LOG 19867 BH AND MW GPJ CRA_CORP.GDT 7/18/04

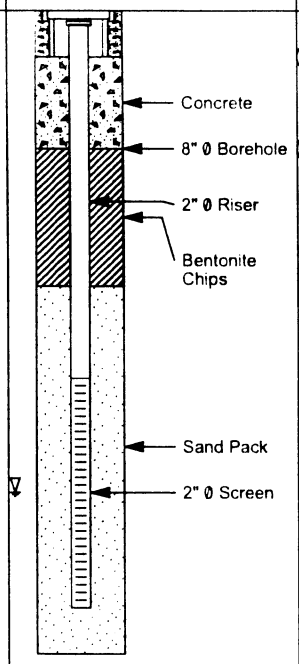
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: PHASE I RFI
PROJECT NUMBER: 19867-00
CLIENT: Vanadium Corporation of America
LOCATION: Niagara Falls, New York

HOLE DESIGNATION: MW-17
DATE COMPLETED: August 20, 2003
DRILLING METHOD: 4 1/4 Inch HSA
FIELD PERSONNEL: C. Simmons

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL
	TOP OF CASING	601.69
	GROUND SURFACE	601.68
	TOP OF RISER	601.01
0	FILL - silty clay, trace fine gravel, low plasticity, cohesive, medium brown with gray mottling, dry, no odor, trace organics	
4	CL - SILTY CLAY - slightly plastic, cohesive, medium brown with gray mottling, very slightly moist, no odor	597.68
6	- slightly moist at 7.2ft BGS	
10	- plastic, very moist at 10.6ft BGS	
12	- wet at 12.0ft BGS - with rounded rock fragments that are coarse gravel in size at 12.6ft BGS	
14	END OF BOREHOLE @ 14.0ft BGS	587.68

Monitoring Well



WELL DETAILS
Screened interval:
593.68 to 588.68ft AMSL
8.00 to 13.00ft BGS
Length: 5ft
Diameter: 2in
Slot Size: 10
Material: PVC
Seal:
598.68 to 595.68ft AMSL
3.00 to 6.00ft BGS
Material: Bentonite Chips
Sand Pack:
595.68 to 587.68ft AMSL
6.00 to 14.00ft BGS
Material: #2 Sand

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
1		17	7
2		25	26
3		50	22
4		83	28
5		75	13
6		58	14
7		92	9

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE. REFER TO CURRENT ELEVATION TABLE
WATER FOUND @ 08/20/2003
LABORATORY ANALYSIS

...BOREHOLE LOGS 19867 BH AND MW.GPJ CRA_CORP.GDT 7/15/04

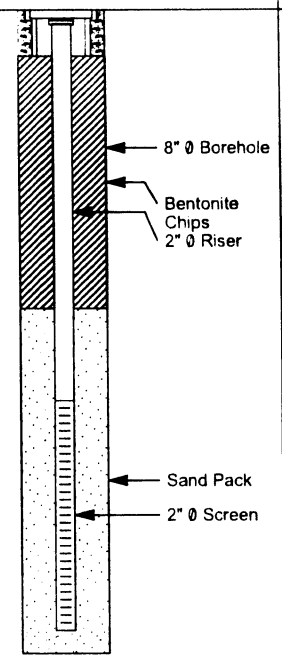
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: PHASE I RFI
PROJECT NUMBER: 19867-00
CLIENT: Vanadium Corporation of America
LOCATION: Niagara Falls, New York

HOLE DESIGNATION: MW-18
DATE COMPLETED: July 28, 2003
DRILLING METHOD: 4 1/4 Inch HSA
FIELD PERSONNEL: J. Raby

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL
	TOP OF CASING	613.02
	GROUND SURFACE	612.94
	TOP OF RISER	611.98
0	TOPSOIL	612.34
	SLAG (FILL)	
14	CL - CLAY	599.94
	END OF BOREHOLE @ 14.0ft BGS	598.94

Monitoring Well



WELL DETAILS
Screened interval:
604.44 to 599.44ft AMSL
8.50 to 13.50ft BGS
Length: 5ft
Diameter: 2in
Slot Size: 10
Material: PVC
Seal:
611.94 to 606.44ft AMSL
1.00 to 6.50ft BGS
Material: Bentonite Chips
Sand Pack:
606.44 to 598.94ft AMSL
6.50 to 14.00ft BGS
Material: #2 Sand

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
1		45	27
2		10	20
3		15	7
4		15	>50
5		10	11
6		55	19
7		40	13

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 19867 BH AND MW.GPJ CRA_CORP.GDT 7/1/04

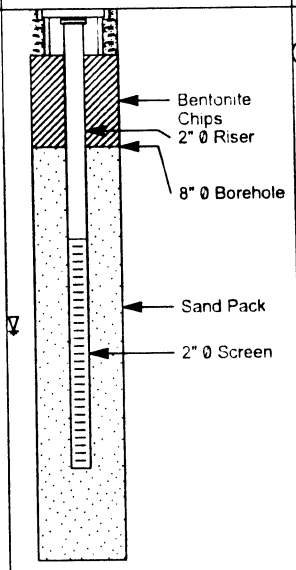
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: PHASE I RFI
PROJECT NUMBER: 19867-00
CLIENT: Vanadium Corporation of America
LOCATION: Niagara Falls, New York

HOLE DESIGNATION: MW-19
DATE COMPLETED: July 23, 2003
DRILLING METHOD: 4 1/4 Inch HSA
FIELD PERSONNEL: P. Kryger/ C. Simmons

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL
	TOP OF CASING	605.63
	GROUND SURFACE	605.50
	TOP OF RISER	605.39
0	TOPSOIL - with slag and sand sized grains, trace gravel, non-cohesive, medium brown to gray, dry, no odor, with organics	605.25
2	SLAG (FILL) - sand sized with graved sized particles, non-cohesive, light to medium bray with trace brown, dry, no odor	
4	- becomes wet at 3.8ft BGS	601.50
	CL - SILTY CLAY - trace fine gravel, non-plastic, cohesive, gray, very slightly moist, trace organics	600.50
6	CL - CLAY - trace silt, non-plastic, cohesive, medium brown to gray, dry, no odor	
8	- medium brown with trace gray mottling, moist to slightly wet (more moisture from 9 to 10 ft), slightly pliable at 8.0ft BGS	
10	- trace fine gravel, medium to reddish brown with trace gray to light beige mottling, moist, pliable at 10.8ft BGS	
12	END OF BOREHOLE @ 12.0ft BGS	593.50
14		
16		
18		
20		
22		
24		
26		
28		

Monitoring Well



WELL DETAILS
Screened interval:
600.50 to 595.50ft AMSL
5.00 to 10.00ft BGS
Length: 5ft
Diameter: 2in
Slot Size: 10
Material: PVC
Seal:
604.50 to 602.50ft AMSL
1.00 to 3.00ft BGS
Material: Bentonite Chips
Sand Pack:
602.50 to 593.50ft AMSL
3.00 to 12.00ft BGS
Material: #2 Sand

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
1		79	43
2		100	50
3		100	42
4		12.5	>50
5		67	26
6		100	13

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ 07/23/2003
CHEMICAL ANALYSIS

I:\GRAPHICS\LOGS\19867 BH AND MW GPJ CRA_CORP.GDT 7/18/04

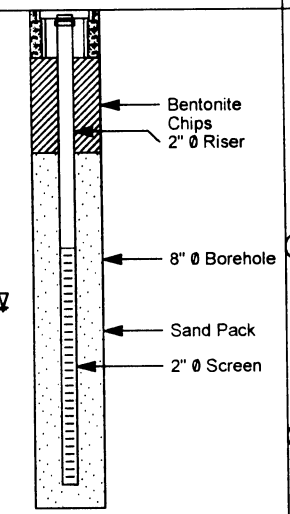
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: PHASE I RFI
PROJECT NUMBER: 19867-00
CLIENT: Vanadium Corporation of America
LOCATION: Niagra Falls, New York

HOLE DESIGNATION: MW-20
DATE COMPLETED: July 25, 2003
DRILLING METHOD: 4 1/4 Inch HSA
FIELD PERSONNEL: P. Kryger

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL
	TOP OF CASING	607.38
	GROUND SURFACE	607.32
	TOP OF RISER	607.17
0	FILL - sand and gravel, with slag, well graded, non-cohesive, medium brown and gray, dry, no odor	
2	FILL - silt, with sand and gravel, trace clay, pieces of slag throughout, non-cohesive, light to medium brown with some gray, dry, no odor	605.32
4	- trace clay, sand, and fine gravel, slightly cohesive, non-plastic, medium reddish brown changing to dark gray to black at base of return, dry, no odor at 4.5ft BGS	
6	- wet at 6.0ft BGS	601.07
8	CL - CLAY - with silt, trace sand, slight plasticity, stiff, medium brown, wet at contact with above silt layer - trace silt, plastic, cohesive, medium to reddish brown, moist, no odor, malleable at 8.0ft BGS	
10	END OF BOREHOLE @ 10.0ft BGS	597.32
12		
14		
16		
18		
20		
22		
24		
26		
28		

Monitoring Well



WELL DETAILS
Screened interval:
602.32 to 597.32ft AMSL
5.00 to 10.00ft BGS
Length: 5ft
Diameter: 2in
Slot Size: 10
Material: PVC
Seal:
606.32 to 604.32ft AMSL
1.00 to 3.00ft BGS
Material: Bentonite Chips
Sand Pack:
604.32 to 596.82ft AMSL
3.00 to 10.50ft BGS
Material: #2 Sand

SAMPLE

NUMBER	INTERVAL	REC (%)	'N' VALUE
1		37.5	22
2		79	19
3		75	83
4		50	32
5		50	23

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ 7/25/2003
CHEMICAL ANALYSIS ( )

OVERBURDEN LOG 19867.GPJ CRA_CORP.GDT 4/15/05

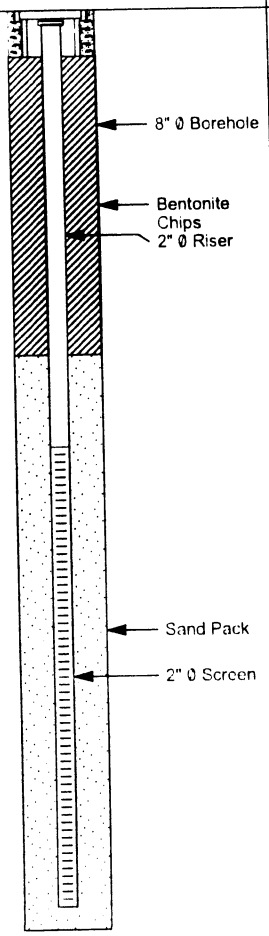
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: PHASE I RFI
PROJECT NUMBER: 19867-00
CLIENT: Vanadium Corporation of America
LOCATION: Niagara Falls, New York

HOLE DESIGNATION: MW-21
DATE COMPLETED: July 28, 2003
DRILLING METHOD: 4 1/4 Inch HSA
FIELD PERSONNEL: J. Raby

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL
	TOP OF CASING	620.02
	GROUND SURFACE	619.97
	TOP OF RISER	619.50
0	TOPSOIL	619.77
	FILL - silt with slag, with clay and coarse sand, non-plastic, light gray, dry	
20	CL - CLAY	600.47
	END OF BOREHOLE @ 20.0ft BGS	599.97

Monitoring Well



WELL DETAILS
Screened interval:
610.47 to 600.47ft AMSL
9.50 to 19.50ft BGS
Length: 10ft
Diameter: 2in
Slot Size: 10
Material: PVC
Seal:
618.97 to 612.47ft AMSL
1.00 to 7.50ft BGS
Material: Bentonite Chips
Sand Pack:
612.47 to 599.97ft AMSL
7.50 to 20.00ft BGS
Material: #2 Sand

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
1		35	31
2		55	24
3		65	15
4		90	17
5		65	51
6		45	37
7		50	18
8		30	>50
9		40	>50
10		30	16

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE: REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 19867 BH AND MW.GPJ CRA_CORP.GDT 7/17/04

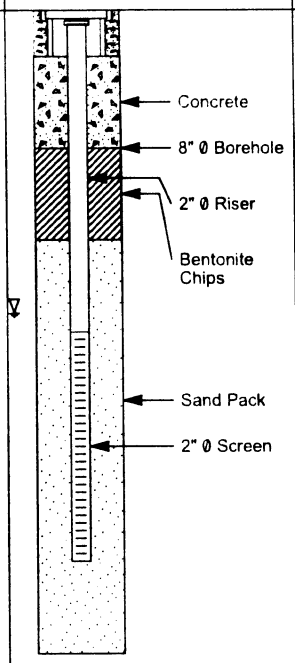
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: PHASE I RFI
PROJECT NUMBER: 19867-00
CLIENT: Vanadium Corporation of America
LOCATION: Niagara Falls, New York

HOLE DESIGNATION: MW-22
DATE COMPLETED: July 22, 2003
DRILLING METHOD: 4 1/4 Inch HSA
FIELD PERSONNEL: P. Kryger/ C. Simmons

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL
	TOP OF CASING GROUND SURFACE TOP OF RISER	606.54 606.45 605.53
0	FILL - silt sized particles, non-plastic, non-cohesive, dark brown to gray, no odor, metallic grains	605.95
2	SLAG (FILL) - gravel sized, non-plastic, cohesive, gray, dry, no odor	
4	- silt sized particles, fine grained, poorly graded, with trace gravel sized particles, non-cohesive at 4.0ft BGS	
6	- trace clay, saturated at 6.0ft BGS	
8		597.75
10	CL - SILTY CLAY - trace gravel and pebbles, plastic, cohesive, dark brown, saturated - trace fine gravel, medium to dark brown with gray mottling, saturated, no odor at 10.0ft BGS	
12	- non-plastic, cohesive, medium to reddish brown with gray mottling, slightly moist at 13.0ft BGS	
14		
16	END OF BOREHOLE @ 16.0ft BGS	590.45
18		
20		
22		
24		
26		
28		

Monitoring Well



WELL DETAILS
Screened interval:
599.45 to 594.45ft AMSL
7.00 to 12.00ft BGS
Length: 5ft
Diameter: 2in
Slot Size: 10
Material: PVC
Seal:
603.45 to 601.45ft AMSL
3.00 to 5.00ft BGS
Material: Bentonite Chips
Sand Pack:
601.45 to 592.45ft AMSL
5.00 to 14.00ft BGS
Material: #2 Sand

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
1		42	12
2		71	40
3		87.5	43
4		71	31
5		50	8
6		50	6
7		87.5	25
8		58	18

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ 6/23/03
CHEMICAL ANALYSIS

C:\BORINGS\19867 BH AND MW\GPJ CRA_CORP.GDT 7/15/03

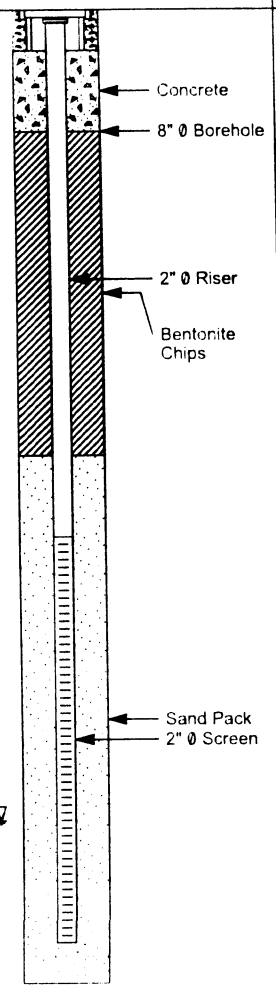
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: PHASE I RFI
PROJECT NUMBER: 19867-00
CLIENT: Vanadium Corporation of America
LOCATION: Niagara Falls, New York

HOLE DESIGNATION: MW-23
DATE COMPLETED: July 25, 2003
DRILLING METHOD: 4 1/4 Inch HSA
FIELD PERSONNEL: P. Kryger

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL
	TOP OF CASING	620.09
	GROUND SURFACE	619.88
	TOP OF RISER	619.74
0	TOPSOIL - clay with silt, with abundant organic matter, non-cohesive, dry, no odor	619.78
2	FILL - clay, with silt, trace sand and fine gravel, trace organics, soft to firm, very dry, no odor	617.38
4	FILL - slag, non-cohesive, light to medim gray, dry, no odor, breaks into coarse gravel sized particles, porous	
6	- slight moist at 5.5ft BGS	
8		
10	- slightly finer grained when broken up at 10.0ft BGS	
12		
14		
16		
18		
20	- moist at 19.5ft BGS - wet at 20.0ft BGS	
22	- saturated at 22.0ft BGS	597.63
24	CL - CLAY - cohesive, stiff, medium to reddish brown, wet, no odor, pliable	595.88
26	END OF BOREHOLE @ 24.0ft BGS	
28		
30		
32		

Monitoring Well



WELL DETAILS
Screened Interval:
606.88 to 596.88ft AMSL
13.00 to 23.00ft BGS
Length: 10ft
Diameter: 2in
Slot Size: 10
Material: PVC
Seal:
616.88 to 608.88ft AMSL
3.00 to 11.00ft BGS
Material: Bentonite Chips
Sand Pack:
608.88 to 595.88ft AMSL
11.00 to 24.00ft BGS
Material: #2 Sand

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
1		33	12
2		58	37
3		100	27
4		75	48
5		83	48
6		50	44
7		67	50
8		67	67
9		42	26
10		75	70
11		17	12
12		100	28

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND @ 07/25/2003
CHEMICAL ANALYSIS

...\19867 BH AND MW.GPJ CRA_CORP.GDT 7/13/04

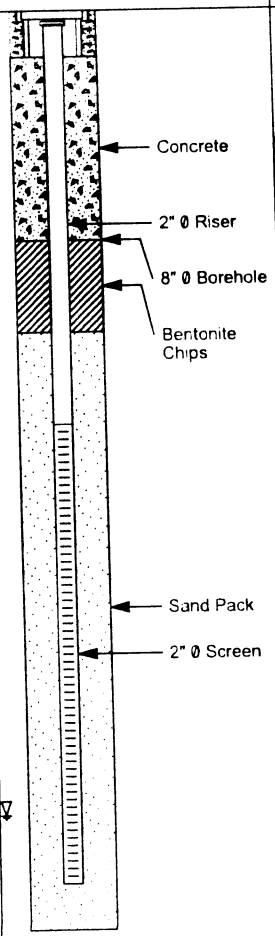
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: PHASE I RFI
PROJECT NUMBER: 19867-00
CLIENT: Vanadium Corporation of America
LOCATION: Niagara Falls, New York

HOLE DESIGNATION: MW-24
DATE COMPLETED: July 28, 2003
DRILLING METHOD: 4 1/4 Inch HSA
FIELD PERSONNEL: J. Raby

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL
	TOP OF CASING	618.48
	GROUND SURFACE	618.41
	TOP OF RISER	617.58
0	TOPSOIL	
		616.41
2	FILL - silt with clay and coarse sand sized particles, with slag, non-plastic, light gray, dry	
10	- slightly moist at 10.0ft BGS	
12	- with clay, with slag at 12.0ft BGS	
18	CL - CLAY - trace silt, plastic, brown to brownish-green, dry, some vegetative matter	600.71
		598.41
20	END OF BOREHOLE @ 20.0ft BGS	

Monitoring Well



WELL DETAILS
Screened Interval:
609.41 to 599.41ft AMSL
9.00 to 19.00ft BGS
Length: 10ft
Diameter: 2in
Slot Size: 10
Material: PVC
Seal:
613.41 to 611.41ft AMSL
5.00 to 7.00ft BGS
Material: Bentonite Chips
Sand Pack:
611.41 to 598.41ft AMSL
7.00 to 20.00ft BGS
Material: #2 Sand

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
1		40	16
2		80	>50
3		90	38
4		90	35
5		100	59
6		55	>50
7		90	18
8		85	14
9		20	18
10		50	12

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE: REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ 07/28/2003
CHEMICAL ANALYSIS

...EN LOG 19867 BH AND MW.GPJ CRA_CORP.GDT 7/15/04

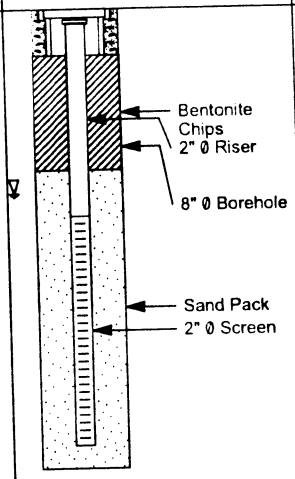
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: PHASE I RFI
PROJECT NUMBER: 19867-00
CLIENT: Vanadium Corporation of America
LOCATION: Niagara Falls, New York

HOLE DESIGNATION: MW-25
DATE COMPLETED: July 23, 2003
DRILLING METHOD: 4 1/4 Inch HSA
FIELD PERSONNEL: P. Kryger/ C. Simmons

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL
	TOP OF CASING	606.05
	GROUND SURFACE	605.96
	TOP OF RISER	605.31
0	FILL - silty clay, trace fine gravel, non-plastic, cohesive, dry, no odor, some gray fine to coarse grained gray slag, some organic matter	
		603.96
2	SLAG (FILL) - sand to fine gravel sized particles, non-cohesive, moist, no odor, slight metallic sheen at base of slag	603.66
	FILL - silty clay, trace fine to coarse grained gravel, dark brown, slightly moist, no odor, trace organics	601.96
4	CL - SILTY CLAY - trace sand and gravel, high plasticity, slightly cohesive, dark gray to brown, saturated, no odor, trace organics	
6	- cohesive, dark brown, at 5.1ft BGS	599.16
	CL - CLAY - trace silt, slightly plastic, cohesive, dark brown, saturated	
8	- trace fine gravel, no silt, with gray mottling, slightly moist, no odor at 8.0ft BGS	
		595.96
10	END OF BOREHOLE @ 10.0ft BGS	
12		
14		
16		
18		
20		
22		
24		
26		
28		

Monitoring Well



WELL DETAILS
Screened interval:
601.46 to 596.46ft AMSL
4.50 to 9.50ft BGS
Length: 5ft
Diameter: 2in
Slot Size: 10
Material: PVC
Seal:
604.96 to 602.46ft AMSL
1.00 to 3.50ft BGS
Material: Bentonite Chips
Sand Pack:
602.46 to 595.96ft AMSL
3.50 to 10.00ft BGS
Material: #2 Sand

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
1		29	5
2		54	37
3		71	WOH
4		71	6
5		92	20

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND @ 07/23/2003
CHEMICAL UNITS: (S)

FIGURE LOG 19867 BH AND MW.GPJ CRA_CORP.GDT 7/15/04

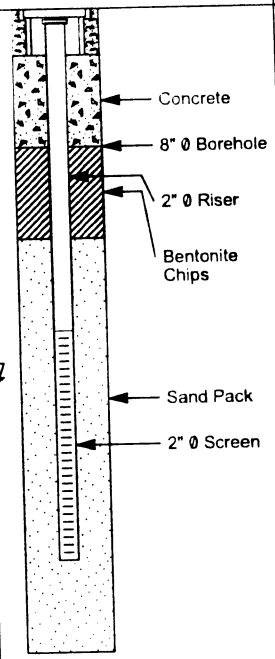
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: PHASE I RFI
PROJECT NUMBER: 19867-00
CLIENT: Vanadium Corporation of America
LOCATION: Niagara Falls, New York

HOLE DESIGNATION: MW-26
DATE COMPLETED: July 23, 2003
DRILLING METHOD: 4 1/4 Inch HSA
FIELD PERSONNEL: P. Kryger

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL
	TOP OF CASING	614.54
	GROUND SURFACE	614.38
	TOP OF RISER	614.33
0	TOPSOIL (FILL) - fine grained, poorly graded, with silt and sand, trace fine gravel, non-cohesive, medium brown, dry, no odor, abundant roots and organics	
2	FILL - very fine silt and sand with large gravel pieces, with light gray porous slag, dry	612.38
4	- sand to fine gravel sized particles, trace silt, non-cohesive, dark brown, very slightly moist, no odor at 4.0ft BGS - fine grained, medium to dark gray at 4.2ft BGS	
6		
8	CL - SILTY CLAY - trace fine gravel, medium to dark brown, moist, no odor, malleable, ductile, pliable	606.18
10	- with large pieces of broken rock, with abundant fine gravel at 10.0ft BGS	
12		601.48
	END OF BOREHOLE @ 12.9ft BGS Refusal at 12.9 ft bgs.	
14		
16		
18		
20		
22		
24		
26		
28		

Monitoring Well



WELL DETAILS
Screened interval:
607.38 to 602.38ft AMSL
7.00 to 12.00ft BGS
Length: 5ft
Diameter: 2in
Slot Size: 10
Material: PVC
Seal:
611.38 to 609.38ft AMSL
3.00 to 5.00ft BGS
Material: Bentonite Chips
Sand Pack:
609.38 to 602.38ft AMSL
5.00 to 12.00ft BGS
Material: #2 Sand

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
1		25	17
2		25	30
3		17	15
4		37.5	18
5		50	10
6		54	26
7		8	>50

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE: REFER TO CURRENT ELEVATION TABLE
WATER FOUND @ 07/23/2003
CHEMICAL ANALYSIS:

GDTEMPLATE 19867 BH AND MW GP1 CRA CORP.GDT 7/15/04

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: PHASE I RFI
PROJECT NUMBER: 19867-00
CLIENT: Vanadium Corporation of America
LOCATION: Niagara Falls, New York

HOLE DESIGNATION: MW-27
DATE COMPLETED: July 29, 2003
DRILLING METHOD: 4 1/4 Inch HSA
FIELD PERSONNEL: J. Raby/ C. Simmons

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING GROUND SURFACE TOP OF RISER	607.02 606.72 606.19					
0	FILL - silt-sized particles, trace fine gravel, slightly plastic, medium to dark brown, dry, no odor	605.62	Bentonite Chips 2" Ø Riser	1		62.5	8
2	SLAG (FILL) - with silt to fine gravel-sized particles, non-plastic, gray, dry, no odor - light brown mottling at 2.0ft BGS		8" Ø Borehole	2		67	7
4	- slightly moist at 4.0ft BGS		Sand Pack 2" Ø Screen	3		12.5	7
6	- saturated at 6.0ft BGS	600.22		4		83	13
8	CL - SILTY CLAY - plastic, cohesive, dark brown, moist, no odor - medium to dark brown, less moisture at 7.6ft BGS			5		83	25
10	END OF BOREHOLE @ 10.0ft BGS	596.72					
12							
14							
16							
18							
20							
22							
24							
26							
28							

WELL DETAILS
Screened interval:
603.72 to 598.72ft AMSL
3.00 to 8.00ft BGS
Length: 5ft
Diameter: 2in
Slot Size: 10
Material: PVC
Seal:
605.72 to 604.72ft AMSL
1.00 to 2.00ft BGS
Material: Bentonite Chips
Sand Pack:
604.72 to 597.72ft AMSL
2.00 to 9.00ft BGS
Material: #2 Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ 07/29/2003

...GEN LOG 19867 BH AND MW GPJ CRA_CORP.GDT 7/15/04

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: PHASE I RFI
PROJECT NUMBER: 19867-00
CLIENT: Vanadium Corporation of America
LOCATION: Niagara Falls, New York

HOLE DESIGNATION: MW-28
DATE COMPLETED: July 29, 2003
DRILLING METHOD: 4 1/4 Inch HSA
FIELD PERSONNEL: J. Raby/ C. Simmons

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING GROUND SURFACE TOP OF RISER	606.22 606.16 605.96					
0	CL - SILTY CLAY (FILL) - with trace vegetative matter, moderately plastic, medium to dark brown, dry, no odor	605.66	Bentonite Chips 2" Ø Riser	1		62.5	14
2	SLAG (FILL) - silt-sized particles with fine grained gravel, non-plastic, gray with brown mottling, dry, no odor		8" Ø Borehole	2		46	54
4			Sand Pack 2" Ø Screen	3		0	13
6	FILL - silty clay, trace slag, plastic, medium to dark brown, very slightly moist, no odor	601.16		4		75	20
8	CL - CLAY - trace silt, plastic, gray to light brown, slightly moist, no odor	599.46		5		75	7
10	END OF BOREHOLE @ 10.0ft BGS	596.16					
12							
14							
16							
18							
20							
22							
24							
26							
28							

WELL DETAILS
Screened interval:
603.16 to 598.16ft AMSL
3.00 to 8.00ft BGS
Length: 5ft
Diameter: 2in
Slot Size: 10
Material: PVC
Seal:
605.16 to 604.16ft AMSL
1.00 to 2.00ft BGS
Material: Bentonite Chips
Sand Pack:
604.16 to 597.66ft AMSL
2.00 to 8.50ft BGS
Material: #2 Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

LOG IN DEN LOG 19867 BH AND MW.GPJ CRA_CORP.GDT 7/13/04

Thursday November 4, 1996

Weather: Sunny with some clouds, cold, temp. strong wind (gusts to 20 mph) from the west.

0915 Arrived on site. The drillers are preparing to begin construction of MW-2B while Mike has located the rest of the borings.

0945 Began developing the MW-5 cluster.

1235 The wells in clusters 3, 4, and 5 have now been developed. Well MW-2B is essentially constructed; the borehole was taking grout so the drillers decided to let the grout set up before completing the well. The drillers have filled the water tank and eaten lunch. We will begin the borings this afternoon.

1325 Boring SB-1 begins. Sample collected from 0'-2' BGS. Count is 3-4-4-6. Brown soil with root fragments. SB-1 (0.9'). Slag (small particles) at the bottom of the sample (Waste)

1328 Sample collected from 2'-4' BGS. Count is 2-2-22-7. White lime-like material, sand to gravel size pieces. 0.1' of reddish brown silty clay (in shoe), yellow mottling. Augered to 4' depth. Waste is dry.

1339 Sample collected from 4'-6' BGS. Count is 44-14-10-14. Waste. Black silty clay with white crystals, fine slag, graphite appearance. Moist. Reddish brown silty ~~clay~~, rock fragments, moist at bottom. Sample to lab

1345 Sample collected from 6'-8' BGS. Count is 35-45-42-33. Only 0.2' recovery - most likely fell in. Augered to depth.

1400 Sample collected from 8'-10' depth. Counter Reddish brown silty clay matrix with large rock fragments. Wet at the bottom. Brow brown fine sand. Native. Augered to depth

1410 Sample collected from 10'-12' depth. Counter Dolostone fragments with clay to silt sized fragments range from gravel to pebble in si

1420 Sample collected from 4'-6' depth. O 3.5 ppm was noted on the OVA.

Bentonite pellets will be put on the bottom borehole to seal the top of rock.

1450 Boring SB-2 begins. Sample collecte 0'-2' depth. Count is 2-14-22-14. The up the white lime-like fill material (wet due water). 0.5' of the fill material mixed with brown silty clay. The bottom 0.5' is the sub like material. Fine gravel to pebble sized

SB-2

1500 Sample collected from 2'-4' depth. Count is Sample same as above, saturated, sand to size fragments. Waste. Augered to depth

1510 Sample collected from 4'-6' depth. Count is White lime-like fill material, gravel size fragme turns light brown (with roots) above native. silty clay, roots, mottled, moist. Sample

1515 Sample collected from 6'-8' depth. Count Reddish brown silty clay, massive, moist, Sample collected.

1525 The drillers are cleaning the sampling

DRILLING LOG FOR _____

Project Name _____

Site Location _____

_____

Date Started/Finished _____

Drilling Company _____

Driller's Name _____

Geologist's Name _____

Geologist's Signature _____

Rig Type (s) _____

Drilling Method (s) _____

Bit Size (s) _____ Auger Size (s) _____

Auger/Split Spoon Refusal _____

Total Depth of Borehole Is _____

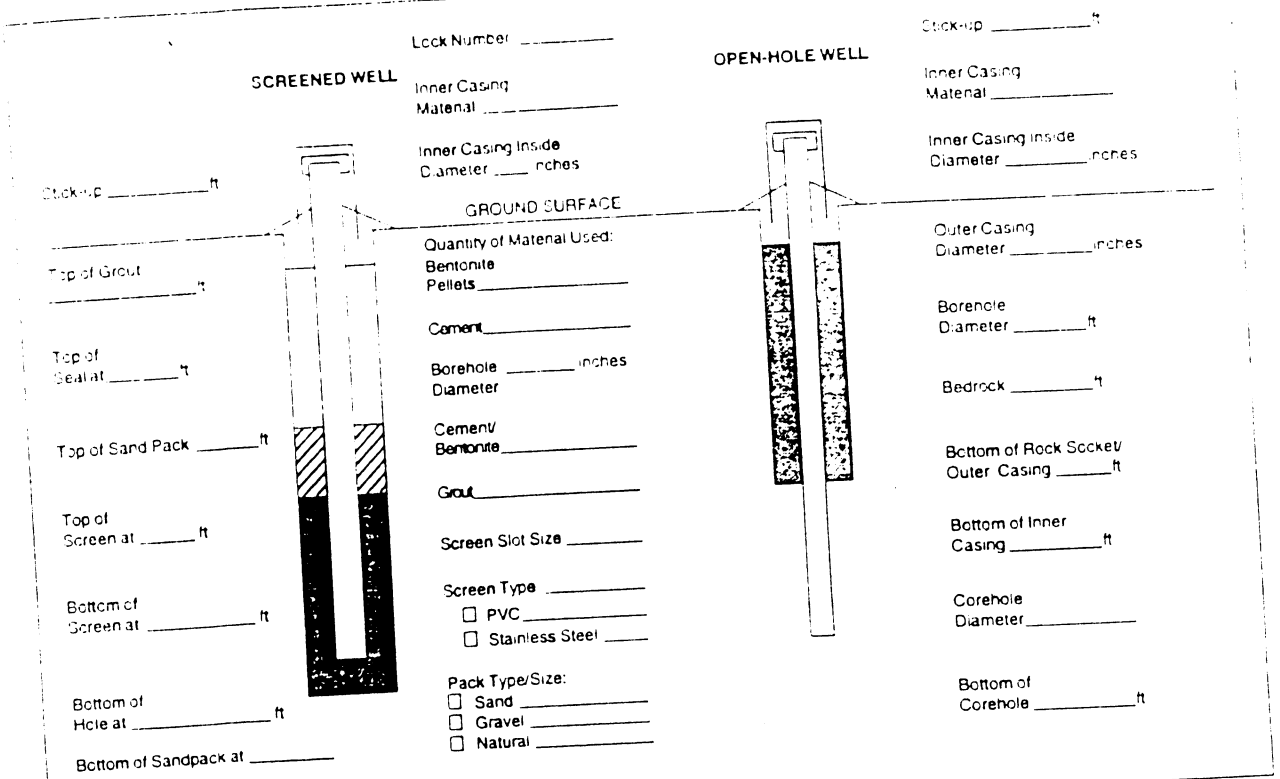
Total Depth of Corehole Is _____

Water Level (TOIC)		
Date	Time	Level(Feet)

Well Location Sketch

SB-3

Depth(Feet)	Sample Number	Blows on Sampler	Soil Components Rock Profile CL SL S GR	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
1	1	4 6							0	
2		10 8								
3	2	4 4							0	
4		5 4								
5	3	20 18							1.5	
6		12 13								
7	4	14 12							+100 Methane	Sample Collected
8		8 10								
9	5	4 3							70 Methane	
10		2 2								
11	6	WOH/ 12"							10 Methane	Sample Collected
12		4 6								
13			Boring Complete							
14										

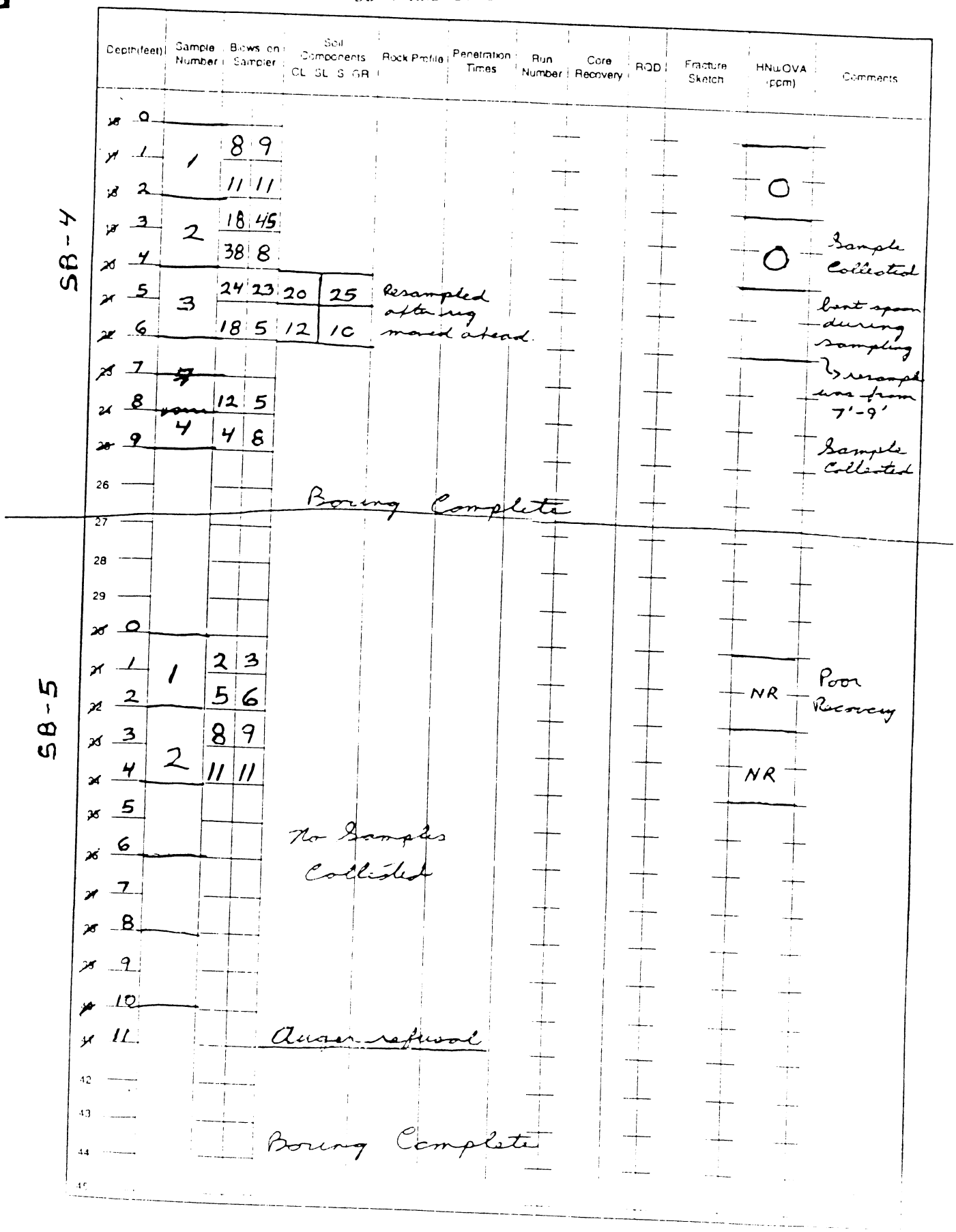


NOTE: See pages 136 and 137 for well construction diagrams

SB-3

Depth-ft.	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
1	Waste material, brown, has characteristics of the white lime-like material, fragments that are yellow, black, white and pink, has mottled appearance in some areas,	●	○	○
2	gravel to pebble sized fragments. Brown natural zone as above to 3.7' BGS. Becomes more like	●	○	○
3	a natural silt with white, yellow and pink flecks throughout. Typical white lime-like waste to 3.9' BGS. Red	●	○	○
4	brown waste material, moist, sand to gravel size waste. Upper 0.4' is a saturated red and brown silt-pH	○	●	○
5	mix with gravel size fragments. Black silty clay with waste, to 5.6', roots, white lime-like fragments to	●	○	○
6	pebble size, some metallic appearance. White lime-like powder to bottom	○	○	●
7	White lime-like material, moist to saturated, gravel to pebble fragments.	○	●	○
8	White lime-like material same as above. Moist to wet	○	●	●
9	0.2' silty clay, mottled, cohesive, appears to be native.	○	●	○
10	Native. Brown clay mix some silt to 11', saturated,	○	○	●
11	very plastic and cohesive. Mottled. Reddish brown silty clay, saturated, cohesive, trace	○	●	○
12	mottling, trace gravel. Boring Collapsed	○	○	○
13	Boring Complete	○	○	○
14		○	○	○

SB-4 AND SB-5


Depth(feet)
Sample Number
Blows on Sampler
Soil Components CL SL S GR
Rock Profile
Penetration Times
Run Number
Core Recovery
RQD
Fracture Sketch
HNu/OVA (ppm)
Comments
SB-4
SB-5
Resampled after auger moved ahead.
Sample Collected
Lost spoon during sampling
resampled area from 7'-9'
Sample Collected
Boring Complete
NR
Poor Recovery
NR
No Samples Collected
Auger refusal
Boring Complete

Depth (feet)	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
0	Waste, brown lime-like waste material, gravel to pebble fragments, some metallic fragments, orange and yellow-like clay. Dry	○	○	○
1		●	○	○
2		●	○	○
3	Brown, sand sized waste material, some gravel sized fragments, few pebble sized fragments - some being green. 0.2' of chromium fragments - placed in separate sample jar. Brown sand at bottom of sample with brown waste fragments. Dry	●	○	○
4		●	○	○
5		○	○	○
6	No Recovery No recovery on resample. Augered to 6'	○	○	○
7		○	●	○
8	0.3' fill material, brown sand sized lime-like material and black silty clay with metallic fragments. Moist	●	●	○
9	Native reddish brown silty clay, mottled gray, orange, and red, filled vertical dessication cracks. Gray-brown immediately below fill material.	●	●	○
26	Boring Complete.	○	○	○
27		○	○	○
28		○	○	○
29		○	○	○
0		○	○	○
1	Topsoil, brown, many rootlets, wet. (0.2')	○	●	○
2	Reddish brown silty clay, orange and gray mottling, moist	○	●	○
3	Reddish brown silty clay, orange and gray mottling, gray filled vertical dessication cracks, large dolostone rock fragment at top of sample. Moist	○	●	○
4		○	○	○
5		○	○	○
6		○	○	○
7		○	○	○
8		○	○	○
9		○	○	○
10		○	○	○
11	Auger Refusal	○	○	○
42		○	○	○
43	Boring Complete	○	○	○

SB-6 AND SB-7

Depth(feet)	Sample Number	Blows on Sampler	Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Blows on ~~Fracture Sketch~~ Sampler	HNu/OVA (ppm)	Comments
0											
1	1	1 3								0	
2		12 24									
3	2	12 23								1.5	
4		38 50/.1									
5	3	8 12									0.7'
6		24 8	Rig moved ahead due to no sample recovery from 10'-12' depth. Augured to 6' depth before resampling.						3 5	NM	recovery
7	4	4 3							7 7	X	No recovery
8		4 4							5 5		
9	No Sample								4 3	X	augured to 10' depth to get through rock
10									6 6		
11	5								10 16		
12											
			Boring Complete								
0											
1	1	1 3								NM	
2		4 12									
3	2	7 8								NM	
4		14 10									
5	3	22 18								O	
6		12 10									
7	////									////	
8	4	8 12								NM	
9		18 25									
10	5	18 24							OVA	NM	
11		50/5"	18 34						O		7" recovery
12	6 10'-12'		50/3"							////	
13	7	15 32								O	
14		50/5"									sample collected
15	8	12 15								10	

SB-6

SB-7

Depth (feet)	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
0	0.3' black topsoil with rootlets, overlying a fine grained	○	●	○
1	black sands with rootlets and plant stems. Moist. Fill material bottom 0.3'. Slag, and white lime-like material	○	●	○
2	White lime-like waste in top half of sample	●	○	○
3	overlying concrete fragments. Gravel to pebble size fragments. Dry	●	○	○
4	0.3' concrete overlying blacks, fine sand with plant	●	●	○
5	roots and stems.	●	●	○
6		○	○	○
7	No Recovery / 1.1' waste, light brown, moist, fine	○	○	○
8	like waste. Native brown silty clay, cohesive, massive, Sample collected for lab analysis	○	○	○
9	No sample - augered to 10' depth	○	○	○
10	Reddish brown silty clay	○	○	○
11		○	○	○
12		○	○	○
59	Samples collected of waste: 7'-8'	○	○	○
	" " of native: 8'-9'			
1	Brown silty clay subsoil with rootlets, reddish brown	●	○	○
1	mottling, sharp break with white to gray lime-	●	○	○
2	like waste at 1.7' depth. Waste mixed with a brown ash-like material. Dry	●	○	○
3	~~White lime like material to 2.1' depth. Grades into a light~~ brown clayey silt with rock and lime like waste	●	○	○
4	fragments gravel to pebble in size. Sample ~~from~~ 0.4' is the white lime-like material with brick fragments. Dry.	●	●	○
5	White lime-like material, massive, some horizontal layering, dry to moist	●	●	○
6		○	○	○
7		○	●	○
8	Sample same as above. Moist. Very compact.	○	●	○
9	Pasty near the bottom as the moisture content increases.	●	○	○
10	Sample same as above. Dry. Blocky.	●	○	○
11		●	●	○
12	Sample same as above. Dry to moist. Blocky	●	●	○
13	Sample same as above, massive, dry to moist	●	●	○
14		●	●	○
15	Sample same as above, blocky, dry to moist			

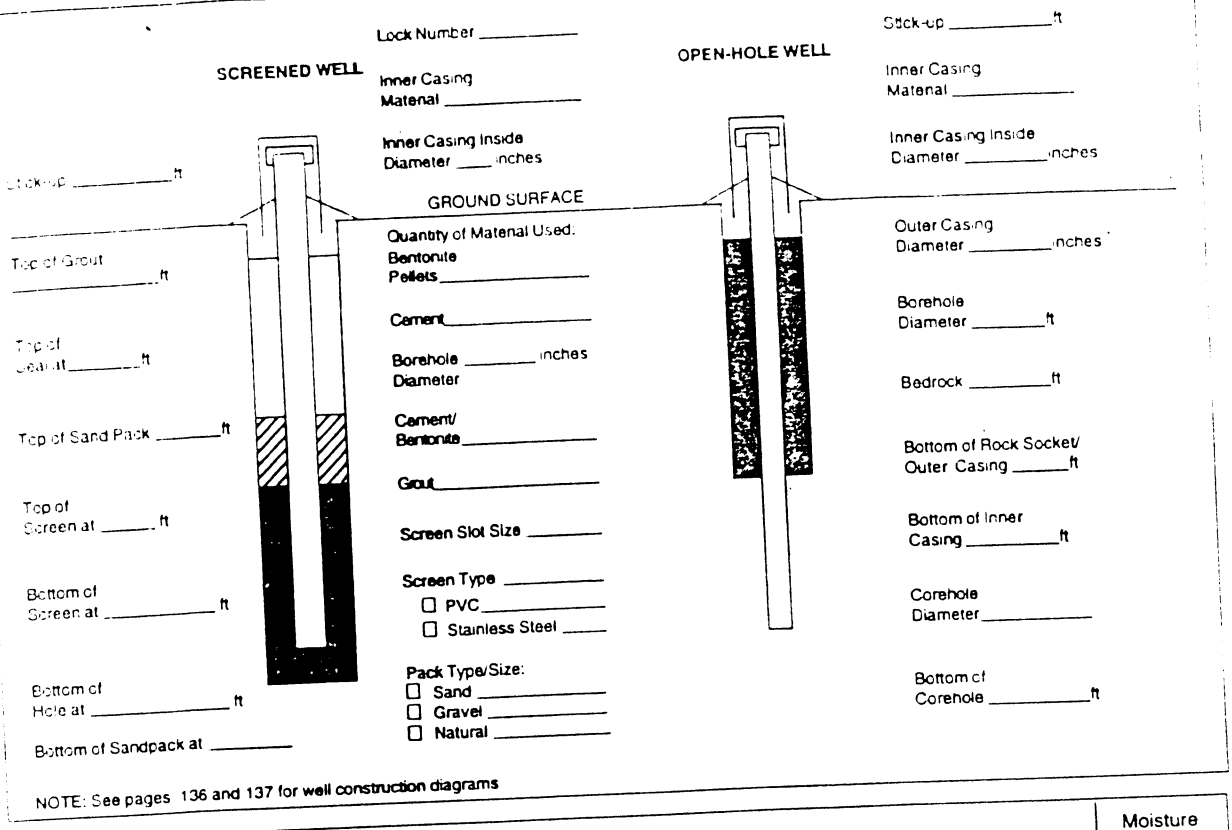
SB-7 AND SB-8

Depth (feet)	Sample Number	Blows on Sampler	Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
16	8	9 8									Sample Collected
17	9										
18											
80											
81	1	1 1								0	
82	1	4 10									
83	2	18 14								0	
84	2	20 8									
85	3	12 12								0	
86	3	8 12									
87	4	18 20								0	
88	4	22 22									
89	5	18 18								0	
90	5	26 30									
91	6	35 40								0	
92	6	50/0"									
93											No Sample
94	7	35 30									
95	7	18 18								NM	Sample Collected
96	8	4 6									
97	8	6 8								10.	Sample
98	9	4 6								Methane	collected
99	9	6 6									
100											
101											
102											
103											
104											

SB-8

SB-7 AND SB-8

Depth (feet)	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
	Native at 15.4' depth. Dark brown to black silty clay, minor	●	●	○
16	mottling, rootlets, dry to moist.	○	●	○
17	Sample same as above, red, orange, and gray	○	●	○
18	blebs, fractures filled fractures, scattered. Grades to reddish brown silty clay at bottom of spoon. Moist. Very stiff.	○	○	○
	Water level at completion is 16.2' BGS			
	0.6' topsoil, brown, rootlets, silty clay composition,	○	●	○
1	Moist. White lime-like powder, paint chips,	●	○	○
2	Gray lime-like waste, blocky to massive, yellow,	○	●	○
3	green, red blebs. Moist. ↳ near the bottom of the sample.	○	●	○
4		○	●	○
5	Sample same as above. Moist. Gray. Sand	○	●	○
6	sized particles of varying colors cemented into a tight matrix.	○	●	○
7	Sample same as above. Massive. Becomes	○	●	○
8	wetter with depth and more friable. Starting to lose the colored particles - more homogeneous	○	●	○
9	White to gray lime like material, uniform, homogenous, moist. Slightly pasty.	○	●	○
10		○	●	○
11	Sample same as above. Dry at the bottom. Mostly uniform with some zones having multicolored	●	○	○
12	sand sized particles	○	○	○
13	No sample collected - augered to 14' depth			
	White lime-like waste, massive, uniform, dry to moist	●	●	○
14		●	●	○
15		○	●	○
16	Sample same as above. Moist, softer than	○	●	○
17	previous samples	○	●	○
18	0.2' white lime-like waste overlying 0.5' native brown silty clay with rootlets, slight mottling. Grades into the reddish brown silty clay, laminated,	○	●	○
19	mottled. Both units very stiff	○	○	○
100		○	○	○
101		○	○	○
102		○	○	○
103		○	○	○
104		○	○	○
105		○	○	○



NOTE: See pages 136 and 137 for well construction diagrams

Depth-ft.	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
1	1.1' of brown soil core, high silty and clay content, numerous rootlets. Moist. Whitish gray lime-like wastes, granular, massive uniform pieces in multi-colored sand sized particles. Dry.	○	●	○
2		●	○	○
3	Sample same as above mixed with reddish brown silty clay. Some angular, ~~fossil~~ sized fragments. Dry	●	○	○
4	White lime-like material, massive, laminated. Very uniform throughout. Dry.	●	○	○
5		●	○	○
6		●	○	○
8'-10'	Sample same as above. Massive. Uniform, dry.	●	○	○
8		○	●	○
10'-12'	Sample same as above to 8.7'. Abrupt change to the multi-colored fine sand sized particles. Similar to material of this type in other borings. Moist	○	●	○
11		○	○	○
12		○	○	○
13	White lime-like waste, paper chip, uniform in color, dry.	●	○	○
14		●	○	○

SB-9 AND SB-10

Depth(feet)	Sample Number	Blows on Sampler	Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
SB-9											
16	7	42 50/3"									
17										100 total	
18	8	8 3	Sample collected							12 methane	
19		7 7								4 total	
20	9	WOH 8									
21		8 12									
SB-10											
0											
1	1	1 1								0	
2		4 10									
3	2	25 8								0	
4		15 15									
5	3	12 18									
6		20 35									
7	4	16 36									
8		26 30									
9	5	16 30									
10		50/1.4									
11	6	10 16								0	
12		20 24									
13	7	28 50/.3									
14											
15	8	8 28								0	
16		24 24									
17	9	16 24									
18		24 26									
19	10	12 18								0	Sample Collected
20		20 26									
21	11	WOH 1								2	Sample collected
22		3 5									
23		1 3								0	

Depth (feet)	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
		●	○	○
	Sample same as above. Dry	●	○	○
17	Waste same as above to 17.8' depth. Native gray to black silty clay, many rootlets, trace mottling, dry to moist.	●	○	○
18		●	●	○
19		●	●	○
20	Reddish brown silty clay, mottled, many small rootlets, filled vertical fractures	●	●	○
21		○	○	○
22		●	●	○
23 1	Brown soil composed primarily of silty clay, rootlets, becomes more of the mottled reddish brown silty	●	●	○
24 2	clay at the bottom of the sample. 0.2' white lime-like powder in the shoe. Dry to Moist	●	○	○
25 3	grayish white lime-like waste with multicolored sand size particles. Dry to 3.6' depth then	○	●	○
26 4	becoming more moist.	●	●	○
27 5	Sample same as above. Blocky. Gray. Dry to Moist	●	●	○
28 6		●	○	○
29 7	Sample same as above. A solid laminated piece	●	○	○
30 8	of waste from 6.4' to 6.6' depth grading abruptly into the multicolored, sand sized waste. Dry	●	●	○
31 9	Sample same as above. Dry to moist	●	●	○
32 10		●	○	○
33 11	Sample same as above for 0.2'. Abrupt change to the uniform white lime-like waste, mostly massive,	●	○	○
34 12	dry. Grades abruptly into the multicolored unit at the bottom of the sample	●	●	○
35 13	Sample same as above. Abrupt change to the uniform white lime-like waste. Dry to moist	●	●	○
36 14		●	○	○
37 15	Sample same as above. Massive, uniform white lime-like waste. Dry	●	○	○
38 16	Sample same as above to 16.7'. Abrupt change to	○	●	○
39 17	the multicolored sand sized lime-like waste, slightly pasty throughout. Blocky throughout. Moist	○	●	○
40 18	throughout.	○	●	○
41 19	White lime-like waste, uniform, massive, moist	○	●	○
42 20		○	●	○
43 21	Sample same as above, saturated, to 21.2'. Native dark gray silty clay, slight mottling, rootlets, moist.	○	●	○
44 22	Reddish brown silty clay, laminated, mottled,		●	

SB-11

Depth(feet)	Sample Number	Blows on Sampler	Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
0											
1	1	1 1								NM	
2		8 12									
3	2	50/5"								0	
4											
5	3	7 8								0	
6		17 25									
7	4	38 40								0	
8		12 11									
9	5	10 12								0	
10		11 50/5"								0	Sample Collected
11	6	5 5									
12		6 10									
13	7	5 8									
14		9 4									
15	8	1 2									
16		12 14								4	
17	9	11 10									
18		6 4								2	Sample Collected
19	10	3 3									
20		6 7									

Depth (feet)	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
0	1.2' of brown sod, high in silty clay content, some	○	●	○
1	rock fragments, rootlets, debris. Grayish white	●	○	○
2	lime-like waste with multicolored sand sized	●	○	○
3	particles. Dry. Sample same as above. Dry.	●	○	○
4	White lime-like waste, massive, uniform, very stiff, some	●	○	○
5	pasty zones in the middle of the spoons. Mostly dry.	●	○	○
6		●–●	○	
7	Sample same as above but less pasty. Dry to Moist.	●–●	○	
8	a small (≈0.3') zone with a pink tint.	○	●	○
9	Sample same as above, uniform, moist, pasty	○	●	○
10		○	●	○
11	Sample same as above. More moist & pasty.	○	●	○
12		●–●	○	
13	Sample same as above. Uniform. ~~Pasty~~. Not	●–●	○	
14	as moist as previous samples.	○	○	●
15	Sample same as above, uniform, soft, saturated	○	○	●
16		○	○	●
17	Sample same as above. Saturated. Top of the	○	○	●
18	native dark gray silty clay at bottom of sample	○	○	○
19	Native dark brown to dark gray silty clay,	○	○	○
20		○	○	○
21		○	○	○
22		○	○	○
23		○	○	○
24		○	○	○
25		○	○	○
26		○	○	○
27		○	○	○
28		○	○	○
29		○	○	○
30		○	○	○
31		○	○	○
32		○	○	○
33		○	○	○

SB-12

Depth (feet)	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
0		○	○	○
1	0.9' brown soil, silty clay content rootlets, moist. Gray lime-like waste with multicolored sand size particles. Moist.	○	●	○
2		○	●	○
3	Sample same as above. Moist.	○	●	○
4		○	●	○
5	Sample same as above. Dry to Moist	●	●	○
6		●	●	○
7	Sample same as above. Moist	○	●	○
8		○	●	○
9	Sample same as above. Potter clip. Clayton white lime-like waste near top of sample. (8.2') to 8.4' and again in the shoe. Moist in the granular material, dry to uniform waste	○	●	○
10		●	●	○
11	white gray lime-like waste, layered between uniform and multicolor granular waste. Becomes	●	●	○
12	more uniform with depth. Dry to moist. Slightly pasty	●	●	○
13	Gray lime-like waste, massive, uniform, moist to pasty	○	●	●
14		○	●	●
15	Sample same as above but becoming a tan color. Wet at 15' depth, very pasty	○	●	●
16		○	○	●
17	Sample same as above, uniform, brown, wet, pasty. ~~Native material brown silty clay at 18.0' depth~~ Reddish brown waste at 18' depth	○	○	●
18		○	○	●
19	Waste? Reddish brown waste, vitreous, brittle? Has color and character of native reddish	○	●	○
20	silty clay. Grades to native clayey silt, reddish brown with hard vitreous fragments	○	●	○
		○	○	○
		○	○	○
		○	○	○
		○	○	○
		○	○	○
		○	○	○
		○	○	○
		○	○	○

APPENDIX B

COMPLETE OU3 ANALYTICAL DATA TABLES

TABLE B.1

SURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*A-2-GRID*	*A-5-GRID*	*B-1-GRID*	*B-4A-GRID*	*C-0-GRID*	*C-5-GRID*	*C-12-GRID*	*Green Surface Waste*	*MOUND1-GRID*
Sample ID:				*A-2*	*A-5*	*B-1*	*B-4A*	*C-0*	*C-5*	*C-12*	*GREEN SURFACE WASTE*	*MOUND1*
Sample Date:				*3/1/2000*	*3/1/2000*	*3/1/2000*	*3/1/2000*	*3/1/2000*	*3/1/2000*	*3/1/2000*	*11/7/1996*	*3/1/2000*
Sample Depth:				*0-0.25 ft*	*0-0.25 ft*	*0-0.25 ft*	*0-0.25 ft*	*0-0.25 ft*	*0-0.25 ft*	*0-0.25 ft*		*0-0.25 ft*
Sample Matrix:				*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*
	Units	*Eastern USA Background*	*TAGMa*									
Metals												
Aluminum	mg/kg	33000	SB	--	--	5030 *	--	9200 *	15600 *	--	49600	21800 *
Antimony	mg/kg	NS	SB	--	--	1.7 N	--	ND (1.5) N	ND (1.7) N	--	ND (1.2)	ND (1.6) N
Arsenic	mg/kg	3 - 12	7.5 or SB	--	--	4.6	--	6.7	**18.0**	--	**8.4 ***	6.0
Barium	mg/kg	15 - 600	300 or SB	--	--	138 E	--	96.0 E	**904 E**	--	**1410 ***	108 E
Beryllium	mg/kg	0 - 1.75	0.16 or SB	--	--	ND (0.28)	--	**0.44 B**	**0.79 B**	--	**3.5**	**0.80 B**
Cadmium	mg/kg	0.1 -1.0	1 or SB	--	--	0.61 B	--	ND (0.17)	0.65 B	--	ND (0.51)	ND (0.19)
Calcium	mg/kg	130 - 35000	SB	--	--	21100	--	31600 *	7670 *	--	--	2450 *
Chromium Total	mg/kg	1.5 - 40	50b or SB	--	--	48 E*	--	38.7 E*	**63.8 E***	--	11.4	**65.4 E***
Chromium VI (Hexavalent	mg/kg	NS	NS	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	0.18 N	ND (1.0)
Cobalt	mg/kg	2.5 or 60	30 or SB	--	--	4.7 B	--	6.9 B	**88.9**	--	ND (0.83)	8.8 B
Copper	mg/kg	1.0 - 50	25 or SB	--	--	**104**	--	**58.7**	**100**	--	3.7 B	**27.0**
Cyanide (total)	mg/kg	NS	NS	--	--	--	--	--	--	--	--	--
Iron	mg/kg	2000 - 550000	2000 or SB	--	--	**17300 E***	--	**16700 E***	**48200 E***	--	1890	**24100 E***
Lead	mg/kg	NS	SB	--	--	167	--	57.9	166	--	18.0 *	44.2
Magnesium	mg/kg	100 - 5000	SB	--	--	11000 *	--	13200 *	3740 *	--	31700	4140 *
Manganese	mg/kg	50 - 5000	SB	--	--	336 EN	--	433 EN	8950 EN	--	24400 E*	566 EN
Mercury	mg/kg	0.001 - 0.2	0.1	--	--	**11.8**	--	ND (0.12)	ND (0.12)	--	ND (0.05)	ND (0.14)
Nickel	mg/kg	0.5 - 25	13 or SB	--	--	**40.9 ***	--	**31.7 ***	**54.1 ***	--	ND (1.2)	**31.9 ***
Potassium	mg/kg	8500 - 43000	SB	--	--	798 BE	--	2280 E	2220 E	--	8240	2950 E
Selenium	mg/kg	0.1 - 3.9	2 or SB	--	--	ND (1.4)	--	ND (1.2)	ND (1.4)	--	**15.9**	ND (1.4)
Silver	mg/kg	NS	SB	--	--	0.66 B	--	ND (0.37)	1.7 B	--	7.6 N	0.50 B
Sodium	mg/kg	6000 - 8000	SB	--	--	1090 B	--	818 B	900 B	--	850 B	577 B
Thallium	mg/kg	NS	SB	--	--	ND (2.3)	--	ND (2.0)	ND (2.3)	--	18.8	ND (2.2)
Vanadium	mg/kg	1.0 - 300	150 or SB	--	--	17.6	--	25.3	25.3	--	3.9 B	38.9
Zinc	mg/kg	9.0 - 50.0	20 or SB	--	--	**323 E**	--	**133 E**	**633 E**	--	12.7	**85.7 E**

TABLE B.1

SURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*A-2-GRID*	*A-5-GRID*	*B-1-GRID*	*B-4A-GRID*	*C-0-GRID*	*C-5-GRID*	*C-12-GRID*	*Green Surface Waste*	*MOUND1-GRID*
Sample ID:				*A-2*	*A-5*	*B-1*	*B-4A*	*C-0*	*C-5*	*C-12*	*GREEN SURFACE WASTE*	*MOUND1*
Sample Date:				*3/1/2000*	*3/1/2000*	*3/1/2000*	*3/1/2000*	*3/1/2000*	*3/1/2000*	*3/1/2000*	*11/7/1996*	*3/1/2000*
Sample Depth:				*0-0.25 ft*	*0-0.25 ft*	*0-0.25 ft*	*0-0.25 ft*	*0-0.25 ft*	*0-0.25 ft*	*0-0.25 ft*		*0-0.25 ft*
Sample Matrix:				*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*
	Units	*Eastern USA Background*	*TAGMa*									
SVOAs												
2-Methylnaphthalene	mg/kg	NS	36.4	ND (0.48)	ND (2.4)	ND (23)	ND (0.41)	0.37 J	ND (4.2)	ND (0.52)	ND	ND (2.2)
2-Methylphenol	mg/kg	NS	0.1	ND (0.48)	ND (2.4)	ND (23)	ND (0.41)	ND (2)	ND (4.2)	ND (0.52)	--	ND (2.2)
4-Methylphenol	mg/kg	NS	0.09	ND (0.48)	ND (2.4)	ND (23)	ND (0.41)	ND (2)	ND (4.2)	ND (0.52)	--	ND (2.2)
Acenaphthene	mg/kg	NS	50	0.17 J	ND (2.4)	13 J	0.055 J	3	3.3 J	0.2 J	ND	0.25 J
Acenaphthylene	mg/kg	NS	41	ND (0.48)	ND (2.4)	ND (23)	ND (0.41)	ND (2)	ND (4.2)	ND (0.52)	--	ND (2.2)
Anthracene	mg/kg	NS	50	0.2 J	0.24 J	16 J	0.062 J	8.9	4.6	0.22 J	ND	0.28 J
Benzo(a)anthracene	mg/kg	NS	0.224	**0.93**	**1.5 J**	**52**	**0.32 J**	**120 D**	**30**	**1.3**	ND	**3.3**
Benzo(a)pyrene	mg/kg	NS	0.061	**1.4**	**1.9 J**	**22 J**	**0.41**	**10**	**8.3**	**1.9**	ND	**1.8 J**
Benzo(b)fluoranthene	mg/kg	NS	1.1	**1.8**	**2.4**	**77**	0.56	**200 D**	**33 D**	**2.4**	ND	**4.8**
Benzo(g,h,i)perylene	mg/kg	NS	50	0.4 J	0.55 J	19 J	0.18	ND (2)	ND (4.2)	0.78	ND	ND (2.2)
Benzo(k)fluoranthene	mg/kg	NS	1.1	0.7	0.78 J	**30**	0.19 J	**56 D**	**20**	0.88	ND	**1.4 J**
bis(2-Ethylhexyl)phthalate	mg/kg	NS	50	0.087 J	ND (2.4)	ND (23)	ND (0.41)	0.64 J	0.43 J	ND (0.52)	0.036 J	ND (2.2)
Butyl benzylphthalate	mg/kg	NS	50	ND (0.48)	ND (2.4)	ND (23)	ND (0.41)	ND (2)	ND (4.2)	ND (0.52)	--	ND (2.2)
Carbazole	mg/kg	NS	NS	0.16 J	ND (2.4)	10 J	0.052 J	3.8	2.1 J	0.17 J	ND	ND (2.2)
Chrysene	mg/kg	NS	0.04	**1.1**	**1.5 J**	**52**	**0.39 J**	**180 D**	**18 D**	**1.3**	ND	**3.3**
Dibenz(a,h)anthracene	mg/kg	NS	0.014	**0.11 J**	ND (2.4)	**6.7 J**	**0.047 J**	**2.9**	**3.5 J**	**0.19 J**	ND	**0.23 J**
Dibenzofuran	mg/kg	NS	6.2	ND (0.48)	ND (2.4)	4.1 J	ND (0.41)	1.3 J	0.81 J	ND (0.52)	ND	ND (2.2)
Diethyl phthalate	mg/kg	NS	7.1	--	--	--	--	--	--	--	ND	--
Di-n-butylphthalate	mg/kg	NS	NS	--	--	--	--	--	--	--	ND	--
Fluoranthene	mg/kg	NS	50	1.7	2.4	**100**	0.6	**240 D**	27 D	2.2	ND	4.3
Fluorene	mg/kg	NS	50	0.082 J	ND (2.4)	7.3 J	ND (0.41)	1.8 J	1.6 J	0.089 J	ND	ND (2.2)
Indeno(1,2,3-cd)pyrene	mg/kg	NS	3.2	0.43 J	0.55 J	**22 J**	0.17 J	3.2	**4.2**	0.77	ND	0.45 J
Methylene chloride	mg/kg	NS	0.1	--	--	--	--	--	--	--	--	--
Naphthalene	mg/kg	NS	13	ND (0.48)	ND (2.4)	2.7 J	ND (0.41)	0.92 J	0.55 J	ND (0.52)	ND	ND (2.2)
Phenanthrene	mg/kg	NS	50	0.9	1.2 J	**61**	0.34 J	**60 D**	23	0.95	ND	1.6 J
Phenol	mg/kg	NS	0.03	ND (0.48)	ND (2.4)	ND (23)	ND (0.41)	ND (2)	ND (4.2)	ND (0.52)	--	ND (2.2)
Pyrene	mg/kg	NS	50	1.6	2.6	**84**	0.54	**120 D**	21	2	ND	5.9

TABLE B.1

SURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*A-2-GRID*	*A-5-GRID*	*B-1-GRID*	*B-4A-GRID*	*C-0-GRID*	*C-5-GRID*	*C-12-GRID*	*Green Surface Waste*	*MOUND1-GRID*
Sample ID:				*A-2*	*A-5*	*B-1*	*B-4A*	*C-0*	*C-5*	*C-12*	*GREEN SURFACE WASTE*	*MOUND1*
Sample Date:				*3/1/2000*	*3/1/2000*	*3/1/2000*	*3/1/2000*	*3/1/2000*	*3/1/2000*	*3/1/2000*	*11/7/1996*	*3/1/2000*
Sample Depth:				*0-0.25 ft*	*0-0.25 ft*	*0-0.25 ft*	*0-0.25 ft*	*0-0.25 ft*	*0-0.25 ft*	*0-0.25 ft*		*0-0.25 ft*
Sample Matrix:				*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*
	Units	*Eastern USA Background*	*TAGMa*									
VOAs												
Acetone	mg/kg	NS	0.2	--	--	--	--	--	--	--	ND	--
Methylene chloride	mg/kg	NS	0.1	--	--	--	--	--	--	--	ND	--
Wet												
Percent Moisture	%	NS	NS	--	--	--	--	--	--	--	--	--
pH	s.u.	NS	NS	--	--	--	--	--	--	--	--	--
Reactive Cyanide	mg/kg	NS	NS	--	--	--	--	--	--	--	--	--
Reactive Sulfide	mg/kg	NS	NS	--	--	--	--	--	--	--	--	--
Total Solids	%	NS	NS	--	--	--	--	--	--	--	--	--

TABLE B.1

SURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-101A*	*MW-102A*	*MW-103A*	*MW-104A*	*MW-105A*	*SB-9A*	*SB-10A*	*SS-1*	*SS-2*	*SS-4*
Sample ID:				*MW-101*	*MW-102*	*MW-103*	*MW-104*	*MW-105*	*SB-9A*	*SB-10A*	*SS-1*	*SS-2*	*SS-4*
Sample Date:				*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*
Sample Depth:													
Sample Matrix:				*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*
	Units	*Eastern USA Background*	*TAGMa*										
Metals													
Aluminum	mg/kg	33000	SB	7470	11200	12400	25600	8830	23200	34000	13900	13100	14800
Antimony	mg/kg	NS	SB	ND (2.7) N	1.7 BJ	24.6	15.1 B	5.9 B	ND (5.5)	ND (1.4)	33.0	46.1	64.9
Arsenic	mg/kg	3 - 12	7.5 or SB	2.5 B	4.8	6.2	5.8	6.3	**8.2**	**21.9 ***	2.4 B	ND (0.57)	ND (0.58)
Barium	mg/kg	15 - 600	300 or SB	41.6 B	121 E	129 E	112 E	118 E	157	100 *	**313 E**	35.3 B	51.4 B
Beryllium	mg/kg	0 - 1.75	0.16 or SB	**0.29 B**	**0.64 BJ**	**0.24 B**	**0.37 B**	**0.43 B**	**0.82 B**	**0.68 B**	**0.24 B**	ND (0.05)	ND (0.06)
Cadmium	mg/kg	0.1 -1.0	1 or SB	**1.5**	**2.5**	**1.5**	**2.7**	**3.1**	**3.8**	ND (0.62)	0.93 B	ND (0.57)	0.74 B
Calcium	mg/kg	130 - 35000	SB	--	--	--	--	--	--	--	--	--	--
Chromium Total	mg/kg	1.5 - 40	50b or SB	9.0 E	37.9 N*	**685 N***	**436 N***	**168 N***	**59.7**	42.0	**1000 N***	**1640**	**2260**
Chromium VI (Hexavalent	mg/kg	NS	NS	--	0.53 E*	0.68 E*	0.77 E*	9.1 E*	0.19	0.15 BN	--	24.6	1.4
Cobalt	mg/kg	2.5 or 60	30 or SB	6.8 B	11.5 B	8.7 B	7.4 B	7.2 B	21.5	13.0 B	5.1 B	3.4 B	**536 B**
Copper	mg/kg	1.0 - 50	25 or SB	16.3	23.1 E	**38.1 E**	**33.7 E**	**36.0 E**	**25.6 E**	**39.9**	**28.1 E**	8.8 E	19.0 E
Cyanide (total)	mg/kg	NS	NS	--	--	--	--	--	--	--	--	--	--
Iron	mg/kg	2000 - 550000	2000 or SB	**12300**	**21200**	**8780**	**13600**	**25600**	**31500**	**24500**	**5620**	**2670**	**4190**
Lead	mg/kg	NS	SB	6.5 N*	27 *	40.9 *	41.4 *	187 *	30.0	23.0 *	26.9 *	7.5	29.1
Magnesium	mg/kg	100 - 5000	SB	25000	5400	33700	36900	35900	5980	11100	57900	70900	67300
Manganese	mg/kg	50 - 5000	SB	628	726 *	654 *	544 *	744 *	1190 *	627 E	431 *	375 *	456 *
Mercury	mg/kg	0.001 - 0.2	0.1	ND (0.13)	ND (0.07)	ND (0.05)	ND (0.07)	**0.57**	ND (0.06) N	ND (0.07)	ND (0.05)	ND (0.06)	NND (0.06) N
Nickel	mg/kg	0.5 - 25	13 or SB	**14.2**	**27.4**	**46.7**	**19.7**	**24.3**	**30.5**	**29.9**	**24.6**	1.6 B	12.5
Potassium	mg/kg	8500 - 43000	SB	840 B	1450 BE	ND (44.6) E	558 BE	792 BE	4090 E	2580	ND (44.7) E	ND (43.3) E	ND (44.1) E
Selenium	mg/kg	0.1 - 3.9	2 or SB	ND (1.1)	**2.4**	ND (1.3)	**2.1**	ND (1.0)	2.0	**3.3**	1.3 B	ND (1.2)	1.3 B
Silver	mg/kg	NS	SB	ND (0.27) N	ND (0.34) N	ND (0.31) N	ND (0.34) N	ND (0.25) N	ND (0.24) N	ND (0.30) N	ND (0.31) N	ND (0.27) N	ND (0.28) N
Sodium	mg/kg	6000 - 8000	SB	ND (134)	ND (39.5)	ND (36.0)	ND (39.9)	ND (28.8)	190 B	298 B	ND (36.1)	ND (34.9)	ND (35.6)
Thallium	mg/kg	NS	SB	ND (0.27) NW	ND (0.95)	ND (0.86)	ND (0.96)	ND (0.69)	ND (0.73)	ND (0.89)	ND (0.87)	ND (0.81)	ND (0.83)
Vanadium	mg/kg	1.0 - 300	150 or SB	13.7	26.2 E	34.2 E	30.2 E	21.3 E	51.4	32.1	67.7 E	38.1	71.2
Zinc	mg/kg	9.0 - 50.0	20 or SB	**184**	**96.6**	**116**	**197**	**338**	**150**	**119**	**73.1**	**76.7**	**77.5**

TABLE B.1

SURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-101A*	*MW-102A*	*MW-103A*	*MW-104A*	*MW-105A*	*SB-9A*	*SB-10A*	*SS-1*	*SS-2*	*SS-4*
Sample ID:				*MW-101*	*MW-102*	*MW-103*	*MW-104*	*MW-105*	*SB-9A*	*SB-10A*	*SS-1*	*SS-2*	*SS-4*
Sample Date:				*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*
Sample Depth:													
Sample Matrix:				*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*
	Units	*Eastern USA Background*	*TAGMa*										
SVOAs													
2-Methylnaphthalene	mg/kg	NS	36.4	–	ND	ND	ND	ND	–	–	ND	ND	ND
2-Methylphenol	mg/kg	NS	0.1	–	–	–	–	–	–	–	–	–	–
4-Methylphenol	mg/kg	NS	0.09	–	–	–	–	–	–	–	–	–	–
Acenaphthene	mg/kg	NS	50	–	ND	0.12 J	ND	ND	0.056 J	ND	0.11 J	ND	ND
Acenaphthylene	mg/kg	NS	41	–	–	–	–	–	–	–	–	–	–
Anthracene	mg/kg	NS	50	–	ND	0.14 J	0.12 J	0.12 J	0.057 J	ND	0.23 J	ND	ND
Benzo(a)anthracene	mg/kg	NS	0.224	–	0.097 J	**0.97**	0.15 J	**0.64**	**0.34 J**	ND	**1.1**	0.067 J	0.18 J
Benzo(a)pyrene	mg/kg	NS	0.061	–	**0.12 J**	**1.4**	**0.18 J**	**0.59**	**0.44**	ND	**1.4**	**0.084 J**	**0.24 J**
Benzo(b)fluoranthene	mg/kg	NS	1.1	–	0.2 J	1	0.3 J	1	0.42	0.073 J	**2.2**	0.15 J	0.31 J
Benzo(g,h,i)perylene	mg/kg	NS	50	–	0.088 J	1.1	0.19 J	0.43	0.38 J	ND	0.86	0.11 J	0.15 J
Benzo(k)fluoranthene	mg/kg	NS	1.1	–	ND	**1.2**	ND	ND	0.36 J	ND	ND	ND	0.23 J
bis(2-Ethylhexyl)phthalate	mg/kg	NS	50	–	ND	0.06 BJ	0.68 B	0.17 BJ	ND	14 D	ND	0.15 J	ND
Butyl benzylphthalate	mg/kg	NS	50	–	–	–	–	–	–	–	–	–	–
Carbazole	mg/kg	NS	NS	–	ND	0.12 J	ND	0.056 J	ND	ND	0.14 J	ND	ND
Chrysene	mg/kg	NS	0.04	–	**0.11 J**	**1.1**	**0.14 J**	**1.9**	**0.36 J**	**0.062 J**	**1.2**	**0.082 J**	**0.22 J**
Dibenz(a,h)anthracene	mg/kg	NS	0.014	–	ND	**0.45 J**	**0.082 J**	**0.19 J**	**0.16 J**	ND	**0.36 J**	ND	**0.081 J**
Dibenzofuran	mg/kg	NS	6.2	–	ND	ND	ND	ND	ND	ND	ND	ND	ND
Diethyl phthalate	mg/kg	NS	7.1	–	ND	0.11 J	ND	ND	ND	0.089 J	ND	ND	0.12 J
Di-n-butylphthalate	mg/kg	NS	NS	–	ND	ND	ND	ND	–	–	ND	ND	ND
Fluoranthene	mg/kg	NS	50	–	0.14 J	1.5	0.17 J	0.66	0.48	0.11 J	1.8	0.099 J	0.32 J
Fluorene	mg/kg	NS	50	–	ND	ND	ND	ND	ND	ND	0.079 J	ND	ND
Indeno(1,2,3-cd)pyrene	mg/kg	NS	3.2	–	0.087 J	0.98	0.17 J	0.4	0.33 J	ND	0.85	0.079 J	0.16 J
Methylene chloride	mg/kg	NS	0.1	–	–	ND	–	–	–	–	–	–	–
Naphthalene	mg/kg	NS	13	–	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phenanthrene	mg/kg	NS	50	–	0.079 J	0.69	0.12 J	0.34 J	0.25 J	0.066 J	1.2	0.055 J	0.15 J
Phenol	mg/kg	NS	0.03	–	–	–	–	–	–	–	–	–	–
Pyrene	mg/kg	NS	50	–	0.14 J	1.4	0.25 J	0.69	0.53	0.12 J	1.8	0.11 J	0.26 J

TABLE B.1

SURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-101A*	*MW-102A*	*MW-103A*	*MW-104A*	*MW-105A*	*SB-9A*	*SB-10A*	*SS-1*	*SS-2*	*SS-4*
Sample ID:				*MW-101*	*MW-102*	*MW-103*	*MW-104*	*MW-105*	*SB-9A*	*SB-10A*	*SS-1*	*SS-2*	*SS-4*
Sample Date:				*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*
Sample Depth:													
Sample Matrix:				*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*
	Units	*Eastern USA Background*	*TAGMa*										
VOAs													
Acetone	mg/kg	NS	0.2	–	0.004 BJ	0.02 B	0.038 B	0.002 BJ	–	–	0.003 BJ	–	–
Methylene chloride	mg/kg	NS	0.1	–	0.002 BJ	–	ND	ND	–	–	0.002 BJ	–	–
Wet													
Percent Moisture	%	NS	NS	–	–	–	–	–	–	–	–	–	–
pH	s.u.	NS	NS	8.0	–	–	–	–	–	–	–	–	–
Reactive Cyanide	mg/kg	NS	NS	ND (50)	–	–	–	–	–	–	–	–	–
Reactive Sulfide	mg/kg	NS	NS	ND (1.0)	–	–	–	–	–	–	–	–	–
Total Solids	%	NS	NS	74	–	–	–	–	–	–	–	–	–

TABLE B.1

SURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SS-5*	*SS-6*	*SS-7*	*SS-8*	*SS-9*	*SS-10*	*SS-11*
Sample ID:				*SS-5*	*SS-6*	*SS-7*	*SS-8*	*SS-9*	*SS-19867-0703-PK-027*	*SS-19867-0703-PK-014*
Sample Date:				*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*7/21/2003*	*7/18/2003*
Sample Depth:									*0-0.167 ft*	*0-0.167 ft*
Sample Matrix:				*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*
	Units	*Eastern USA Background*	*TAGMa*							
Metals										
Aluminum	mg/kg	33000	SB	22500	18000	21300	17200	19200	13000	14200
Antimony	mg/kg	NS	SB	ND (7.2)	37.5	12.9 B	29.0	12.9 B	ND (0.926) UJ	R
Arsenic	mg/kg	3 - 12	7.5 or SB	**12.6**	ND (0.59)	3.3	ND (0.51)	0.67 B	4.86	5.59
Barium	mg/kg	15 - 600	300 or SB	207	56.6	111	80.8	88.7	99.8 J	83.1
Beryllium	mg/kg	0 - 1.75	0.16 or SB	**0.76 B**	0.09 B	**0.62 B**	**0.36 B**	**0.44 B**	**0.468**	**0.440 J**
Cadmium	mg/kg	0.1 -1.0	1 or SB	**4.0**	0.60 B	**2.8**	**1.9**	**2.1**	0.427 J	0.114 J
Calcium	mg/kg	130 - 35000	SB	–	–	–	–	–	6370	3170
Chromium Total	mg/kg	1.5 - 40	50b or SB	**119**	**1330**	**459**	**1040**	**489**	**60.1 J**	**70.5**
Chromium VI (Hexavalent	mg/kg	NS	NS	–	–	–	1.6	–	1.4 J	ND (6.7) UJ
Cobalt	mg/kg	2.5 or 60	30 or SB	13.5 B	4.3 B	15.3	7.6 B	8.1 B	5.31	5.86
Copper	mg/kg	1.0 - 50	25 or SB	**55.8 E**	10.5 E	16.0 E	14.0 E	14.4 E	**29.2**	**71.2**
Cyanide (total)	mg/kg	NS	NS	–	–	–	–	–	0.311 J	ND (0.626)
Iron	mg/kg	2000 - 550000	2000 or SB	**25100**	**3990**	**22600**	**12400**	**14200**	**15100**	**17800**
Lead	mg/kg	NS	SB	67.1	8.1	15.1	10.8	11.7	70.8	50.9
Magnesium	mg/kg	100 - 5000	SB	5270	73100	21300	40100	32900	4010	3030
Manganese	mg/kg	50 - 5000	SB	1220 *	358 *	1200 *	566 *	612 *	239	270
Mercury	mg/kg	0.001 - 0.2	0.1	**0.30 N**	ND (0.06)	NND (0.06)	NND (0.05)	NND (0.06) N	**0.162**	0.100
Nickel	mg/kg	0.5 - 25	13 or SB	**51.0**	6.6 B	**15.8**	10.5	10.7	**23.8**	**26.8**
Potassium	mg/kg	8500 - 43000	SB	2950 E	ND (45.0) E	2270 E	1560 E	1930 E	1670	1260
Selenium	mg/kg	0.1 - 3.9	2 or SB	**4.0**	ND (1.3)	**2.1**	ND (1.1)	**2.3**	ND (23.1)	ND (1.37)
Silver	mg/kg	NS	SB	ND (0.31)	NND (0.28)	NND (0.24)	NND (0.24)	NND (0.25) N	0.182 J	0.285 J
Sodium	mg/kg	6000 - 8000	SB	ND (40.6)	ND (36.2)	ND (30.7)	ND (31.1)	ND (32.5)	ND (92.6)	ND (137)
Thallium	mg/kg	NS	SB	ND (0.94)	ND (0.84)	ND (0.71)	ND (0.72)	ND (0.76)	0.762 J	1.21 J
Vanadium	mg/kg	1.0 - 300	150 or SB	49.3	42.9	46.9	39.9	38.3	26.0	35.3 J
Zinc	mg/kg	9.0 - 50.0	20 or SB	**162**	**66.2**	**91.6**	**57.1**	**77.9**	**109**	**84.8**

TABLE B.1

SURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SS-5*	*SS-6*	*SS-7*	*SS-8*	*SS-9*	*SS-10*	*SS-11*
Sample ID:				*SS-5*	*SS-6*	*SS-7*	*SS-8*	*SS-9*	*SS-19867-0703-PK-027*	*SS-19867-0703-PK-014*
Sample Date:				*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*7/21/2003*	*7/18/2003*
Sample Depth:									*0-0.167 ft*	*0-0.167 ft*
Sample Matrix:				*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*
	Units	*Eastern USA Background*	*TAGMa*							
SVOAs										
2-Methylnaphthalene	mg/kg	NS	36.4	ND	ND	–	–	–	–	–
2-Methylphenol	mg/kg	NS	0.1	–	–	–	–	–	–	–
4-Methylphenol	mg/kg	NS	0.09	–	–	–	–	–	–	–
Acenaphthene	mg/kg	NS	50	0.26 J	ND	ND	ND	ND	–	–
Acenaphthylene	mg/kg	NS	41	–	–	–	–	–	–	–
Anthracene	mg/kg	NS	50	0.28 J	0.051 J	ND	ND	ND	–	–
Benzo(a)anthracene	mg/kg	NS	0.224	**1.6**	0.18 J	0.13 J	0.14 J	0.16 J	–	–
Benzo(a)pyrene	mg/kg	NS	0.061	**1.9**	**0.21 J**	**0.17 J**	**0.19 J**	**0.17 J**	–	–
Benzo(b)fluoranthene	mg/kg	NS	1.1	**1.8**	0.32 J	0.14 J	0.19 J	0.16 J	–	–
Benzo(g,h,i)perylene	mg/kg	NS	50	1.8	0.16 J	0.14 J	0.17 J	0.14 J	–	–
Benzo(k)fluoranthene	mg/kg	NS	1.1	**1.3**	ND	0.16 J	0.16 J	0.13 J	–	–
bis(2-Ethylhexyl)phthalate	mg/kg	NS	50	0.068 J	0.79	ND	ND	0.095 J	–	–
Butyl benzylphthalate	mg/kg	NS	50	–	–	–	–	–	–	–
Carbazole	mg/kg	NS	NS	0.2 J	ND	ND	ND	ND	–	–
Chrysene	mg/kg	NS	0.04	**1.5**	**0.19 J**	**0.15 J**	**0.16 J**	**0.16 J**	–	–
Dibenz(a,h)anthracene	mg/kg	NS	0.014	**0.68**	**0.08 J**	**0.064 J**	**0.071 J**	**0.065 J**	–	–
Dibenzofuran	mg/kg	NS	6.2	0.071 J	ND	ND	ND	ND	–	–
Diethyl phthalate	mg/kg	NS	7.1	0.77	ND	ND	ND	ND	–	–
Di-n-butylphthalate	mg/kg	NS	NS	ND	ND	–	–	–	–	–
Fluoranthene	mg/kg	NS	50	1.9	0.32 J	0.22 J	0.23 J	0.23 J	–	–
Fluorene	mg/kg	NS	50	0.12 J	ND	ND	ND	ND	–	–
Indeno(1,2,3-cd)pyrene	mg/kg	NS	3.2	1.5	0.15 J	0.13 J	0.15 J	0.12 J	–	–
Methylene chloride	mg/kg	NS	0.1	–	–	–	–	–	–	–
Naphthalene	mg/kg	NS	13	0.09 J	ND	ND	ND	ND	–	–
Phenanthrene	mg/kg	NS	50	1.2	0.22 J	0.1 J	0.1 J	0.15 J	–	–
Phenol	mg/kg	NS	0.03	–	–	–	–	–	–	–
Pyrene	mg/kg	NS	50	2.6	0.24 J	0.17 J	0.21 J	0.22 J	–	–

TABLE B.1

SURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SS-5*	*SS-6*	*SS-7*	*SS-8*	*SS-9*	*SS-10*	*SS-11*
Sample ID:				*SS-5*	*SS-6*	*SS-7*	*SS-8*	*SS-9*	*SS-19867-0703-PK-027*	*SS-19867-0703-PK-014*
Sample Date:				*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*7/21/2003*	*7/18/2003*
Sample Depth:									*0-0.167 ft*	*0-0.167 ft*
Sample Matrix:				*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*
	Units	*Eastern USA Background*	*TAGMa*							
VOAs										
Acetone	mg/kg	NS	0.2	–	–	–	–	–	–	–
Methylene chloride	mg/kg	NS	0.1	–	–	–	–	–	–	–
Wet										
Percent Moisture	%	NS	NS	–	–	–	–	–	12.2	32.3
pH	s.u.	NS	NS	–	–	–	–	–	7.4	6.7 J
Reactive Cyanide	mg/kg	NS	NS	–	–	–	–	–	–	–
Reactive Sulfide	mg/kg	NS	NS	–	–	–	–	–	–	–
Total Solids	%	NS	NS	–	–	–	–	–	–	–

TABLE B.1

SURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SS-12*	*SS-13*	*SS-14*	*SS-17*	*SS-18*
Sample ID:				*SS-19867-0703-PK-026*	*SS-19867-0703-PK-029*	*SS-19867-0703-PK-030*	*SS-19867-0703-PK-031*	*SS-19867-0703-PK-028*
Sample Date:				*7/21/2003*	*7/21/2003*	*7/21/2003*	*7/21/2003*	*7/21/2003*
Sample Depth:				*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*
Sample Matrix:				*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*
	Units	*Eastern USA Background*	*TAGMa*					
Metals								
Aluminum	mg/kg	33000	SB	14700	16500	14900	16700	15900
Antimony	mg/kg	NS	SB	ND (0.962) UJ	ND (1.03) UJ	ND (0.962) UJ	ND (0.997) UJ	ND (0.943) UJ
Arsenic	mg/kg	3 - 12	7.5 or SB	3.04	4.41	4.44	5.44	4.16
Barium	mg/kg	15 - 600	300 or SB	81.4 J	107 J	104 J	118 J	94.2 J
Beryllium	mg/kg	0 - 1.75	0.16 or SB	**0.439 J**	**0.615**	**0.569**	**0.665**	**0.578**
Cadmium	mg/kg	0.1 -1.0	1 or SB	0.239 J	0.276 J	0.235 J	0.386 J	0.313 J
Calcium	mg/kg	130 - 35000	SB	10900	4030	6470	2940	4210
Chromium Total	mg/kg	1.5 - 40	50b or SB	**85.5 J**	35.7 J	36.1 J	**57.8 J**	29.6 J
Chromium VI (Hexavalen	mg/kg	NS	NS	ND (6.6)	ND (5.1)	ND (4.7)	ND (5.0)	ND (5.0)
Cobalt	mg/kg	2.5 or 60	30 or SB	4.08	7.99	8.05	12.2	8.05
Copper	mg/kg	1.0 - 50	25 or SB	**25.1**	20.4	18.4	20.6	17.9
Cyanide (total)	mg/kg	NS	NS	0.368 J	ND (0.635)	0.273 J	0.421 J	ND (0.535) UJ
Iron	mg/kg	2000 - 550000	2000 or SB	**11000**	**20800**	**19800**	**28300**	**20500**
Lead	mg/kg	NS	SB	35.9	37.2	25.7	26.8	22.0
Magnesium	mg/kg	100 - 5000	SB	2780	4890	5440	4120	4360
Manganese	mg/kg	50 - 5000	SB	134	663	527	808	514
Mercury	mg/kg	0.001 - 0.2	0.1	**0.296**	**0.114**	0.0802	0.0836	0.0738
Nickel	mg/kg	0.5 - 25	13 or SB	**23.0**	**23.4**	**21.0**	**25.7**	**21.2**
Potassium	mg/kg	8500 - 43000	SB	2200	2360	2380	2340	2560
Selenium	mg/kg	0.1 - 3.9	2 or SB	ND (0.962)	ND (2.36)	ND (2.40)	ND (4.63)	ND (0.943)
Silver	mg/kg	NS	SB	0.147 J	0.221 J	0.151 J	0.173 J	ND (0.943)
Sodium	mg/kg	6000 - 8000	SB	ND (96.2)	ND (94.3)	ND (96.2)	ND (92.6)	ND (94.3)
Thallium	mg/kg	NS	SB	0.715 J	0.486 J	0.603 J	0.922 J	0.511 J
Vanadium	mg/kg	1.0 - 300	150 or SB	22.5	31.9	30.5	37.5	31.3
Zinc	mg/kg	9.0 - 50.0	20 or SB	**80.2**	**515**	**121**	**114**	**93.6**

TABLE B.1

SURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SS-12*	*SS-13*	*SS-14*	*SS-17*	*SS-18*
Sample ID:				*SS-19867-0703-PK-026*	*SS-19867-0703-PK-029*	*SS-19867-0703-PK-030*	*SS-19867-0703-PK-031*	*SS-19867-0703-PK-028*
Sample Date:				*7/21/2003*	*7/21/2003*	*7/21/2003*	*7/21/2003*	*7/21/2003*
Sample Depth:				*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*
Sample Matrix:				*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*
	Units	*Eastern USA Background*	*TAGMa*					
SVOAs								
2-Methylnaphthalene	mg/kg	NS	36.4	--	--	--	--	--
2-Methylphenol	mg/kg	NS	0.1	--	--	--	--	--
4-Methylphenol	mg/kg	NS	0.09	--	--	--	--	--
Acenaphthene	mg/kg	NS	50	--	--	--	--	--
Acenaphthylene	mg/kg	NS	41	--	--	--	--	--
Anthracene	mg/kg	NS	50	--	--	--	--	--
Benzo(a)anthracene	mg/kg	NS	0.224	--	--	--	--	--
Benzo(a)pyrene	mg/kg	NS	0.061	--	--	--	--	--
Benzo(b)fluoranthene	mg/kg	NS	1.1	--	--	--	--	--
Benzo(g,h,i)perylene	mg/kg	NS	50	--	--	--	--	--
Benzo(k)fluoranthene	mg/kg	NS	1.1	--	--	--	--	--
bis(2-Ethylhexyl)phthalate	mg/kg	NS	50	--	--	--	--	--
Butyl benzylphthalate	mg/kg	NS	50	--	--	--	--	--
Carbazole	mg/kg	NS	NS	--	--	--	--	--
Chrysene	mg/kg	NS	0.04	--	--	--	--	--
Dibenz(a,h)anthracene	mg/kg	NS	0.014	--	--	--	--	--
Dibenzofuran	mg/kg	NS	6.2	--	--	--	--	--
Diethyl phthalate	mg/kg	NS	7.1	--	--	--	--	--
Di-n-butylphthalate	mg/kg	NS	NS	--	--	--	--	--
Fluoranthene	mg/kg	NS	50	--	--	--	--	--
Fluorene	mg/kg	NS	50	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	mg/kg	NS	3.2	--	--	--	--	--
Methylene chloride	mg/kg	NS	0.1	--	--	--	--	--
Naphthalene	mg/kg	NS	13	--	--	--	--	--
Phenanthrene	mg/kg	NS	50	--	--	--	--	--
Phenol	mg/kg	NS	0.03	--	--	--	--	--
Pyrene	mg/kg	NS	50	--	--	--	--	--

TABLE B.1

SURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SS-12*	*SS-13*	*SS-14*	*SS-17*	*SS-18*
Sample ID:				*SS-19867-0703-PK-026*	*SS-19867-0703-PK-029*	*SS-19867-0703-PK-030*	*SS-19867-0703-PK-031*	*SS-19867-0703-PK-028*
Sample Date:				*7/21/2003*	*7/21/2003*	*7/21/2003*	*7/21/2003*	*7/21/2003*
Sample Depth:				*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*
Sample Matrix:				*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*
	Units	*Eastern USA Background*	*TAGMa*					
VOAs								
Acetone	mg/kg	NS	0.2	–	–	–	–	–
Methylene chloride	mg/kg	NS	0.1	–	–	–	–	–
Wet								
Percent Moisture	%	NS	NS	41.4	23.5	17.4	19.2	21.4
pH	s.u.	NS	NS	7.0	7.4	7.4	7.0	7.5
Reactive Cyanide	mg/kg	NS	NS	–	–	–	–	–
Reactive Sulfide	mg/kg	NS	NS	–	–	–	–	–
Total Solids	%	NS	NS	–	–	–	–	–

TABLE B.1

SURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SS-19*	*SS-21*	*SS-25*	*SS-26*	*SS-28*
Sample ID:				*SS-19867-0703-PK-032*	*SS-19867-0703-PK-022*	*SS-19867-0703-PK-033*	*SS-19867-0703-PK-021*	*SS-19867-0703-PK-020*
Sample Date:				*7/21/2003*	*7/18/2003*	*7/21/2003*	*7/18/2003*	*7/18/2003*
Sample Depth:				*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*
Sample Matrix:				*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*
	Units	*Eastern USA Background*	*TAGMa*					
Metals								
Aluminum	mg/kg	33000	SB	15800	20900	18500	18000	18700
Antimony	mg/kg	NS	SB	ND (0.909) UJ	ND (3.03)	ND (0.893) UJ	ND (1.26)	R
Arsenic	mg/kg	3 - 12	7.5 or SB	4.91	**7.53**	4.59	4.06	6.36
Barium	mg/kg	15 - 600	300 or SB	97.5 J	133	118 J	133	126
Beryllium	mg/kg	0 - 1.75	0.16 or SB	**0.596**	**0.868**	**0.729**	**0.602 J**	**0.802**
Cadmium	mg/kg	0.1 -1.0	1 or SB	0.311 J	0.259 J	0.262 J	ND (0.631)	0.304 J
Calcium	mg/kg	130 - 35000	SB	2830	3620	3870	74200	3690
Chromium Total	mg/kg	1.5 - 40	50b or SB	44.5 J	46.6	45.5 J	**326**	**58.7**
Chromium VI (Hexavalent	mg/kg	NS	NS	ND (4.9)	1.6 J	ND (4.8)	1.8 J	ND (4.9) UJ
Cobalt	mg/kg	2.5 or 60	30 or SB	10.2	14.0	10.6	8.54	12.5
Copper	mg/kg	1.0 - 50	25 or SB	18.1	20.2	19.4	23.0	24.0
Cyanide (total)	mg/kg	NS	NS	0.255 J	0.193 J	0.254 J	ND (0.604) UJ	0.359 J
Iron	mg/kg	2000 - 550000	2000 or SB	**22200**	**29300**	**25100**	**18600**	**25800**
Lead	mg/kg	NS	SB	25.4	22.3	21.4	47.1	31.2
Magnesium	mg/kg	100 - 5000	SB	4020	5050	4940	16900	4820
Manganese	mg/kg	50 - 5000	SB	657	831	649	594	863
Mercury	mg/kg	0.001 - 0.2	0.1	0.0560	0.0609	0.0555	0.0298 J	0.0800
Nickel	mg/kg	0.5 - 25	13 or SB	**22.9**	**25.7**	**23.4**	**25.0**	**31.3**
Potassium	mg/kg	8500 - 43000	SB	2140	2570	2450	2620	2390
Selenium	mg/kg	0.1 - 3.9	2 or SB	ND (2.27)	ND (1.19)	ND (2.68)	**5.06**	ND (1.01)
Silver	mg/kg	NS	SB	ND (0.909)	0.451 J	ND (0.893)	0.379 J	0.429 J
Sodium	mg/kg	6000 - 8000	SB	ND (90.9)	ND (119)	ND (89.3)	ND (150)	ND (101)
Thallium	mg/kg	NS	SB	ND (0.909)	1.60	0.587 J	ND (1.26)	1.46
Vanadium	mg/kg	1.0 - 300	150 or SB	35.5	42.9	38.5	36.5	40.4 J
Zinc	mg/kg	9.0 - 50.0	20 or SB	**94.1**	**118**	**87.8**	**418**	**138**

TABLE B.1

SURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SS-19*	*SS-21*	*SS-25*	*SS-26*	*SS-28*
Sample ID:				*SS-19867-0703-PK-032*	*SS-19867-0703-PK-022*	*SS-19867-0703-PK-033*	*SS-19867-0703-PK-021*	*SS-19867-0703-PK-020*
Sample Date:				*7/21/2003*	*7/18/2003*	*7/21/2003*	*7/18/2003*	*7/18/2003*
Sample Depth:				*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*
Sample Matrix:				*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*
	Units	*Eastern USA Background*	*TAGMa*					
SVOAs								
2-Methylnaphthalene	mg/kg	NS	36.4	--	--	--	--	--
2-Methylphenol	mg/kg	NS	0.1	--	--	--	--	--
4-Methylphenol	mg/kg	NS	0.09	--	--	--	--	--
Acenaphthene	mg/kg	NS	50	--	--	--	--	--
Acenaphthylene	mg/kg	NS	41	--	--	--	--	--
Anthracene	mg/kg	NS	50	--	--	--	--	--
Benzo(a)anthracene	mg/kg	NS	0.224	--	--	--	--	--
Benzo(a)pyrene	mg/kg	NS	0.061	--	--	--	--	--
Benzo(b)fluoranthene	mg/kg	NS	1.1	--	--	--	--	--
Benzo(g,h,i)perylene	mg/kg	NS	50	--	--	--	--	--
Benzo(k)fluoranthene	mg/kg	NS	1.1	--	--	--	--	--
bis(2-Ethylhexyl)phthalate	mg/kg	NS	50	--	--	--	--	--
Butyl benzylphthalate	mg/kg	NS	50	--	--	--	--	--
Carbazole	mg/kg	NS	NS	--	--	--	--	--
Chrysene	mg/kg	NS	0.04	--	--	--	--	--
Dibenz(a,h)anthracene	mg/kg	NS	0.014	--	--	--	--	--
Dibenzofuran	mg/kg	NS	6.2	--	--	--	--	--
Diethyl phthalate	mg/kg	NS	7.1	--	--	--	--	--
Di-n-butylphthalate	mg/kg	NS	NS	--	--	--	--	--
Fluoranthene	mg/kg	NS	50	--	--	--	--	--
Fluorene	mg/kg	NS	50	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	mg/kg	NS	3.2	--	--	--	--	--
Methylene chloride	mg/kg	NS	0.1	--	--	--	--	--
Naphthalene	mg/kg	NS	13	--	--	--	--	--
Phenanthrene	mg/kg	NS	50	--	--	--	--	--
Phenol	mg/kg	NS	0.03	--	--	--	--	--
Pyrene	mg/kg	NS	50	--	--	--	--	--

TABLE B.1

SURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SS-19*	*SS-21*	*SS-25*	*SS-26*	*SS-28*
Sample ID:				*SS-19867-0703-PK-032*	*SS-19867-0703-PK-022*	*SS-19867-0703-PK-033*	*SS-19867-0703-PK-021*	*SS-19867-0703-PK-020*
Sample Date:				*7/21/2003*	*7/18/2003*	*7/21/2003*	*7/18/2003*	*7/18/2003*
Sample Depth:				*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*
Sample Matrix:				*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*
	Units	*Eastern USA Background*	*TAGMa*					
VOAs								
Acetone	mg/kg	NS	0.2	–	–	–	–	–
Methylene chloride	mg/kg	NS	0.1	–	–	–	–	–
Wet								
Percent Moisture	%	NS	NS	21.3	17.7	16.2	29.3	16.4
pH	s.u.	NS	NS	7.2	7.2 J	7.5	7.2 J	6.5 J
Reactive Cyanide	mg/kg	NS	NS	–	–	–	–	–
Reactive Sulfide	mg/kg	NS	NS	–	–	–	–	–
Total Solids	%	NS	NS	–	–	–	–	–

TABLE B.1

SURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SS-29*	*SS-33*	*SS-34*	*SS-35*	*SS-36*
Sample ID:				*SS-19867-0703-PK-017*	*SS-19867-0703-PK-018*	*SS-19867-0703-PK-019*	*SS-19867-0703-PK-016*	*SS-19867-0703-PK-015*
Sample Date:				*7/18/2003*	*7/18/2003*	*7/18/2003*	*7/18/2003*	*7/18/2003*
Sample Depth:				*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*
Sample Matrix:				*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*
	Units	*Eastern USA Background*	*TAGMa*					
Metals								
Aluminum	mg/kg	33000	SB	31900	18800	17700	19800	29700
Antimony	mg/kg	NS	SB	R	R	R	R	R
Arsenic	mg/kg	3 - 12	7.5 or SB	**16.6**	7.11	6.25	6.89	**14.0**
Barium	mg/kg	15 - 600	300 or SB	102	141	117	126	91.8
Beryllium	mg/kg	0 - 1.75	0.16 or SB	**0.726**	**0.840**	**0.784**	**0.833**	**0.675**
Cadmium	mg/kg	0.1 -1.0	1 or SB	0.213 J	0.354 J	0.312 J	0.160 J	0.0696 J
Calcium	mg/kg	130 - 35000	SB	16100	3370	6470	13800	23700
Chromium Total	mg/kg	1.5 - 40	50b or SB	46.7	**64.5**	41.4	**101**	40.8
Chromium VI (Hexavalent	mg/kg	NS	NS	ND (6.0) UJ	ND (4.9) UJ	ND (4.2) UJ	ND (5.5) UJ	ND (5.3) UJ
Cobalt	mg/kg	2.5 or 60	30 or SB	11.1	13.0	11.3	12.5	10.1
Copper	mg/kg	1.0 - 50	25 or SB	**37.5**	**25.3**	23.3	23.2	**32.5**
Cyanide (total)	mg/kg	NS	NS	0.398 J	0.334 J	ND (0.536) UJ	0.323 J	0.258 J
Iron	mg/kg	2000 - 550000	2000 or SB	**23800**	**26900**	**24500**	**27000**	**22000**
Lead	mg/kg	NS	SB	26.2	30.1	29.9	33.2	23.4
Magnesium	mg/kg	100 - 5000	SB	8840	4950	6120	7410	11000
Manganese	mg/kg	50 - 5000	SB	620	943	651	795	543
Mercury	mg/kg	0.001 - 0.2	0.1	0.0849	0.0666	0.0762	0.0860	**0.123**
Nickel	mg/kg	0.5 - 25	13 or SB	**31.4**	**32.9**	**28.1**	**29.3**	**27.7**
Potassium	mg/kg	8500 - 43000	SB	2500	2540	2610	2480	2100
Selenium	mg/kg	0.1 - 3.9	2 or SB	0.998 J	1.17 J	0.980 J	0.950 J	1.40
Silver	mg/kg	NS	SB	0.285 J	0.490 J	0.368 J	0.412 J	0.306 J
Sodium	mg/kg	6000 - 8000	SB	ND (108)	ND (121)	ND (111)	ND (115)	ND (123)
Thallium	mg/kg	NS	SB	1.37	1.66	1.69	1.78	1.54
Vanadium	mg/kg	1.0 - 300	150 or SB	33.8 J	41.3 J	37.1 J	41.3 J	30.0 J
Zinc	mg/kg	9.0 - 50.0	20 or SB	**126**	**132**	**127**	**205**	**114**

TABLE B.1

SURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SS-29*	*SS-33*	*SS-34*	*SS-35*	*SS-36*
Sample ID:				*SS-19867-0703-PK-017*	*SS-19867-0703-PK-018*	*SS-19867-0703-PK-019*	*SS-19867-0703-PK-016*	*SS-19867-0703-PK-015*
Sample Date:				*7/18/2003*	*7/18/2003*	*7/18/2003*	*7/18/2003*	*7/18/2003*
Sample Depth:				*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*
Sample Matrix:				*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*
	Units	*Eastern USA Background*	*TAGMa*					
SVOAs								
2-Methylnaphthalene	mg/kg	NS	36.4	–	–	–	–	–
2-Methylphenol	mg/kg	NS	0.1	–	–	–	–	–
4-Methylphenol	mg/kg	NS	0.09	–	–	–	–	–
Acenaphthene	mg/kg	NS	50	–	–	–	–	–
Acenaphthylene	mg/kg	NS	41	–	–	–	–	–
Anthracene	mg/kg	NS	50	–	–	–	–	–
Benzo(a)anthracene	mg/kg	NS	0.224	–	–	–	–	–
Benzo(a)pyrene	mg/kg	NS	0.061	–	–	–	–	–
Benzo(b)fluoranthene	mg/kg	NS	1.1	–	–	–	–	–
Benzo(g,h,i)perylene	mg/kg	NS	50	–	–	–	–	–
Benzo(k)fluoranthene	mg/kg	NS	1.1	–	–	–	–	–
bis(2-Ethylhexyl)phthalate	mg/kg	NS	50	–	–	–	–	–
Butyl benzylphthalate	mg/kg	NS	50	–	–	–	–	–
Carbazole	mg/kg	NS	NS	–	–	–	–	–
Chrysene	mg/kg	NS	0.04	–	–	–	–	–
Dibenz(a,h)anthracene	mg/kg	NS	0.014	–	–	–	–	–
Dibenzofuran	mg/kg	NS	6.2	–	–	–	–	–
Diethyl phthalate	mg/kg	NS	7.1	–	–	–	–	–
Di-n-butylphthalate	mg/kg	NS	NS	–	–	–	–	–
Fluoranthene	mg/kg	NS	50	–	–	–	–	–
Fluorene	mg/kg	NS	50	–	–	–	–	–
Indeno(1,2,3-cd)pyrene	mg/kg	NS	3.2	–	–	–	–	–
Methylene chloride	mg/kg	NS	0.1	–	–	–	–	–
Naphthalene	mg/kg	NS	13	–	–	–	–	–
Phenanthrene	mg/kg	NS	50	–	–	–	–	–
Phenol	mg/kg	NS	0.03	–	–	–	–	–
Pyrene	mg/kg	NS	50	–	–	–	–	–

TABLE B.1

SURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SS-29*	*SS-33*	*SS-34*	*SS-35*	*SS-36*
Sample ID:				*SS-19867-0703-PK-017*	*SS-19867-0703-PK-018*	*SS-19867-0703-PK-019*	*SS-19867-0703-PK-016*	*SS-19867-0703-PK-015*
Sample Date:				*7/18/2003*	*7/18/2003*	*7/18/2003*	*7/18/2003*	*7/18/2003*
Sample Depth:				*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*
Sample Matrix:				*SUSO*	*SUSO*	*SUSO*	*SUSO*	*SUSO*
	Units	*Eastern USA Background*	*TAGMa*					
VOAs								
Acetone	mg/kg	NS	0.2	–	–	–	–	–
Methylene chloride	mg/kg	NS	0.1	–	–	–	–	–
Wet								
Percent Moisture	%	NS	NS	20.1	19.2	15.2	17.9	20.6
pH	s.u.	NS	NS	7.7 J	7.3 J	7.6 J	8.0 J	7.6 J
Reactive Cyanide	mg/kg	NS	NS	–	–	–	–	–
Reactive Sulfide	mg/kg	NS	NS	–	–	–	–	–
Total Solids	%	NS	NS	–	–	–	–	–

TABLE B.1

SURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				***SS-38***	***SS-39***
Sample ID:				***SS-19867-0703-PK-003***	***SS-19867-0703-PK-002***
Sample Date:				***7/18/2003***	***7/18/2003***
Sample Depth:				***0-0.167 ft***	***0-0.167 ft***
Sample Matrix:				***SUSO***	***SUSO***
	Units	***Eastern USA Background***	***TAGMa***		
Metals					
Aluminum	mg/kg	33000	SB	9390	7310
Antimony	mg/kg	NS	SB	R	R
Arsenic	mg/kg	3 - 12	7.5 or SB	**10.6**	5.16
Barium	mg/kg	15 - 600	300 or SB	144	82.9
Beryllium	mg/kg	0 - 1.75	0.16 or SB	**0.495 J**	**0.317 J**
Cadmium	mg/kg	0.1 -1.0	1 or SB	0.198 J	ND (0.521)
Calcium	mg/kg	130 - 35000	SB	61400	56900
Chromium Total	mg/kg	1.5 - 40	50b or SB	**207**	15.4
Chromium VI (Hexavalent	mg/kg	NS	NS	ND (4.2) UJ	ND (4.5) UJ
Cobalt	mg/kg	2.5 or 60	30 or SB	6.85	5.86
Copper	mg/kg	1.0 - 50	25 or SB	**39.3**	**38.4**
Cyanide (total)	mg/kg	NS	NS	0.288 J	ND (0.532)
Iron	mg/kg	2000 - 550000	2000 or SB	**17800**	**14900**
Lead	mg/kg	NS	SB	130	95.4
Magnesium	mg/kg	100 - 5000	SB	29600	12200
Manganese	mg/kg	50 - 5000	SB	1060	797
Mercury	mg/kg	0.001 - 0.2	0.1	**0.784**	**0.131**
Nickel	mg/kg	0.5 - 25	13 or SB	**19.5**	**13.8**
Potassium	mg/kg	8500 - 43000	SB	1660	1150
Selenium	mg/kg	0.1 - 3.9	2 or SB	**2.70**	**3.28**
Silver	mg/kg	NS	SB	0.393 J	0.191 J
Sodium	mg/kg	6000 - 8000	SB	249	ND (104)
Thallium	mg/kg	NS	SB	0.921 J	0.934 J
Vanadium	mg/kg	1.0 - 300	150 or SB	21.2 J	17.1 J
Zinc	mg/kg	9.0 - 50.0	20 or SB	**203**	**114**

TABLE B.1

SURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SS-38*	*SS-39*
Sample ID:				*SS-19867-0703-PK-003*	*SS-19867-0703-PK-002*
Sample Date:				*7/18/2003*	*7/18/2003*
Sample Depth:				*0-0.167 ft*	*0-0.167 ft*
Sample Matrix:				*SUSO*	*SUSO*
	Units	*Eastern USA Background*	*TAGMa*		
SVOAs					
2-Methylnaphthalene	mg/kg	NS	36.4	–	–
2-Methylphenol	mg/kg	NS	0.1	–	–
4-Methylphenol	mg/kg	NS	0.09	–	–
Acenaphthene	mg/kg	NS	50	–	–
Acenaphthylene	mg/kg	NS	41	–	–
Anthracene	mg/kg	NS	50	–	–
Benzo(a)anthracene	mg/kg	NS	0.224	–	–
Benzo(a)pyrene	mg/kg	NS	0.061	–	–
Benzo(b)fluoranthene	mg/kg	NS	1.1	–	–
Benzo(g,h,i)perylene	mg/kg	NS	50	–	–
Benzo(k)fluoranthene	mg/kg	NS	1.1	–	–
bis(2-Ethylhexyl)phthalate	mg/kg	NS	50	–	–
Butyl benzylphthalate	mg/kg	NS	50	–	–
Carbazole	mg/kg	NS	NS	–	–
Chrysene	mg/kg	NS	0.04	–	–
Dibenz(a,h)anthracene	mg/kg	NS	0.014	–	–
Dibenzofuran	mg/kg	NS	6.2	–	–
Diethyl phthalate	mg/kg	NS	7.1	–	–
Di-n-butylphthalate	mg/kg	NS	NS	–	–
Fluoranthene	mg/kg	NS	50	–	–
Fluorene	mg/kg	NS	50	–	–
Indeno(1,2,3-cd)pyrene	mg/kg	NS	3.2	–	–
Methylene chloride	mg/kg	NS	0.1	–	–
Naphthalene	mg/kg	NS	13	–	–
Phenanthrene	mg/kg	NS	50	–	–
Phenol	mg/kg	NS	0.03	–	–
Pyrene	mg/kg	NS	50	–	–

TABLE B.1

SURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SS-38*	*SS-39*
Sample ID:				*SS-19867-0703-PK-003*	*SS-19867-0703-PK-002*
Sample Date:				*7/18/2003*	*7/18/2003*
Sample Depth:				*0-0.167 ft*	*0-0.167 ft*
Sample Matrix:				*SUSO*	*SUSO*
	Units	*Eastern USA Background*	*TAGMa*		
VOAs					
Acetone	mg/kg	NS	0.2	–	–
Methylene chloride	mg/kg	NS	0.1	–	–
Wet					
Percent Moisture	%	NS	NS	12.6	6.00
pH	s.u.	NS	NS	8.0 J	6.9 J
Reactive Cyanide	mg/kg	NS	NS	–	–
Reactive Sulfide	mg/kg	NS	NS	–	–
Total Solids	%	NS	NS	–	–

TABLE B.1

SURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Notes:

a	- NYSDEC Technical and Adminiatrative Guidance, Recommended Soil Cleanup Objectives, January 1994.
b	- Telephone conversation, Jim Harrington, NYSDEC, February 3, 2004.
–	- No Data
NS	- No Standard
ND ()	- Non detect at associated value
J	- Estimated Value
E	- Concentrations exceed the calibration range
N	- Spike sample recovery was not within the control limits
B	- Value greater than or equal to the instrument detection limit, but less than the contract required detection limit
D	- Analysis at a secondary dilution factor
U	- Not Detected
*	- Duplicate analysis not within the control limits
SB	- Soil background

TABLE B.2

SURFACE SLAG ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*Next to TP-20*	*SB-3A*	*SS-3*	*SS-15*	*SS-16*	*SS-16*
Sample ID:				*S-19867-08-03-PK-031*	*SB-3A*	*SS-3*	*SS-19867-0703-PK-013*	*SS-19867-0703-PK-024*	*SS-19867-0703-PK-025*
Sample Date:				*8/18/2003*	*11/7/1996*	*11/7/1996*	*7/18/2003*	*7/18/2003*	*7/18/2003*
Sample Depth:				*0-1.5 ft*			*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*
Sample Matrix:				*SUSO-Slag*	*SUSO-Slag*	*SUSO-Slag*	*SUSO-Slag*	*SUSO-Slag*	*SUSO-Slag*
									Duplicate
	Units	*Eastern USA Background*	*TAGMa*						
Metals									
Aluminum	mg/kg	33000	SB	12700 B	16600	113000	16100	11700	13400
Antimony	mg/kg	NS	SB	4.50	339	86.4	R	ND (0.980) UJ	ND (2.12)
Arsenic	mg/kg	3 - 12	7.5 or SB	**35.8**	ND (0.47)	5.0	**11.7**	**37.8**	**45.3**
Barium	mg/kg	15 - 600	300 or SB	**308 B**	163	264	209	215 J	278
Beryllium	mg/kg	0 - 1.75	0.16 or SB	**0.965**	ND (0.05)	**0.35 B**	**0.301 J**	**0.347 J**	**0.706**
Cadmium	mg/kg	0.1 -1.0	1 or SB	0.419 J	**6.2**	**141**	ND (1.67)	ND (0.490)	ND (0.519)
Calcium	mg/kg	130 - 35000	SB	27700 B	--	--	193000	80800	89800
Chromium Total	mg/kg	1.5 - 40	50b or SB	**317**	**11800**	**1300**	**5140**	**997 J**	**1260**
Chromium VI (Hexavalen	mg/kg	NS	NS	3.1 J	--	ND (0.003)	5.6 J	ND (4.7)	ND (4.7)
Cobalt	mg/kg	2.5 or 60	30 or SB	12.9	**72.3**	20.2	19.8	14.4	26.8
Copper	mg/kg	1.0 - 50	25 or SB	**379**	**175 E**	**5420 E**	**97.2**	**60.9**	**76.4**
Cyanide (total)	mg/kg	NS	NS	ND (0.603)	--	--	0.302 J	0.303 J	0.176 J
Iron	mg/kg	2000 - 550000	2000 or SB	**52200 B**	**51300**	**27600**	**23100**	**24400**	**25200**
Lead	mg/kg	NS	SB	172	52.2	1760	86.3	75.0	92.0
Magnesium	mg/kg	100 - 5000	SB	9740 J	19400	20700	21300	15900	17700
Manganese	mg/kg	50 - 5000	SB	2330 J	4240 *	1470 *	8990	1470	1610
Mercury	mg/kg	0.001 - 0.2	0.1	**0.216**	ND (0.05) N	ND (0.05) N	0.0413	**0.295**	**0.266**
Nickel	mg/kg	0.5 - 25	13 or SB	**87.8 B**	**5160**	**454**	**637**	**443**	**555**
Potassium	mg/kg	8500 - 43000	SB	1450	ND (36.1) E	799 BE	460	1140	1380
Selenium	mg/kg	0.1 - 3.9	2 or SB	**7.27**	**8.8**	**5.8**	**26.3**	**6.33**	**12.0**
Silver	mg/kg	NS	SB	ND (1.07)	ND (0.23) N	4.2 N	4.38	ND (0.980)	0.428 J
Sodium	mg/kg	6000 - 8000	SB	302	ND (29.1)	129 B	ND (333)	ND (98.0)	ND (132)
Thallium	mg/kg	NS	SB	ND (1.07)	0.82 B	ND (0.64)	2.04 J	ND (0.980)	0.792 J
Vanadium	mg/kg	1.0 - 300	150 or SB	28.1	**151**	26.9	**191 J**	69.3	81.8
Zinc	mg/kg	9.0 - 50.0	20 or SB	**258**	**323**	**1400**	**170**	**133**	**154**

TABLE B.2

SURFACE SLAG ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*Next to TP-20*	*SB-3A*	*SS-3*	*SS-15*	*SS-16*	*SS-16*
Sample ID:				*S-19867-08-03-PK-031*	*SB-3A*	*SS-3*	*SS-19867-0703-PK-013*	*SS-19867-0703-PK-024*	*SS-19867-0703-PK-025*
Sample Date:				*8/18/2003*	*11/7/1996*	*11/7/1996*	*7/18/2003*	*7/18/2003*	*7/18/2003*
Sample Depth:				*0-1.5 ft*			*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*
Sample Matrix:				*SUSO-Slag*	*SUSO-Slag*	*SUSO-Slag*	*SUSO-Slag*	*SUSO-Slag*	*SUSO-Slag*
									Duplicate
	Units	*Eastern USA Background*	*TAGMa*						
MetalsR									
Arsenic	mg/L	NS	NS	–	–	–	–	–	–
Barium	mg/L	NS	NS	–	–	–	–	–	–
Cadmium	mg/L	NS	NS	–	–	–	–	–	–
Chromium Total	mg/L	NS	NS	–	–	–	–	–	–
Lead	mg/L	NS	NS	–	–	–	–	–	–
Mercury	mg/L	NS	NS	–	–	–	–	–	–
Selenium	mg/L	NS	NS	–	–	–	–	–	–
Silver	mg/L	NS	NS	–	–	–	–	–	–
SVOAs									
2,4-Dimethylphenol	mg/kg	NS	NS	–	–	–	–	–	–
2-Methylnaphthalene	mg/kg	NS	36.4	–	–	0.066 J	–	–	–
2-Methylphenol	mg/kg	NS	0.1	–	–	–	–	–	–
Acenaphthene	mg/kg	NS	50	–	0.27 J	0.17 J	–	–	–
Acenaphthylene	mg/kg	NS	41	–	–	–	–	–	–
Anthracene	mg/kg	NS	50	–	0.24 J	0.34 J	–	–	–
Benzo(a)anthracene	mg/kg	NS	0.224	–	**2.2**	**1.5**	–	–	–
Benzo(a)pyrene	mg/kg	NS	0.061	–	**2.3**	**1.4**	–	–	–
Benzo(b)fluoranthene	mg/kg	NS	1.1	–	**2.5**	**2.6**	–	–	–
Benzo(g,h,i)perylene	mg/kg	NS	50	–	2.2	1.3	–	–	–
Benzo(k)fluoranthene	mg/kg	NS	1.1	–	**1.8**	ND	–	–	–
bis(2-Ethylhexyl)phthalate	mg/kg	NS	50	–	0.15 J	0.13 J	–	–	–
Carbazole	mg/kg	NS	NS	–	0.19 J	0.33 J	–	–	–
Chrysene	mg/kg	NS	0.04	–	**1.9**	**1.4**	–	–	–
Dibenz(a,h)anthracene	mg/kg	NS	0.014	–	**0.88**	**0.55**	–	–	–
Dibenzofuran	mg/kg	NS	6.2	–	0.046 J	0.13 J	–	–	–
Diethyl phthalate	mg/kg	NS	7.1	–	ND	0.11 J	–	–	–
Di-n-butylphthalate	mg/kg	NS	NS	–	–	0.094 J	–	–	–
Di-n-octyl phthalate	mg/kg	NS	NS	–	–	–	–	–	–

TABLE B.2

SURFACE SLAG ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*Next to TP-20*	*SB-3A*	*SS-3*	*SS-15*	*SS-16*	*SS-16*
Sample ID:				*S-19867-08-03-PK-031*	*SB-3A*	*SS-3*	*SS-19867-0703-PK-013*	*SS-19867-0703-PK-024*	*SS-19867-0703-PK-025*
Sample Date:				*8/18/2003*	*11/7/1996*	*11/7/1996*	*7/18/2003*	*7/18/2003*	*7/18/2003*
Sample Depth:				*0-1.5 ft*			*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*
Sample Matrix:				*SUSO-Slag*	*SUSO-Slag*	*SUSO-Slag*	*SUSO-Slag*	*SUSO-Slag*	*SUSO-Slag Duplicate*
	Units	*Eastern USA Background*	*TAGMa*						
Fluoranthene	mg/kg	NS	50	–	2.2	1.9	–	–	–
Fluorene	mg/kg	NS	50	–	0.096 J	0.15 J	–	–	–
Indeno(1,2,3-cd)pyrene	mg/kg	NS	3.2	–	1.9	1.2	–	–	–
Naphthalene	mg/kg	NS	13	–	0.049 J	0.18 J	–	–	–
Phenanthrene	mg/kg	NS	50	–	1.1	1.5	–	–	–
Phenol	mg/kg	NS	0.03	–	–	–	–	–	–
Pyrene	mg/kg	NS	50	–	2.8	2	–	–	–
Wet									
Percent Moisture	%	NS	NS	11.9	–	–	16.6	15.6	15.5
pH	S.U.	NS	NS	–	–	–	8.2 J	7.5 J	7.7 J

TABLE B.2

SURFACE SLAG ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SS-20*	*SS-22*	*SS-23*	*SS-24*	*SS-27*	*SS-30*
Sample ID:				*SS-19867-0703-PK-023*	*SS-19867-0703-PK-012*	*SS-19867-0703-PK-010*	*SS-19867-0703-PK-011*	*SS-19867-0703-PK-009*	*SS-19867-0703-PK-008*
Sample Date:				*7/18/2003*	*7/18/2003*	*7/18/2003*	*7/18/2003*	*7/18/2003*	*7/18/2003*
Sample Depth:				*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*
Sample Matrix:				*SUSO-Slag*	*SUSO-Slag*	*SUSO-Slag*	*SUSO-Slag*	*SUSO-Slag*	*SUSO-Slag*
	Units	*Eastern USA Background*	*TAGMa*						
Metals									
Aluminum	mg/kg	33000	SB	20800	21800	21000	16300	13400	12800
Antimony	mg/kg	NS	SB	ND (2.20)	R	R	R	R	R
Arsenic	mg/kg	3 - 12	7.5 or SB	4.04	2.53	ND (2.06)	ND (1.97)	ND (1.05)	5.09
Barium	mg/kg	15 - 600	300 or SB	170	120	175	**675**	88.3	192
Beryllium	mg/kg	0 - 1.75	0.16 or SB	ND (0.550)	ND (0.629)	ND (0.560)	**0.632**	**0.222 J**	**0.186 J**
Cadmium	mg/kg	0.1 -1.0	1 or SB	ND (0.550)	ND (0.629)	ND (0.560)	ND (0.536)	ND (0.525)	ND (0.630)
Calcium	mg/kg	130 - 35000	SB	193000	212000	215000	121000	148000	157000
Chromium Total	mg/kg	1.5 - 40	50b or SB	**6780**	**7540**	**10300**	**807**	**1740**	**2550**
Chromium VI (Hexavalent	mg/kg	NS	NS	8.4	15 J	16 J	2.0 J	10 J	3.2 J
Cobalt	mg/kg	2.5 or 60	30 or SB	**31.7**	**30.2**	**34.1**	7.44	3.79	**33.9**
Copper	mg/kg	1.0 - 50	25 or SB	**72.1**	**92.3**	**83.8**	**36.4**	**29.4**	**95.6**
Cyanide (total)	mg/kg	NS	NS	ND (0.587) UJ	0.257 J	ND (0.536)	0.201 J	ND (0.561)	0.229 J
Iron	mg/kg	2000 - 550000	2000 or SB	**22300**	**21300**	**21800**	**15100**	**7630**	**26100**
Lead	mg/kg	NS	SB	44.9	32.2	42.6	26.8	28.1	40.4
Magnesium	mg/kg	100 - 5000	SB	29900	20300	24700	26100	56200	21400
Manganese	mg/kg	50 - 5000	SB	3050	3510	4000	2050	615	2900
Mercury	mg/kg	0.001 - 0.2	0.1	0.0241 J	0.0469	0.0380	0.0218 J	0.0115 J	0.0422
Nickel	mg/kg	0.5 - 25	13 or SB	**779**	**1210**	**1150**	**86.3**	**64.4**	**1200**
Potassium	mg/kg	8500 - 43000	SB	538	436	336	1850	602	892
Selenium	mg/kg	0.1 - 3.9	2 or SB	**22.9**	**20.3**	**21.4**	**6.16**	**3.98**	**14.3**
Silver	mg/kg	NS	SB	1.23	1.44	1.88	0.414 J	0.383 J	0.768 J
Sodium	mg/kg	6000 - 8000	SB	ND (110)	ND (126)	209	ND (144)	ND (152)	519
Thallium	mg/kg	NS	SB	ND (1.10)	31.2	ND (1.12)	ND (1.07)	17.7	ND (1.26)
Vanadium	mg/kg	1.0 - 300	150 or SB	**263**	**202 J**	**227 J**	44.5 J	42.9 J	86.6 J
Zinc	mg/kg	9.0 - 50.0	20 or SB	**181**	**174**	**118**	**129**	**103**	**111**

TABLE B.2

SURFACE SLAG ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SS-20*	*SS-22*	*SS-23*	*SS-24*	*SS-27*	*SS-30*
Sample ID:				*SS-19867-0703-PK-023*	*SS-19867-0703-PK-012*	*SS-19867-0703-PK-010*	*SS-19867-0703-PK-011*	*SS-19867-0703-PK-009*	*SS-19867-0703-PK-008*
Sample Date:				*7/18/2003*	*7/18/2003*	*7/18/2003*	*7/18/2003*	*7/18/2003*	*7/18/2003*
Sample Depth:				*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*
Sample Matrix:				*SUSO-Slag*	*SUSO-Slag*	*SUSO-Slag*	*SUSO-Slag*	*SUSO-Slag*	*SUSO-Slag*
	Units	*Eastern USA Background*	*TAGMa*						
MetalsR									
Arsenic	mg/L	NS	NS	–	–	–	–	–	–
Barium	mg/L	NS	NS	–	–	–	–	–	–
Cadmium	mg/L	NS	NS	–	–	–	–	–	–
Chromium Total	mg/L	NS	NS	–	–	–	–	–	–
Lead	mg/L	NS	NS	–	–	–	–	–	–
Mercury	mg/L	NS	NS	–	–	–	–	–	–
Selenium	mg/L	NS	NS	–	–	–	–	–	–
Silver	mg/L	NS	NS	–	–	–	–	–	–
SVOAs									
2,4-Dimethylphenol	mg/kg	NS	NS	–	–	–	–	–	–
2-Methylnaphthalene	mg/kg	NS	36.4	–	–	–	–	–	–
2-Methylphenol	mg/kg	NS	0.1	–	–	–	–	–	–
Acenaphthene	mg/kg	NS	50	–	–	–	–	–	–
Acenaphthylene	mg/kg	NS	41	–	–	–	–	–	–
Anthracene	mg/kg	NS	50	–	–	–	–	–	–
Benzo(a)anthracene	mg/kg	NS	0.224	–	–	–	–	–	–
Benzo(a)pyrene	mg/kg	NS	0.061	–	–	–	–	–	–
Benzo(b)fluoranthene	mg/kg	NS	1.1	–	–	–	–	–	–
Benzo(g,h,i)perylene	mg/kg	NS	50	–	–	–	–	–	–
Benzo(k)fluoranthene	mg/kg	NS	1.1	–	–	–	–	–	–
bis(2-Ethylhexyl)phthalate	mg/kg	NS	50	–	–	–	–	–	–
Carbazole	mg/kg	NS	NS	–	–	–	–	–	–
Chrysene	mg/kg	NS	0.04	–	–	–	–	–	–
Dibenz(a,h)anthracene	mg/kg	NS	0.014	–	–	–	–	–	–
Dibenzofuran	mg/kg	NS	6.2	–	–	–	–	–	–
Diethyl phthalate	mg/kg	NS	7.1	–	–	–	–	–	–
Di-n-butylphthalate	mg/kg	NS	NS	–	–	–	–	–	–
Di-n-octyl phthalate	mg/kg	NS	NS	–	–	–	–	–	–

TABLE B.2

SURFACE SLAG ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SS-20*	*SS-22*	*SS-23*	*SS-24*	*SS-27*	*SS-30*
Sample ID:				*SS-19867-0703-PK-023*	*SS-19867-0703-PK-012*	*SS-19867-0703-PK-010*	*SS-19867-0703-PK-011*	*SS-19867-0703-PK-009*	*SS-19867-0703-PK-008*
Sample Date:				*7/18/2003*	*7/18/2003*	*7/18/2003*	*7/18/2003*	*7/18/2003*	*7/18/2003*
Sample Depth:				*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*
Sample Matrix:				*SUSO-Slag*	*SUSO-Slag*	*SUSO-Slag*	*SUSO-Slag*	*SUSO-Slag*	*SUSO-Slag*
	Units	*Eastern USA Background*	*TAGMa*						
Fluoranthene	mg/kg	NS	50	–	–	–	–	–	–
Fluorene	mg/kg	NS	50	–	–	–	–	–	–
Indeno(1,2,3-cd)pyrene	mg/kg	NS	3.2	–	–	–	–	–	–
Naphthalene	mg/kg	NS	13	–	–	–	–	–	–
Phenanthrene	mg/kg	NS	50	–	–	–	–	–	–
Phenol	mg/kg	NS	0.03	–	–	–	–	–	–
Pyrene	mg/kg	NS	50	–	–	–	–	–	–
Wet									
Percent Moisture	%	NS	NS	17.3	26.4	17.4	18.1	13.5	22.2
pH	S.U.	NS	NS	7.8 J	8.3 J	7.7 J	8.0 J	8.8 J	8.4 J

TABLE B.2

SURFACE SLAG ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SS-31*	*SS-32*	*SS-37*	*SS-37*	*SS-40*	*WT-105-92*
Sample ID:				*SS-19867-0703-PK-004*	*SS-19867-0703-PK-007*	*SS-19867-0703-PK-005*	*SS-19867-0703-PK-006*	*SS-19867-0703-PK-001*	*WT-105*
Sample Date:				*7/18/2003*	*7/18/2003*	*7/18/2003*	*7/18/2003*	*7/18/2003*	*1/1/1989*
Sample Depth:				*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*	
Sample Matrix:				*SUSO-Slag*	*SUSO-Slag*	*SUSO-Slag*	*SUSO-Slag Duplicate*	*SUSO-Slag*	*SUSO-Slag*
	Units	*Eastern USA Background*	*TAGMa*						
Metals									
Aluminum	mg/kg	33000	SB	12800	19000	16000	16500	6560	5960
Antimony	mg/kg	NS	SB	R	R	R	R	R	22.3
Arsenic	mg/kg	3 - 12	7.5 or SB	5.05	**7.52**	ND (1.15)	ND (1.22)	2.46	**24.2**
Barium	mg/kg	15 - 600	300 or SB	116	164	90.8	88.4	70.1	207
Beryllium	mg/kg	0 - 1.75	0.16 or SB	ND (0.613)	**0.849**	**0.332 J**	**0.339 J**	**0.224 J**	**1.1**
Cadmium	mg/kg	0.1 -1.0	1 or SB	ND (0.613)	0.295 J	ND (0.577)	ND (0.609)	0.191 J	ND (1)
Calcium	mg/kg	130 - 35000	SB	141000	31500	147000	145000	149000	5370
Chromium Total	mg/kg	1.5 - 40	50b or SB	**3130**	**278**	**846**	**825**	**1100**	R
Chromium VI (Hexavalen	mg/kg	NS	NS	4.3 J	ND (4.8) UJ	ND (5.6) UJ	2.0 J	ND (4.7) UJ	0.50
Cobalt	mg/kg	2.5 or 60	30 or SB	17.0	13.1	4.96	4.32	8.43	13.0 J
Copper	mg/kg	1.0 - 50	25 or SB	**80.7**	**29.1**	19.0	17.8	**462**	**1640**
Cyanide (total)	mg/kg	NS	NS	0.289 J	0.309 J	0.227 J	0.299 J	ND (0.509)	--
Iron	mg/kg	2000 - 550000	2000 or SB	**17800**	**27300**	**10400**	**10400**	**11600**	**30200**
Lead	mg/kg	NS	SB	72.2	38.5	27.1	27.0	70.7	4.2 J
Magnesium	mg/kg	100 - 5000	SB	52700	11300	40000	42200	61500	354
Manganese	mg/kg	50 - 5000	SB	1930	846	450	444	690	7190
Mercury	mg/kg	0.001 - 0.2	0.1	0.0589	0.0696	0.0267 J	0.0278 J	**0.375**	ND (0.04)
Nickel	mg/kg	0.5 - 25	13 or SB	**1570**	**36.9**	**27.3**	**26.1**	**658**	**199**
Potassium	mg/kg	8500 - 43000	SB	611	2730	1100	1070	1060	ND (1000)
Selenium	mg/kg	0.1 - 3.9	2 or SB	**8.96**	2.00	**6.66**	**5.82**	**2.65**	ND (1)
Silver	mg/kg	NS	SB	0.843 J	0.484 J	0.215 J	0.231 J	0.432 J	R
Sodium	mg/kg	6000 - 8000	SB	ND (123)	ND (126)	ND (115)	ND (122)	ND (168)	836
Thallium	mg/kg	NS	SB	ND (1.23)	1.81	16.2 J	ND (1.22) UJ	ND (1.03)	--
Vanadium	mg/kg	1.0 - 300	150 or SB	82.2 J	40.7 J	36.3 J	38.4 J	19.7 J	5.4
Zinc	mg/kg	9.0 - 50.0	20 or SB	**130**	**289**	**102**	**98.9**	**191**	19.2 J

TABLE B.2

SURFACE SLAG ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SS-31*	*SS-32*	*SS-37*	*SS-37*	*SS-40*	*WT-105-92*
Sample ID:				*SS-19867-0703-PK-004*	*SS-19867-0703-PK-007*	*SS-19867-0703-PK-005*	*SS-19867-0703-PK-006*	*SS-19867-0703-PK-001*	*WT-105*
Sample Date:				*7/18/2003*	*7/18/2003*	*7/18/2003*	*7/18/2003*	*7/18/2003*	*1/1/1989*
Sample Depth:				*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*	
Sample Matrix:				*SUSO-Slag*	*SUSO-Slag*	*SUSO-Slag*	*SUSO-Slag Duplicate*	*SUSO-Slag*	*SUSO-Slag*
	Units	*Eastern USA Background*	*TAGMa*						
MetalsR									
Arsenic	mg/L	NS	NS	–	–	–	–	–	ND (0.043)
Barium	mg/L	NS	NS	–	–	–	–	–	0.323 J
Cadmium	mg/L	NS	NS	–	–	–	–	–	ND (0.003)
Chromium Total	mg/L	NS	NS	–	–	–	–	–	ND (0.005)
Lead	mg/L	NS	NS	–	–	–	–	–	ND (0.04)
Mercury	mg/L	NS	NS	–	–	–	–	–	ND (0.0002)
Selenium	mg/L	NS	NS	–	–	–	–	–	ND (0.051)
Silver	mg/L	NS	NS	–	–	–	–	–	ND (0.004)
SVOAs									
2,4-Dimethylphenol	mg/kg	NS	NS	–	–	–	–	–	ND (0.33)
2-Methylnaphthalene	mg/kg	NS	36.4	–	–	–	–	–	0.008 JJ
2-Methylphenol	mg/kg	NS	0.1	–	–	–	–	–	ND (0.33)
Acenaphthene	mg/kg	NS	50	–	–	–	–	–	0.01 JJ
Acenaphthylene	mg/kg	NS	41	–	–	–	–	–	ND (0.33)
Anthracene	mg/kg	NS	50	–	–	–	–	–	ND (0.33)
Benzo(a)anthracene	mg/kg	NS	0.224	–	–	–	–	–	0.014 JJ
Benzo(a)pyrene	mg/kg	NS	0.061	–	–	–	–	–	ND (0.33)
Benzo(b)fluoranthene	mg/kg	NS	1.1	–	–	–	–	–	ND (0.33)
Benzo(g,h,i)perylene	mg/kg	NS	50	–	–	–	–	–	ND (0.33)
Benzo(k)fluoranthene	mg/kg	NS	1.1	–	–	–	–	–	ND (0.33)
bis(2-Ethylhexyl)phthalate	mg/kg	NS	50	–	–	–	–	–	–
Carbazole	mg/kg	NS	NS	–	–	–	–	–	ND (0.33)
Chrysene	mg/kg	NS	0.04	–	–	–	–	–	0.02 JJ
Dibenz(a,h)anthracene	mg/kg	NS	0.014	–	–	–	–	–	ND (0.33)
Dibenzofuran	mg/kg	NS	6.2	–	–	–	–	–	0.004 JJ
Diethyl phthalate	mg/kg	NS	7.1	–	–	–	–	–	0.008 JJ
Di-n-butylphthalate	mg/kg	NS	NS	–	–	–	–	–	0.022 JJ
Di-n-octyl phthalate	mg/kg	NS	NS	–	–	–	–	–	ND (0.33)

TABLE B.2

SURFACE SLAG ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SS-31*	*SS-32*	*SS-37*	*SS-37*	*SS-40*	*WT-105-92*
Sample ID:				*SS-19867-0703-PK-004*	*SS-19867-0703-PK-007*	*SS-19867-0703-PK-005*	*SS-19867-0703-PK-006*	*SS-19867-0703-PK-001*	*WT-105*
Sample Date:				*7/18/2003*	*7/18/2003*	*7/18/2003*	*7/18/2003*	*7/18/2003*	*1/1/1989*
Sample Depth:				*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*	*0-0.167 ft*	
Sample Matrix:				*SUSO-Slag*	*SUSO-Slag*	*SUSO-Slag*	*SUSO-Slag Duplicate*	*SUSO-Slag*	*SUSO-Slag*
	Units	*Eastern USA Background*	*TAGMa*						
Fluoranthene	mg/kg	NS	50	–	–	–	–	–	ND (0.33)
Fluorene	mg/kg	NS	50	–	–	–	–	–	0.004 JJ
Indeno(1,2,3-cd)pyrene	mg/kg	NS	3.2	–	–	–	–	–	ND (0.33)
Naphthalene	mg/kg	NS	13	–	–	–	–	–	0.044 JJ
Phenanthrene	mg/kg	NS	50	–	–	–	–	–	ND (0.33)
Phenol	mg/kg	NS	0.03	–	–	–	–	–	ND (0.33)
Pyrene	mg/kg	NS	50	–	–	–	–	–	ND (0.33)
Wet									
Percent Moisture	%	NS	NS	18.5	20.6	22.6	22.5	6.46	–
pH	S.U.	NS	NS	8.0 J	7.8 J	8.2 J	8.3 J	8.0 J	6.35

TABLE B.2

SURFACE SLAG ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*WT-106-92*	*WT-106-92*	*WT-107-92*	*WT-108-92*
Sample ID:				*WT-106*	*WT-106 DUP*	*WT-107*	*WT-108*
Sample Date:				*1/1/1989*	*1/1/1989*	*1/1/1989*	*1/1/1989*
Sample Depth:							
Sample Matrix:				*SUSO-Slag*	*SUSO-Slag Duplicate*	*SUSO-Slag*	*SUSO-Slag*
	Units	*Eastern USA Background*	*TAGMa*				
Metals							
Aluminum	mg/kg	33000	SB	11900	16700	15000	18800
Antimony	mg/kg	NS	SB	38.1	60.6	23.5 J	46.1 J
Arsenic	mg/kg	3 - 12	7.5 or SB	ND (2)	ND (2)	ND (2)	ND (2)
Barium	mg/kg	15 - 600	300 or SB	31.4	27.8	36.2 J	38.9 J
Beryllium	mg/kg	0 - 1.75	0.16 or SB	**0.44**	**0.86**	**0.77**	ND (1)
Cadmium	mg/kg	0.1 -1.0	1 or SB	ND (1)	ND (1)	**2.0 J**	ND (1)
Calcium	mg/kg	130 - 35000	SB	162000	203000	189000	217000
Chromium Total	mg/kg	1.5 - 40	50b or SB	R	R	**1030 J**	**2160 J**
Chromium VI (Hexavalent	mg/kg	NS	NS	51.4	66.2	4.11	91.6
Cobalt	mg/kg	2.5 or 60	30 or SB	3.7 J	5.0 J	3.2	2.9
Copper	mg/kg	1.0 - 50	25 or SB	7.7	9.6	7.7	7.0
Cyanide (total)	mg/kg	NS	NS	–	–	–	–
Iron	mg/kg	2000 - 550000	2000 or SB	**2390**	**3360**	**2850**	**3400**
Lead	mg/kg	NS	SB	3.9 J	6.8 J	6.0 J	3.6 J
Magnesium	mg/kg	100 - 5000	SB	56600	76900	71200	99200
Manganese	mg/kg	50 - 5000	SB	334	354	288	465
Mercury	mg/kg	0.001 - 0.2	0.1	ND (0.04)	ND (0.04)	ND (0.04)	ND (0.04)
Nickel	mg/kg	0.5 - 25	13 or SB	**18.0**	**23.5**	11.4 J	8.6 J
Potassium	mg/kg	8500 - 43000	SB	ND (1000)	ND (1000)	386	ND (1000)
Selenium	mg/kg	0.1 - 3.9	2 or SB	ND (1)	ND (1)	R	R
Silver	mg/kg	NS	SB	ND (2)	ND (2)	ND (2)	ND (2)
Sodium	mg/kg	6000 - 8000	SB	215	213	ND (1000)	ND (1000)
Thallium	mg/kg	NS	SB	–	–	–	–
Vanadium	mg/kg	1.0 - 300	150 or SB	42.7	69.0	39.8	55.2
Zinc	mg/kg	9.0 - 50.0	20 or SB	9.7 J	12.1 J	R	R

TABLE B.2

SURFACE SLAG ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*WT-106-92*	*WT-106-92*	*WT-107-92*	*WT-108-92*
Sample ID:				*WT-106*	*WT-106 DUP*	*WT-107*	*WT-108*
Sample Date:				*1/1/1989*	*1/1/1989*	*1/1/1989*	*1/1/1989*
Sample Depth:							
Sample Matrix:				*SUSO-Slag*	*SUSO-Slag Duplicate*	*SUSO-Slag*	*SUSO-Slag*
	Units	*Eastern USA Background*	*TAGMa*				
MetalsR							
Arsenic	mg/L	NS	NS	ND (0.043)	ND (0.043)	ND (0.043)	ND (0.043)
Barium	mg/L	NS	NS	0.459 J	0.522 J	0.412	0.564
Cadmium	mg/L	NS	NS	ND (0.003)	ND (0.003)	ND (0.003)	ND (0.003)
Chromium Total	mg/L	NS	NS	0.508 J	0.887 J	0.118	0.411
Lead	mg/L	NS	NS	ND (0.04)	ND (0.04)	ND (0.04)	ND (0.04)
Mercury	mg/L	NS	NS	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
Selenium	mg/L	NS	NS	ND (0.051)	ND (0.051)	ND (0.051)	ND (0.051)
Silver	mg/L	NS	NS	ND (0.004)	ND (0.004)	ND (0.004)	ND (0.004)
SVOAs							
2,4-Dimethylphenol	mg/kg	NS	NS	ND (0.33)	ND (0.33)	ND (0.33)	ND (0.33)
2-Methylnaphthalene	mg/kg	NS	36.4	ND (0.33)	0.005 JJ	ND (0.33)	ND (0.33)
2-Methylphenol	mg/kg	NS	0.1	ND (0.33)	ND (0.33)	ND (0.33)	ND (0.33)
Acenaphthene	mg/kg	NS	50	ND (0.33)	0.009 JJ	0.009 JJ	ND (0.33)
Acenaphthylene	mg/kg	NS	41	ND (0.33)	ND (0.33)	0.003 JJ	ND (0.33)
Anthracene	mg/kg	NS	50	ND (0.33)	0.029 JJ	0.007 JJ	ND (0.33)
Benzo(a)anthracene	mg/kg	NS	0.224	0.011 JJ	0.12 JJ	0.071 JJ	0.009 JJ
Benzo(a)pyrene	mg/kg	NS	0.061	ND (0.33)	**0.063 JJ**	0.042 JJ	ND (0.33)
Benzo(b)fluoranthene	mg/kg	NS	1.1	ND (0.33)	0.08 JJ	0.049 JJ	0.022 JJ
Benzo(g,h,i)perylene	mg/kg	NS	50	ND (0.33)	ND (0.33)	ND (0.33)	ND (0.33)
Benzo(k)fluoranthene	mg/kg	NS	1.1	ND (0.33)	0.056 JJ	0.042 JJ	ND (0.33)
bis(2-Ethylhexyl)phthalate	mg/kg	NS	50	--	--	--	--
Carbazole	mg/kg	NS	NS	ND (0.33)	0.015 JJ	0.004 JJ	ND (0.33)
Chrysene	mg/kg	NS	0.04	0.014 JJ	**0.15 JJ**	**0.085 JJ**	0.017 JJ
Dibenz(a,h)anthracene	mg/kg	NS	0.014	ND (0.33)	ND (0.33)	ND (0.33)	ND (0.33)
Dibenzofuran	mg/kg	NS	6.2	ND (0.33)	0.008 JJ	ND (0.33)	ND (0.33)
Diethyl phthalate	mg/kg	NS	7.1	ND (0.33)	0.013 JJ	ND (0.33)	ND (0.33)
Di-n-butylphthalate	mg/kg	NS	NS	0.016 JJ	0.06 JJ	ND (0.33)	ND (0.33)
Di-n-octyl phthalate	mg/kg	NS	NS	ND (0.33)	ND (0.33)	0.003 JJ	0.002 JJ

TABLE B.2

SURFACE SLAG ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*WT-106-92*	*WT-106-92*	*WT-107-92*	*WT-108-92*
Sample ID:				*WT-106*	*WT-106 DUP*	*WT-107*	*WT-108*
Sample Date:				*1/1/1989*	*1/1/1989*	*1/1/1989*	*1/1/1989*
Sample Depth:							
Sample Matrix:				*SUSO-Slag*	*SUSO-Slag Duplicate*	*SUSO-Slag*	*SUSO-Slag*
	Units	*Eastern USA Background*	*TAGMa*				
Fluoranthene	mg/kg	NS	50	ND (0.33)	ND (0.33)	0.12 JJ	0.027 JJ
Fluorene	mg/kg	NS	50	ND (0.33)	ND (0.33)	ND (0.33)	ND (0.33)
Indeno(1,2,3-cd)pyrene	mg/kg	NS	3.2	ND (0.33)	ND (0.33)	ND (0.33)	ND (0.33)
Naphthalene	mg/kg	NS	13	ND (0.33)	ND (0.33)	ND (0.33)	ND (0.33)
Phenanthrene	mg/kg	NS	50	ND (0.33)	ND (0.33)	0.054 JJ	0.014 JJ
Phenol	mg/kg	NS	0.03	ND (0.33)	ND (0.33)	ND (0.33)	ND (0.33)
Pyrene	mg/kg	NS	50	ND (0.33)	ND (0.33)	0.065 JJ	0.01 JJ
Wet							
Percent Moisture	%	NS	NS	--	--	--	--
pH	S.U.	NS	NS	10.12	10.51	9.90	8.24

TABLE B.2

SURFACE SLAG ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Notes:

a - NYSDEC Technical and Adminiatrative Guidance, Recommended Soil Cleanup Objectives, January 1994.
b - Telephone conversation, Jim Harrington, NYSDEC, February 3, 2004.
-- - No Data.
NS - No Standard.
ND () - Non detect at associated value.
J - Estimated Value.
E - Concentrations exceed the calibration range.
N - Spike sample recovery was not within the control limits.
B - Value greater than or equal to the instrument detection limit, but less than the contract required detection limit.
D - Analysis at a secondary dilution factor.
U - Not Detected.
* - Duplicate analysis not within the control limits.
SB - Soil background.

TABLE B.3

SUBSURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*B1/B2COMP-GRID*	*B-1-GRID*	*B-2*	*B-2-GRID*	*B-3*	*BH-12*	*C-0-GRID*
Sample ID:				*B1/B2-COMPWASTE*	*B-1-SUB*	*B-2*	*B-2*	*B-3*	*S-19867-07-03-PK-008*	*C-0*
Sample Date:				*3/1/2000*	*3/1/2000*	*11/7/1996*	*3/1/2000*	*11/7/1996*	*7/23/2003*	*3/1/2000*
Sample Depth:				*0.25-1 ft*	*0.83-0.83 ft*	*18-22 ft*	*1.5-1.5 ft*	*17-20 ft*	*8-10 ft*	
Sample Matrix:				*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*
	Units	*Eastern USA Background*	*TAGMa*							
Metals										
Aluminum	mg/kg	33000	SB	13800 *	23800 *	12500	26700 *	15900	1500	4270 *
Antimony	mg/kg	NS	SB	7.6 BN	ND (1.5) N	ND (2.4) N	ND (1.5) N	ND (2.5) N	4.37 J	ND (1.5) N
Arsenic	mg/kg	3 - 12	7.5 or SB	**14.7**	5.8	3.2	4.1	3.4	3.79	6.8
Barium	mg/kg	15 - 600	300 or SB	**473 E**	154 E	87.1	138 E	115	11.3 J	33.5 BE
Beryllium	mg/kg	0 - 1.75	0.16 or SB	**0.26 N**	**1.2 B**	**0.41 B**	**1.2 B**	**0.58 B**	**0.162 J**	ND (0.25)
Cadmium	mg/kg	0.1 -1.0	1 or SB	**1.6**	ND (0.17)	**2.8**	ND (0.18)	**2.9**	0.164 J	ND (0.18)
Calcium	mg/kg	130 - 35000	SB	50000	2460 *	--	6320 *	--	163000	7620 *
Chromium Total	mg/kg	1.5 - 40	50b or SB	**62.3 E***	30.6 E*	17.2 E	35.9 E*	22.7 E	4.90	37.5 E*
Chromium VI (Hexavalent)	mg/kg	NS	NS	ND (1.0)	ND (1.0)	ND (1.1)	ND (1.0)	ND (1.2)	ND (4.2)	ND (1.0)
Cobalt	mg/kg	2.5 or 60	30 or SB	11 B	16.6	7.5 B	11.3 B	9.9 B	1.47 J	5.6 B
Copper	mg/kg	1.0 - 50	25 or SB	**257**	**36.8**	17.8	**26.6**	20.6	6.55	**141**
Cyanide (total)	mg/kg	NS	NS	--	--	--	--	--	ND (0.495)	--
Iron	mg/kg	2000 - 550000	2000 or SB	**123000 E***	**33000 E***	**16300 E**	**34000 E***	**18200 E**	**4040**	**20900 E***
Lead	mg/kg	NS	SB	1870	86.9	6.8 N*	9.3	7.3 N*	14.1	28.8
Magnesium	mg/kg	100 - 5000	SB	8330 *	6850 *	8980 E	10100	8320 E	101000	2600 *
Manganese	mg/kg	50 - 5000	SB	948 EN	870 EN	359	467 EN	528	403	230 EN
Mercury	mg/kg	0.001 - 0.2	0.1	**16.8**	ND (0.12)	ND (0.12)	ND (0.12)	ND (0.12)	ND (0.0284)	**0.15**
Nickel	mg/kg	0.5 - 25	13 or SB	**46.2 ***	**31.7 ***	**17.5**	**31.8 ***	**21.2**	6.21 J	**51.4 ***
Potassium	mg/kg	8500 - 43000	SB	1220 BE	3790 E	1280	4250 E	1490	553	726 BE
Selenium	mg/kg	0.1 - 3.9	2 or SB	ND (1.2)	ND (1.2)	ND (0.95)	ND (1.3)	1.9	ND (1.49)	ND (1.2)
Silver	mg/kg	NS	SB	2.0 B	ND (0.37)	ND (0.24) N	ND (0.38)	ND (0.25) N	0.172 J	ND (0.38)
Sodium	mg/kg	6000 - 8000	SB	1390	834 B	ND (119)	806 B	ND (126)	272	764 B
Thallium	mg/kg	NS	SB	ND (2.0)	ND (2.0)	ND (0.24) N	ND (2.0)	ND (0.25) N	ND (1.12)	ND (2.0)
Vanadium	mg/kg	1.0 - 300	150 or SB	21.0	42.1	20.0	45.0	22.4	6.48 J	37.8
Zinc	mg/kg	9.0 - 50.0	20 or SB	**1090 E**	**84.2**	**46.9 N**	**74.4 E**	**55.4 N**	**86.8 J**	**698 E**

TABLE B.3

SUBSURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*B1/B2COMP-GRID*	*B-1-GRID*	*B-2*	*B-2-GRID*	*B-3*	*BH-12*	*C-0-GRID*
Sample ID:				*B1/B2-COMPWASTE*	*B-1-SUB*	*B-2*	*B-2*	*B-3*	*S-19867-07-03-PK-008*	*C-0*
Sample Date:				*3/1/2000*	*3/1/2000*	*11/7/1996*	*3/1/2000*	*11/7/1996*	*7/23/2003*	*3/1/2000*
Sample Depth:				*0.25-1 ft*	*0.83-0.83 ft*	*18-22 ft*	*1.5-1.5 ft*	*17-20 ft*	*8-10 ft*	
Sample Matrix:				*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*
	Units	*Eastern USA Background*	*TAGMa*							
MetalsR										
Arsenic	mg/L	NS	NS	0.0038	--	--	--	--	--	0.004 B
Barium	mg/L	NS	NS	2.09 E	--	--	--	--	--	0.704 E
Cadmium	mg/L	NS	NS	0.007	--	--	--	--	--	0.0034 B
Chromium Total	mg/L	NS	NS	ND (0.002) E*	--	--	--	--	--	0.0049 BE*
Lead	mg/L	NS	NS	0.182 E	--	--	--	--	--	0.0032 E
Mercury	mg/L	NS	NS	ND (0.00020)	--	--	--	--	--	ND (0.00020)
Selenium	mg/L	NS	NS	ND (0.005)	--	--	--	--	--	ND (0.0050)
Silver	mg/L	NS	NS	ND (0.0015)	--	--	--	--	--	ND (0.0015)
PesticidesR										
2,4,5-TP (Silvex)	mg/L	NS	NS	ND (0.000001)	--	--	--	--	--	ND (0.000001)
2,4-Dichlorophenylacetic acid	mg/L	NS	NS	ND (0.000001)	--	--	--	--	--	ND (0.000001)
Chlordane	mg/L	NS	NS	ND (0.0012)	--	--	--	--	--	ND (0.0012)
Endrin	mg/L	NS	NS	0.0022 B	--	--	--	--	--	0.038 B
gamma-BHC (Lindane)	mg/L	NS	NS	ND (0.0001)	--	--	--	--	--	ND (0.0001)
Heptachlor	mg/L	NS	NS	ND (0.0001)	--	--	--	--	--	ND (0.0001)
Heptachlor epoxide	mg/L	NS	NS	ND (0.0001)	--	--	--	--	--	ND (0.0001)
Methoxychlor	mg/L	NS	NS	ND (0.0005)	--	--	--	--	--	ND (0.0005)
Toxaphene	mg/L	NS	NS	ND (0.001)	--	--	--	--	--	ND (0.001)

TABLE B.3

SUBSURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*B1/B2COMP-GRID*	*B-1-GRID*	*B-2*	*B-2-GRID*	*B-3*	*BH-12*	*C-0-GRID*
Sample ID:				*B1/B2-COMPWASTE*	*B-1-SUB*	*B-2*	*B-2*	*B-3*	*S-19867-07-03-PK-008*	*C-0*
Sample Date:				*3/1/2000*	*3/1/2000*	*11/7/1996*	*3/1/2000*	*11/7/1996*	*7/23/2003*	*3/1/2000*
Sample Depth:				*0.25-1 ft*	*0.83-0.83 ft*	*18-22 ft*	*1.5-1.5 ft*	*17-20 ft*	*8-10 ft*	
Sample Matrix:				*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*
	Units	*Eastern USA Background*	*TAGMa*							
SVOAs										
2-Methylnaphthalene	mg/kg	NS	36.4	ND (2)	ND (0.4)	--	ND (0.41)	--	--	2.7 J
2-Methylphenol	mg/kg	NS	0.1	ND (2)	ND (0.4)	--	ND (0.41)	--	--	ND (4)
4-Methylphenol	mg/kg	NS	0.09	ND (2)	ND (0.4)	--	ND (0.41)	--	--	ND (4)
Acenaphthene	mg/kg	NS	50	ND (2)	ND (0.4)	--	ND (0.41)	--	--	11
Acenaphthylene	mg/kg	NS	41	ND (2)	ND (0.4)	--	ND (0.41)	--	--	2.1 J
Anthracene	mg/kg	NS	50	ND (2)	ND (0.4)	--	ND (0.41)	--	--	29
Benzo(a)anthracene	mg/kg	NS	0.224	**0.61 J**	ND (0.4)	--	ND (0.41)	--	--	**97 D**
Benzo(a)pyrene	mg/kg	NS	0.061	**0.61 J**	ND (0.4)	--	ND (0.41)	--	--	**88 D**
Benzo(b)fluoranthene	mg/kg	NS	1.1	**1.3 J**	ND (0.4)	--	ND (0.41)	--	--	**130 D**
Benzo(g,h,i)perylene	mg/kg	NS	50	0.53 J	ND (0.4)	--	ND (0.41)	--	--	**83**
Benzo(k)fluoranthene	mg/kg	NS	1.1	ND (2)	ND (0.4)	--	ND (0.41)	--	--	**26**
bis(2-Ethylhexyl)phthalate	mg/kg	NS	50	0.49 J	ND (0.4)	--	ND (0.41)	--	--	ND (4)
Butyl benzylphthalate	mg/kg	NS	50	0.22 J	ND (0.4)	--	ND (0.41)	--	--	ND (4)
Carbazole	mg/kg	NS	NS	ND (2)	ND (0.4)	--	ND (0.41)	--	--	16
Chrysene	mg/kg	NS	0.04	**0.63 J**	ND (0.4)	--	ND (0.41)	--	--	**87 D**
Dibenz(a,h)anthracene	mg/kg	NS	0.014	ND (2)	ND (0.4)	--	ND (0.41)	--	--	**3.8 J**
Dibenzofuran	mg/kg	NS	6.2	ND (2)	ND (0.4)	--	ND (0.41)	--	--	**8.6**
Diethyl phthalate	mg/kg	NS	7.1	--	--	--	--	--	--	--
Fluoranthene	mg/kg	NS	50	1 J	ND (0.4)	--	ND (0.41)	--	--	**180 D**
Fluorene	mg/kg	NS	50	ND (2)	ND (0.4)	--	ND (0.41)	--	--	14
Indeno(1,2,3-cd)pyrene	mg/kg	NS	3.2	ND (2)	ND (0.4)	--	ND (0.41)	--	--	**11**
Naphthalene	mg/kg	NS	13	ND (2)	ND (0.4)	--	ND (0.41)	--	--	9.7
Pentachlorophenol	mg/kg	NS	1	--	--	--	--	--	--	--
Phenanthrene	mg/kg	NS	50	0.5 J	ND (0.4)	--	ND (0.41)	--	--	**130 D**
Phenol	mg/kg	NS	0.03	ND (2)	ND (0.4)	--	ND (0.41)	--	--	ND (0.41)
Pyrene	mg/kg	NS	50	1 J	ND (0.4)	--	ND (0.41)	--	--	**160 D**

TABLE B.3

SUBSURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*B1/B2COMP-GRID*	*B-1-GRID*	*B-2*	*B-2-GRID*	*B-3*	*BH-12*	*C-0-GRID*
Sample ID:				*B1/B2-COMPWASTE*	*B-1-SUB*	*B-2*	*B-2*	*B-3*	*S-19867-07-03-PK-008*	*C-0*
Sample Date:				*3/1/2000*	*3/1/2000*	*11/7/1996*	*3/1/2000*	*11/7/1996*	*7/23/2003*	*3/1/2000*
Sample Depth:				*0.25-1 ft*	*0.83-0.83 ft*	*18-22 ft*	*1.5-1.5 ft*	*17-20 ft*	*8-10 ft*	
Sample Matrix:				*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*
	Units	*Eastern USA Background*	*TAGMa*							
VOAs										
2-Butanone (Methyl Ethyl Ketone)	mg/kg	NS	0.3	--	--	--	--	--	--	--
Acetone	mg/kg	NS	0.2	--	--	--	--	--	--	--
Ethylbenzene	mg/kg	NS	5.5	--	ND (0.012)	--	ND (0.012)	--	--	0.001 J
Methylene chloride	mg/kg	NS	0.1	--	--	--	--	--	--	--
Tetrachloroethene	mg/kg	NS	1.4	--	ND (0.012)	--	ND (0.012)	--	--	ND (0.012)
Toluene	mg/kg	NS	1.5	--	ND (0.012)	--	ND (0.012)	--	--	0.002 J
Trichloroethene	mg/kg	NS	0.7	--	ND (0.012)	--	ND (0.012)	--	--	ND (0.012)
Xylene (total)	mg/kg	NS	1.2	--	ND (0.012)	--	ND (0.012)	--	--	0.023
VOAsR										
1,1-Dichloroethene	mg/L	NS	NS	ND (0.013)	--	--	--	--	--	ND (0.013)
1,2-Dichloroethane	mg/L	NS	NS	ND (0.0095)	--	--	--	--	--	ND (0.0095)
1,4-Dichlorobenzene	mg/L	NS	NS	ND (0.010)	--	--	--	--	--	ND (0.010)
2,4,5-Trichlorophenol	mg/L	NS	NS	ND (0.025)	--	--	--	--	--	ND (0.025)
2,4,6-Trichlorophenol	mg/L	NS	NS	ND (0.011)	--	--	--	--	--	ND (0.011)
2,4-Dinitrotoluene	mg/L	NS	NS	ND (0.010)	--	--	--	--	--	ND (0.010)
2-Butanone (Methyl Ethyl Ketone)	mg/L	NS	NS	ND (0.020)	--	--	--	--	--	ND (0.020)
2-Methylphenol	mg/L	NS	NS	ND (0.016)	--	--	--	--	--	ND (0.016)
3-Methylphenol	mg/L	NS	NS	ND (0.016)	--	--	--	--	--	ND (0.016)
4-Methylphenol	mg/L	NS	NS	ND (0.016)	--	--	--	--	--	ND (0.016)
Benzene	mg/L	NS	NS	ND (0.008)	--	--	--	--	--	ND (0.008)
Carbon tetrachloride	mg/L	NS	NS	ND (0.013)	--	--	--	--	--	ND (0.013)
Chlorobenzene	mg/L	NS	NS	ND (0.0083)	--	--	--	--	--	ND (0.0083)
Chloroform (Trichloromethane)	mg/L	NS	NS	ND (0.0080)	--	--	--	--	--	ND (0.0080)
Hexachlorobenzene	mg/L	NS	NS	ND (0.010)	--	--	--	--	--	ND (0.010)
Hexachlorobutadiene	mg/L	NS	NS	ND (0.010)	--	--	--	--	--	ND (0.010)
Hexachloroethane	mg/L	NS	NS	ND (0.010)	--	--	--	--	--	ND (0.010)
Nitrobenzene	mg/L	NS	NS	ND (0.010)	--	--	--	--	--	ND (0.010)
Pentachlorophenol	mg/L	NS	NS	ND (0.050)	--	--	--	--	--	ND (0.050)

TABLE B.3

SUBSURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*B1/B2COMP-GRID*	*B-1-GRID*	*B-2*	*B-2-GRID*	*B-3*	*BH-12*	*C-0-GRID*
Sample ID:				*B1/B2-COMPWASTE*	*B-1-SUB*	*B-2*	*B-2*	*B-3*	*S-19867-07-03-PK-008*	*C-0*
Sample Date:				*3/1/2000*	*3/1/2000*	*11/7/1996*	*3/1/2000*	*11/7/1996*	*7/23/2003*	*3/1/2000*
Sample Depth:				*0.25-1 ft*	*0.83-0.83 ft*	*18-22 ft*	*1.5-1.5 ft*	*17-20 ft*	*8-10 ft*	
Sample Matrix:				*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*
	Units	*Eastern USA Background*	*TAGMa*							
Pyridine	mg/L	NS	NS	ND (0.010)	--	--	--	--	--	ND (0.010)
Tetrachloroethene	mg/L	NS	NS	ND (0.011)	--	--	--	--	--	0.12
Trichloroethene	mg/L	NS	NS	ND (0.010)	--	--	--	--	--	0.028
Vinyl chloride	mg/L	NS	NS	ND (0.011)	--	--	--	--	--	ND (0.011)
Wet										
Ignitability	Deg F	NS	NS	ND (200)	--	--	--	--	--	ND (200)
Percent Moisture	%	NS	NS	--	--	--	--	--	5.58	--
pH	S.U.	NS	NS	7.7	--	9.4	--	9.8	9.8 J	7.4
Reactive Cyanide	mg/kg	NS	NS	--	--	ND (50)	--	ND (50)	--	--
Reactive Hydrogen Cyanide	mg/L	NS	NS	ND (10)	--	--	--	--	--	ND (10)
Reactive Hydrogen Sulfide	mg/L	NS	NS	ND (10)	--	--	--	--	--	ND (10)
Reactive Sulfide	mg/kg	NS	NS	--	--	ND (1.0)	--	ND (1.0)	--	--
Total Solids	%	NS	NS	--	--	84	--	79	--	--

A: Eastern USA Background Concentration
B: TAGM

TABLE B.3

SUBSURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*C-5-GRID*	*C-5-GRID*	*MOUND1-GRID*	*MOUND1-GRID*	*MW-15*	*MW-15*
Sample ID:				*C-5*	*C-5-SUB*	*MOUND1*	*MOUND1-SUB*	*S-19867-0703-PK-011*	*S-19867-0703-PK-012*
Sample Date:				*3/1/2000*	*3/1/2000*	*3/1/2000*	*3/1/2000*	*7/24/2003*	*7/24/2003*
Sample Depth:					*10-10 ft*	*0.25-2 ft*	*1.5-2.5 ft*	*2-4 ft*	*10-12 ft*
Sample Matrix:				*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*
	Units	*Eastern USA Background*	*TAGMa*						
Metals									
Aluminum	mg/kg	33000	SB	5930 *	14600 *	22700 *	21400 *	14600	17200
Antimony	mg/kg	NS	SB	ND (1.6) N	ND (1.4) N	ND (1.6) N	ND (1.4) N	ND (1.22) UJ	ND (2.03) UJ
Arsenic	mg/kg	3 - 12	7.5 or SB	**18.6**	4.2	6.7	2.7	6.13	6.72
Barium	mg/kg	15 - 600	300 or SB	**370 E**	108 E	110 E	76.6 E	86.4	80.2
Beryllium	mg/kg	0 - 1.75	0.16 or SB	ND (0.26)	**1.0 B**	**0.85 B**	**0.67 B**	**0.652**	**0.768**
Cadmium	mg/kg	0.1 -1.0	1 or SB	**1.1 B**	0.22 B	ND (0.18)	ND (0.17)	ND (0.608)	ND (0.613)
Calcium	mg/kg	130 - 35000	SB	26900 *	60100 *	3670 *	2100 *	57900	33700
Chromium Total	mg/kg	1.5 - 40	50b or SB	**855 E***	20.1 E*	**59.4 E***	26.3 E*	20.8	24.9
Chromium VI (Hexavalent)	mg/kg	NS	NS	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (4.8)	ND (5.0)
Cobalt	mg/kg	2.5 or 60	30 or SB	4.0 B	10.3 B	10 B	7.6 B	9.91	14.2
Copper	mg/kg	1.0 - 50	25 or SB	**197**	20.9	22.1	7.6	19.6	19.1
Cyanide (total)	mg/kg	NS	NS	--	--	--	--	ND (0.596)	ND (0.625)
Iron	mg/kg	2000 - 550000	2000 or SB	**37500 E***	**20600 E***	**29400 E***	**26700 E***	**23900**	**28800**
Lead	mg/kg	NS	SB	237	15.4	36.3	7.5	6.81	8.66
Magnesium	mg/kg	100 - 5000	SB	5460 *	12500 *	4710 *	5570 *	11800	10600
Manganese	mg/kg	50 - 5000	SB	364 EN	608 EN	808 EN	355 EN	641	540
Mercury	mg/kg	0.001 - 0.2	0.1	ND (0.13)	ND (0.11)	**0.36**	**0.14**	ND (0.0413)	ND (0.0383)
Nickel	mg/kg	0.5 - 25	13 or SB	**15.2 ***	**21.2 ***	**26.0 ***	**18.6 ***	**22.5**	**28.5**
Potassium	mg/kg	8500 - 43000	SB	937 BE	3820 E	3000 E	3720 E	2600	3640
Selenium	mg/kg	0.1 - 3.9	2 or SB	ND (1.3)	ND (1.1)	ND (1.3)	ND (1.2)	1.67	ND (1.23)
Silver	mg/kg	NS	SB	6.7	ND (0.34)	ND (0.39)	ND (0.36)	ND (1.22)	0.239 J
Sodium	mg/kg	6000 - 8000	SB	1750	758 B	752 B	918 B	162	123
Thallium	mg/kg	NS	SB	ND (2.1)	ND (1.8)	ND (2.1)	ND (1.9)	ND (1.22)	ND (1.23)
Vanadium	mg/kg	1.0 - 300	150 or SB	18.0	28.3	43.5	33.9	29.1	31.9
Zinc	mg/kg	9.0 - 50.0	20 or SB	**824 E**	**96.1 E**	**94.7 E**	**63.9 E**	**51.9**	**67.3**

TABLE B.3

SUBSURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*C-5-GRID*	*C-5-GRID*	*MOUND1-GRID*	*MOUND1-GRID*	*MW-15*	*MW-15*
Sample ID:				*C-5*	*C-5-SUB*	*MOUND1*	*MOUND1-SUB*	*S-19867-0703-PK-011*	*S-19867-0703-PK-012*
Sample Date:				*3/1/2000*	*3/1/2000*	*3/1/2000*	*3/1/2000*	*7/24/2003*	*7/24/2003*
Sample Depth:					*10-10 ft*	*0.25-2 ft*	*1.5-2.5 ft*	*2-4 ft*	*10-12 ft*
Sample Matrix:				*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*
	Units	*Eastern USA Background*	*TAGMa*						
MetalsR									
Arsenic	mg/L	NS	NS	ND (0.0035)	–	0.005 B	–	–	–
Barium	mg/L	NS	NS	1.440 E	–	1.950 E	–	–	–
Cadmium	mg/L	NS	NS	ND (0.00070)	–	ND (0.00070)	–	–	–
Chromium Total	mg/L	NS	NS	ND (0.002) E*	–	0.0045 BE*	–	–	–
Lead	mg/L	NS	NS	0.119 E	–	0.0194 E	–	–	–
Mercury	mg/L	NS	NS	ND (0.00020)	–	ND (0.00020)	–	–	–
Selenium	mg/L	NS	NS	ND (0.005)	–	ND (0.005)	–	–	–
Silver	mg/L	NS	NS	ND (0.0015)	–	ND (0.0015)	–	–	–
PesticidesR									
2,4,5-TP (Silvex)	mg/L	NS	NS	ND (0.000001)	–	ND (0.000001)	–	–	–
2,4-Dichlorophenylacetic acid	mg/L	NS	NS	ND (0.000001)	–	ND (0.000001)	–	–	–
Chlordane	mg/L	NS	NS	ND (0.0012)	–	ND (0.0017)	–	–	–
Endrin	mg/L	NS	NS	0.0011 B	–	0.013 B	–	–	–
gamma-BHC (Lindane)	mg/L	NS	NS	ND (0.0001)	–	ND (0.0014)	–	–	–
Heptachlor	mg/L	NS	NS	ND (0.0001)	–	ND (0.0014)	–	–	–
Heptachlor epoxide	mg/L	NS	NS	ND (0.0001)	–	ND (0.0014)	–	–	–
Methoxychlor	mg/L	NS	NS	ND (0.0005)	–	ND (0.0005)	–	–	–
Toxaphene	mg/L	NS	NS	ND (0.001)	–	ND (0.001)	–	–	–

TABLE B.3

SUBSURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*C-5-GRID*	*C-5-GRID*	*MOUND1-GRID*	*MOUND1-GRID*	*MW-15*	*MW-15*
Sample ID:				*C-5*	*C-5-SUB*	*MOUND1*	*MOUND1-SUB*	*S-19867-0703-PK-011*	*S-19867-0703-PK-012*
Sample Date:				*3/1/2000*	*3/1/2000*	*3/1/2000*	*3/1/2000*	*7/24/2003*	*7/24/2003*
Sample Depth:					*10-10 ft*	*0.25-2 ft*	*1.5-2.5 ft*	*2-4 ft*	*10-12 ft*
Sample Matrix:				*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*
	Units	*Eastern USA Background*	*TAGMa*						
SVOAs									
2-Methylnaphthalene	mg/kg	NS	36.4	ND (2.1)	ND (0.37)	ND (0.42)	ND (0.39)	–	–
2-Methylphenol	mg/kg	NS	0.1	ND (2.1)	ND (0.37)	ND (0.42)	ND (0.39)	–	–
4-Methylphenol	mg/kg	NS	0.09	**0.22 J**	ND (0.37)	ND (0.42)	ND (0.39)	–	–
Acenaphthene	mg/kg	NS	50	ND (2.1)	ND (0.37)	0.065 J	ND (0.39)	–	–
Acenaphthylene	mg/kg	NS	41	ND (2.1)	ND (0.37)	ND (0.42)	ND (0.39)	–	–
Anthracene	mg/kg	NS	50	ND (2.1)	ND (0.37)	0.077 J	ND (0.39)	–	–
Benzo(a)anthracene	mg/kg	NS	0.224	**0.24 J**	ND (0.37)	**0.36 J**	ND (0.39)	–	–
Benzo(a)pyrene	mg/kg	NS	0.061	ND (2.1)	ND (0.37)	**0.47**	ND (0.39)	–	–
Benzo(b)fluoranthene	mg/kg	NS	1.1	0.33 J	ND (0.37)	0.7	ND (0.39)	–	–
Benzo(g,h,i)perylene	mg/kg	NS	50	ND (2.1)	0.073 J	0.15 J	ND (0.39)	–	–
Benzo(k)fluoranthene	mg/kg	NS	1.1	ND (2.1)	ND (0.37)	0.26 J	ND (0.39)	–	–
bis(2-Ethylhexyl)phthalate	mg/kg	NS	50	1.2 J	ND (0.37)	ND (0.42)	ND (0.39)	–	–
Butyl benzylphthalate	mg/kg	NS	50	ND (2.1)	ND (0.37)	ND (0.42)	ND (0.39)	–	–
Carbazole	mg/kg	NS	NS	ND (2.1)	ND (0.37)	0.067 J	ND (0.39)	–	–
Chrysene	mg/kg	NS	0.04	**0.22 J**	ND (0.37)	**0.45**	ND (0.39)	–	–
Dibenz(a,h)anthracene	mg/kg	NS	0.014	ND (2.1)	ND (0.37)	**0.044 J**	ND (0.39)	–	–
Dibenzofuran	mg/kg	NS	6.2	ND (2.1)	ND (0.37)	ND (0.42)	ND (0.39)	–	–
Diethyl phthalate	mg/kg	NS	7.1	–	–	–	–	–	–
Fluoranthene	mg/kg	NS	50	0.35 J	ND (0.37)	0.7	ND (0.39)	–	–
Fluorene	mg/kg	NS	50	ND (2.1)	ND (0.37)	ND (0.42)	ND (0.39)	–	–
Indeno(1,2,3-cd)pyrene	mg/kg	NS	3.2	ND (2.1)	ND (0.37)	0.15 J	ND (0.39)	–	–
Naphthalene	mg/kg	NS	13	ND (2.1)	ND (0.37)	ND (0.42)	ND (0.39)	–	–
Pentachlorophenol	mg/kg	NS	1	–	–	–	–	–	–
Phenanthrene	mg/kg	NS	50	0.22 J	ND (0.37)	0.39 J	ND (0.39)	–	–
Phenol	mg/kg	NS	0.03	ND (2.1)	**0.047 J**	ND (0.42)	ND (0.39)	–	–
Pyrene	mg/kg	NS	50	ND (2.1)	ND (0.37)	0.62	ND (0.39)	–	–

TABLE B.3

SUBSURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*C-5-GRID*	*C-5-GRID*	*MOUND1-GRID*	*MOUND1-GRID*	*MW-15*	*MW-15*
Sample ID:				*C-5*	*C-5-SUB*	*MOUND1*	*MOUND1-SUB*	*S-19867-0703-PK-011*	*S-19867-0703-PK-012*
Sample Date:				*3/1/2000*	*3/1/2000*	*3/1/2000*	*3/1/2000*	*7/24/2003*	*7/24/2003*
Sample Depth:					*10-10 ft*	*0.25-2 ft*	*1.5-2.5 ft*	*2-4 ft*	*10-12 ft*
Sample Matrix:				*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*
	Units	*Eastern USA Background*	*TAGMa*						
VOAs									
2-Butanone (Methyl Ethyl Ketone)	mg/kg	NS	0.3	--	--	--	--	--	--
Acetone	mg/kg	NS	0.2	--	--	--	--	--	--
Ethylbenzene	mg/kg	NS	5.5	ND (0.013)	ND (0.012)	ND (0.013)	ND (0.012)	--	--
Methylene chloride	mg/kg	NS	0.1	--	--	--	--	--	--
Tetrachloroethene	mg/kg	NS	1.4	ND (0.013)	ND (0.012)	0.003 J	ND (0.012)	--	--
Toluene	mg/kg	NS	1.5	ND (0.013)	ND (0.012)	ND (0.013)	ND (0.012)	--	--
Trichloroethene	mg/kg	NS	0.7	ND (0.013)	ND (0.012)	0.007 J	0.003 J	--	--
Xylene (total)	mg/kg	NS	1.2	ND (0.013)	ND (0.012)	ND (0.013)	ND (0.012)	--	--
VOAsR									
1,1-Dichloroethene	mg/L	NS	NS	ND (0.013)	--	ND (0.013)	--	--	--
1,2-Dichloroethane	mg/L	NS	NS	ND (0.0095)	--	ND (0.0095)	--	--	--
1,4-Dichlorobenzene	mg/L	NS	NS	ND (0.010)	--	ND (0.010)	--	--	--
2,4,5-Trichlorophenol	mg/L	NS	NS	ND (0.025)	--	ND (0.025)	--	--	--
2,4,6-Trichlorophenol	mg/L	NS	NS	ND (0.011)	--	ND (0.011)	--	--	--
2,4-Dinitrotoluene	mg/L	NS	NS	ND (0.010)	--	ND (0.010)	--	--	--
2-Butanone (Methyl Ethyl Ketone)	mg/L	NS	NS	ND (0.020)	--	ND (0.020)	--	--	--
2-Methylphenol	mg/L	NS	NS	ND (0.016)	--	ND (0.016)	--	--	--
3-Methylphenol	mg/L	NS	NS	ND (0.016)	--	ND (0.016)	--	--	--
4-Methylphenol	mg/L	NS	NS	ND (0.016)	--	ND (0.016)	--	--	--
Benzene	mg/L	NS	NS	ND (0.008)	--	ND (0.008)	--	--	--
Carbon tetrachloride	mg/L	NS	NS	ND (0.013)	--	ND (0.013)	--	--	--
Chlorobenzene	mg/L	NS	NS	ND (0.0083)	--	ND (0.0083)	--	--	--
Chloroform (Trichloromethane)	mg/L	NS	NS	ND (0.0080)	--	ND (0.0080)	--	--	--
Hexachlorobenzene	mg/L	NS	NS	ND (0.010)	--	ND (0.010)	--	--	--
Hexachlorobutadiene	mg/L	NS	NS	ND (0.010)	--	ND (0.010)	--	--	--
Hexachloroethane	mg/L	NS	NS	ND (0.010)	--	ND (0.010)	--	--	--
Nitrobenzene	mg/L	NS	NS	ND (0.010)	--	ND (0.010)	--	--	--
Pentachlorophenol	mg/L	NS	NS	ND (0.050)	--	ND (0.050)	--	--	--

TABLE B.3

SUBSURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*C-5-GRID*	*C-5-GRID*	*MOUND1-GRID*	*MOUND1-GRID*	*MW-15*	*MW-15*
Sample ID:				*C-5*	*C-5-SUB*	*MOUND1*	*MOUND1-SUB*	*S-19867-0703-PK-011*	*S-19867-0703-PK-012*
Sample Date:				*3/1/2000*	*3/1/2000*	*3/1/2000*	*3/1/2000*	*7/24/2003*	*7/24/2003*
Sample Depth:					*10-10 ft*	*0.25-2 ft*	*1.5-2.5 ft*	*2-4 ft*	*10-12 ft*
Sample Matrix:				*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*
	Units	*Eastern USA Background*	*TAGMa*						
Pyridine	mg/L	NS	NS	ND (0.010)	–	ND (0.010)	–	–	–
Tetrachloroethene	mg/L	NS	NS	ND (0.011)	–	ND (0.011)	–	–	–
Trichloroethene	mg/L	NS	NS	ND (0.010)	–	ND (0.010)	–	–	–
Vinyl chloride	mg/L	NS	NS	ND (0.011)	–	ND (0.011)	–	–	–
Wet									
Ignitability	Deg F	NS	NS	ND (200)	–	ND (200)	–	–	–
Percent Moisture	%	NS	NS	–	–	–	–	17.7	21.6
pH	S.U.	NS	NS	–	–	6.3	–	8.2	8.2
Reactive Cyanide	mg/kg	NS	NS	–	–	–	–	–	–
Reactive Hydrogen Cyanide	mg/L	NS	NS	ND (10)	–	ND (10)	–	–	–
Reactive Hydrogen Sulfide	mg/L	NS	NS	ND (10)	–	ND (10)	–	–	–
Reactive Sulfide	mg/kg	NS	NS	–	–	–	–	–	–
Total Solids	%	NS	NS	–	–	–	–	–	–

A: Eastern USA Background Concentration
B: TAGM

TABLE B.3

SUBSURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-15*	*MW-16*	*MW-16*	*MW-17*	*MW-17*
Sample ID:				*S-19867-0703-PK-013*	*S-19867-0703-PK-014*	*S-19867-0703-PK-015*	*S-19867-08-03-PK-032*	*S-19867-08-03-PK-033*
Sample Date:				*7/24/2003*	*7/24/2003*	*7/24/2003*	*8/20/2003*	*8/20/2003*
Sample Depth:				*10-12 ft*	*2-4 ft*	*10-11 ft*	*0-4 ft*	*11-13 ft*
Sample Matrix:				*SUBSO*	*SUBSO*	*SUBSO*	*SUSO*	*SUBSO*
				Duplicate				
	Units	*Eastern USA Background*	*TAGMa*					
Metals								
Aluminum	mg/kg	33000	SB	12700	15500	12000	24300 B	11900 B
Antimony	mg/kg	NS	SB	ND (1.21) UJ	ND (1.13) UJ	ND (1.33) UJ	ND (5.42)	ND (1.17)
Arsenic	mg/kg	3 - 12	7.5 or SB	4.96	6.20	6.22	5.67	5.14
Barium	mg/kg	15 - 600	300 or SB	56.2	83.9	51.9	143 B	67.7 B
Beryllium	mg/kg	0 - 1.75	0.16 or SB	**0.561 J**	**0.693**	**0.540 J**	**1.05**	**0.532 J**
Cadmium	mg/kg	0.1 -1.0	1 or SB	ND (0.606)	ND (0.564)	ND (0.570)	ND (0.542)	ND (0.584)
Calcium	mg/kg	130 - 35000	SB	45600	62200	43600	4780 B	43900 B
Chromium Total	mg/kg	1.5 - 40	50b or SB	19.2	20.8	17.7	33.6	18.3
Chromium VI (Hexavalent)	mg/kg	NS	NS	ND (5.2)	ND (5.1)	ND (5.0)	ND (4.5)	ND (5.7)
Cobalt	mg/kg	2.5 or 60	30 or SB	10.5	9.59	11.4	17.4	10.0
Copper	mg/kg	1.0 - 50	25 or SB	16.3	22.6	14.3	**30.4**	15.3
Cyanide (total)	mg/kg	NS	NS	ND (0.584)	0.937	ND (0.633)	ND (0.590)	ND (0.584)
Iron	mg/kg	2000 - 550000	2000 or SB	**23000**	**23600**	**23400**	**32900 B**	**21800 B**
Lead	mg/kg	NS	SB	6.42	7.74	5.39	14.0	8.19
Magnesium	mg/kg	100 - 5000	SB	9630	11500	8530	8480 J	11100 J
Manganese	mg/kg	50 - 5000	SB	576	854	837	997 J	597 J
Mercury	mg/kg	0.001 - 0.2	0.1	ND (0.0423)	0.0154 J	ND (0.0376)	0.0108 J	ND (0.0410)
Nickel	mg/kg	0.5 - 25	13 or SB	**23.1**	**22.0**	**24.9**	**40.0 B**	**21.1 B**
Potassium	mg/kg	8500 - 43000	SB	2440	2740	2350	3460	2740
Selenium	mg/kg	0.1 - 3.9	2 or SB	**2.24**	1.76	1.82	**4.01**	**6.21**
Silver	mg/kg	NS	SB	ND (1.21)	ND (1.13)	ND (1.14)	ND (1.08)	ND (1.17)
Sodium	mg/kg	6000 - 8000	SB	120 J	163	129	172	131
Thallium	mg/kg	NS	SB	ND (1.21)	ND (1.13)	ND (1.14)	ND (1.08)	ND (1.17)
Vanadium	mg/kg	1.0 - 300	150 or SB	25.2	31.0	24.5	45.4	25.2
Zinc	mg/kg	9.0 - 50.0	20 or SB	**54.3**	**46.9**	**50.6**	**78.7**	**70.1**

TABLE B.3

SUBSURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-15*	*MW-16*	*MW-16*	*MW-17*	*MW-17*
Sample ID:				*S-19867-0703-PK-013*	*S-19867-0703-PK-014*	*S-19867-0703-PK-015*	*S-19867-08-03-PK-032*	*S-19867-08-03-PK-033*
Sample Date:				*7/24/2003*	*7/24/2003*	*7/24/2003*	*8/20/2003*	*8/20/2003*
Sample Depth:				*10-12 ft*	*2-4 ft*	*10-11 ft*	*0-4 ft*	*11-13 ft*
Sample Matrix:				*SUBSO*	*SUBSO*	*SUBSO*	*SUSO*	*SUBSO*
				Duplicate				
	Units	*Eastern USA Background*	*TAGMa*					
MetalsR								
Arsenic	mg/L	NS	NS	–	–	–	–	–
Barium	mg/L	NS	NS	–	–	–	–	–
Cadmium	mg/L	NS	NS	–	–	–	–	–
Chromium Total	mg/L	NS	NS	–	–	–	–	–
Lead	mg/L	NS	NS	–	–	–	–	–
Mercury	mg/L	NS	NS	–	–	–	–	–
Selenium	mg/L	NS	NS	–	–	–	–	–
Silver	mg/L	NS	NS	–	–	–	–	–
PesticidesR								
2,4,5-TP (Silvex)	mg/L	NS	NS	–	–	–	–	–
2,4-Dichlorophenylacetic acid	mg/L	NS	NS	–	–	–	–	–
Chlordane	mg/L	NS	NS	–	–	–	–	–
Endrin	mg/L	NS	NS	–	–	–	–	–
gamma-BHC (Lindane)	mg/L	NS	NS	–	–	–	–	–
Heptachlor	mg/L	NS	NS	–	–	–	–	–
Heptachlor epoxide	mg/L	NS	NS	–	–	–	–	–
Methoxychlor	mg/L	NS	NS	–	–	–	–	–
Toxaphene	mg/L	NS	NS	–	–	–	–	–

TABLE B.3

SUBSURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-15*	*MW-16*	*MW-16*	*MW-17*	*MW-17*
Sample ID:				*S-19867-0703-PK-013*	*S-19867-0703-PK-014*	*S-19867-0703-PK-015*	*S-19867-08-03-PK-032*	*S-19867-08-03-PK-033*
Sample Date:				*7/24/2003*	*7/24/2003*	*7/24/2003*	*8/20/2003*	*8/20/2003*
Sample Depth:				*10-12 ft*	*2-4 ft*	*10-11 ft*	*0-4 ft*	*11-13 ft*
Sample Matrix:				*SUBSO*	*SUBSO*	*SUBSO*	*SUSO*	*SUBSO*
				Duplicate				
	Units	*Eastern USA Background*	*TAGMa*					
SVOAs								
2-Methylnaphthalene	mg/kg	NS	36.4	--	--	--	--	--
2-Methylphenol	mg/kg	NS	0.1	--	--	--	--	--
4-Methylphenol	mg/kg	NS	0.09	--	--	--	--	--
Acenaphthene	mg/kg	NS	50	--	--	--	--	--
Acenaphthylene	mg/kg	NS	41	--	--	--	--	--
Anthracene	mg/kg	NS	50	--	--	--	--	--
Benzo(a)anthracene	mg/kg	NS	0.224	--	--	--	--	--
Benzo(a)pyrene	mg/kg	NS	0.061	--	--	--	--	--
Benzo(b)fluoranthene	mg/kg	NS	1.1	--	--	--	--	--
Benzo(g,h,i)perylene	mg/kg	NS	50	--	--	--	--	--
Benzo(k)fluoranthene	mg/kg	NS	1.1	--	--	--	--	--
bis(2-Ethylhexyl)phthalate	mg/kg	NS	50	--	--	--	--	--
Butyl benzylphthalate	mg/kg	NS	50	--	--	--	--	--
Carbazole	mg/kg	NS	NS	--	--	--	--	--
Chrysene	mg/kg	NS	0.04	--	--	--	--	--
Dibenz(a,h)anthracene	mg/kg	NS	0.014	--	--	--	--	--
Dibenzofuran	mg/kg	NS	6.2	--	--	--	--	--
Diethyl phthalate	mg/kg	NS	7.1	--	--	--	--	--
Fluoranthene	mg/kg	NS	50	--	--	--	--	--
Fluorene	mg/kg	NS	50	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	mg/kg	NS	3.2	--	--	--	--	--
Naphthalene	mg/kg	NS	13	--	--	--	--	--
Pentachlorophenol	mg/kg	NS	1	--	--	--	--	--
Phenanthrene	mg/kg	NS	50	--	--	--	--	--
Phenol	mg/kg	NS	0.03	--	--	--	--	--
Pyrene	mg/kg	NS	50	--	--	--	--	--

TABLE B.3

SUBSURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-15*	*MW-16*	*MW-16*	*MW-17*	*MW-17*
Sample ID:				*S-19867-0703-PK-013*	*S-19867-0703-PK-014*	*S-19867-0703-PK-015*	*S-19867-08-03-PK-032*	*S-19867-08-03-PK-033*
Sample Date:				*7/24/2003*	*7/24/2003*	*7/24/2003*	*8/20/2003*	*8/20/2003*
Sample Depth:				*10-12 ft*	*2-4 ft*	*10-11 ft*	*0-4 ft*	*11-13 ft*
Sample Matrix:				*SUBSO*	*SUBSO*	*SUBSO*	*SUSO*	*SUBSO*
				Duplicate				
	Units	*Eastern USA Background*	*TAGMa*					
VOAs								
2-Butanone (Methyl Ethyl Ketone)	mg/kg	NS	0.3	–	–	–		–
Acetone	mg/kg	NS	0.2	–	–	–	–	–
Ethylbenzene	mg/kg	NS	5.5	–	–	–	–	–
Methylene chloride	mg/kg	NS	0.1	–	–	–	–	–
Tetrachloroethene	mg/kg	NS	1.4	–	–	–	–	–
Toluene	mg/kg	NS	1.5	–	–	–	–	–
Trichloroethene	mg/kg	NS	0.7	–	–	–	–	–
Xylene (total)	mg/kg	NS	1.2	–	–	–	–	–
VOAsR								
							–	
1,1-Dichloroethene	mg/L	NS	NS	–	–	–	–	–
1,2-Dichloroethane	mg/L	NS	NS	–	–	–	–	–
1,4-Dichlorobenzene	mg/L	NS	NS	–	–	–	–	–
2,4,5-Trichlorophenol	mg/L	NS	NS	–	–	–	–	–
2,4,6-Trichlorophenol	mg/L	NS	NS	–	–	–	–	–
2,4-Dinitrotoluene	mg/L	NS	NS	–	–	–	–	–
2-Butanone (Methyl Ethyl Ketone)	mg/L	NS	NS	–	–	–	–	–
2-Methylphenol	mg/L	NS	NS	–	–	–	–	–
3-Methylphenol	mg/L	NS	NS	–	–	–	–	–
4-Methylphenol	mg/L	NS	NS	–	–	–	–	–
Benzene	mg/L	NS	NS	–	–	–	–	–
Carbon tetrachloride	mg/L	NS	NS	–	–	–	–	–
Chlorobenzene	mg/L	NS	NS	–	–	–	–	–
Chloroform (Trichloromethane)	mg/L	NS	NS	–	–	–	–	–
Hexachlorobenzene	mg/L	NS	NS	–	–	–	–	–
Hexachlorobutadiene	mg/L	NS	NS	–	–	–	–	–
Hexachloroethane	mg/L	NS	NS	–	–	–	–	–
Nitrobenzene	mg/L	NS	NS	–	–	–	–	–
Pentachlorophenol	mg/L	NS	NS	–	–	–	–	–

TABLE B.3

SUBSURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-15*	*MW-16*	*MW-16*	*MW-17*	*MW-17*
Sample ID:				*S-19867-0703-PK-013*	*S-19867-0703-PK-014*	*S-19867-0703-PK-015*	*S-19867-08-03-PK-032*	*S-19867-08-03-PK-033*
Sample Date:				*7/24/2003*	*7/24/2003*	*7/24/2003*	*8/20/2003*	*8/20/2003*
Sample Depth:				*10-12 ft*	*2-4 ft*	*10-11 ft*	*0-4 ft*	*11-13 ft*
Sample Matrix:				*SUBSO*	*SUBSO*	*SUBSO*	*SUSO*	*SUBSO*
				Duplicate				
	Units	*Eastern USA Background*	*TAGMa*					
Pyridine	mg/L	NS	NS	–	–	–	–	–
Tetrachloroethene	mg/L	NS	NS	–	–	–	–	–
Trichloroethene	mg/L	NS	NS	–	–	–	–	–
Vinyl chloride	mg/L	NS	NS	–	–	–	–	–
Wet								
Ignitability	Deg F	NS	NS	–	–	–	–	–
Percent Moisture	%	NS	NS	22.2	20.8	20.2	16.1	22.2
pH	S.U.	NS	NS	8.3	8.3	8.5	8.1	8.1
Reactive Cyanide	mg/kg	NS	NS	–	–	–	–	–
Reactive Hydrogen Cyanide	mg/L	NS	NS	–	–	–	–	–
Reactive Hydrogen Sulfide	mg/L	NS	NS	–	–	–	–	–
Reactive Sulfide	mg/kg	NS	NS	–	–	–	–	–
Total Solids	%	NS	NS	–	–	–	–	–

A: Eastern USA Background Concentration
B: TAGM

TABLE B.3

SUBSURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-19*	*MW-20*	*MW-22*	*MW-23*	*MW-24*
Sample ID:				*S-19867-07-03-PK-010*	*S-19867-0703-PK-017*	*S-19867-07-03-PK-002*	*S-19867-0703-PK-019*	*S-19867-07-03-PK-022*
Sample Date:				*7/28/2003*	*7/25/2003*	*7/22/2003*	*7/25/2003*	*7/28/2003*
Sample Depth:				*10-12 ft*	*8-10 ft*	*13-14 ft*	*22-24 ft*	*18-20 ft*
Sample Matrix:				*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*
	Units	*Eastern USA Background*	*TAGMa*					
Metals								
Aluminum	mg/kg	33000	SB	20400	15800	15300	19800	14500
Antimony	mg/kg	NS	SB	ND (2.09)	ND (1.19) UJ	ND (0.736) UJ	ND (1.92) UJ	ND (0.995) UJ
Arsenic	mg/kg	3 - 12	7.5 or SB	5.90	5.38	2.95	4.13	6.12
Barium	mg/kg	15 - 600	300 or SB	143	96.9	110 J	145	100 J
Beryllium	mg/kg	0 - 1.75	0.16 or SB	**0.838**	**0.688**	**0.872**	**0.806**	**0.925**
Cadmium	mg/kg	0.1 -1.0	1 or SB	ND (0.620)	ND (0.530)	ND (0.368)	ND (0.575)	ND (0.498)
Calcium	mg/kg	130 - 35000	SB	68000	63800	48300	68100	59400
Chromium Total	mg/kg	1.5 - 40	50b or SB	28.0	22.5	21.8	29.6	20.6
Chromium VI (Hexavalent)	mg/kg	NS	NS	ND (5.2)	ND (4.9)	ND (4.7)	ND (4.8)	ND (5.1)
Cobalt	mg/kg	2.5 or 60	30 or SB	11.8	11.8	9.17	11.5	14.5
Copper	mg/kg	1.0 - 50	25 or SB	**25.7**	**30.1**	18.7	20.0	24.2
Cyanide (total)	mg/kg	NS	NS	ND (0.557)	ND (0.570)	ND (0.580)	ND (0.549)	ND (0.624)
Iron	mg/kg	2000 - 550000	2000 or SB	**28700**	**25300**	**21800**	**25700**	**26400**
Lead	mg/kg	NS	SB	8.86	7.67	8.10	7.06	8.30
Magnesium	mg/kg	100 - 5000	SB	11800	11500	11500	12900	10900
Manganese	mg/kg	50 - 5000	SB	668	602	575	576	805
Mercury	mg/kg	0.001 - 0.2	0.1	ND (0.0447)	ND (0.0385)	ND (0.0342)	ND (0.0394)	ND (0.0419)
Nickel	mg/kg	0.5 - 25	13 or SB	**24.8**	**27.9**	**22.6 J**	**28.1**	**27.4 J**
Potassium	mg/kg	8500 - 43000	SB	4860	3070	2880	3580	2400
Selenium	mg/kg	0.1 - 3.9	2 or SB	ND (1.24)	1.81	ND (1.47)	**2.84**	ND (1.99)
Silver	mg/kg	NS	SB	0.433 J	0.206 J	ND (0.736)	0.349 J	ND (0.995)
Sodium	mg/kg	6000 - 8000	SB	294	256	219	241	361
Thallium	mg/kg	NS	SB	ND (1.24)	ND (1.06)	ND (2.94)	ND (1.15)	ND (2.99)
Vanadium	mg/kg	1.0 - 300	150 or SB	38.2	33.4	28.9 J	34.6	31.1 J
Zinc	mg/kg	9.0 - 50.0	20 or SB	**64.5**	**53.7**	**53.9 J**	**59.3**	**52.1 J**

TABLE B.3

SUBSURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-19*	*MW-20*	*MW-22*	*MW-23*	*MW-24*
Sample ID:				*S-19867-07-03-PK-010*	*S-19867-0703-PK-017*	*S-19867-07-03-PK-002*	*S-19867-0703-PK-019*	*S-19867-07-03-PK-022*
Sample Date:				*7/28/2003*	*7/25/2003*	*7/22/2003*	*7/25/2003*	*7/28/2003*
Sample Depth:				*10-12 ft*	*8-10 ft*	*13-14 ft*	*22-24 ft*	*18-20 ft*
Sample Matrix:				*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*
	Units	*Eastern USA Background*	*TAGMa*					
MetalsR								
Arsenic	mg/L	NS	NS	–	–	–	–	–
Barium	mg/L	NS	NS	–	–	–	–	–
Cadmium	mg/L	NS	NS	–	–	–	–	–
Chromium Total	mg/L	NS	NS	–	–	–	–	–
Lead	mg/L	NS	NS	–	–	–	–	–
Mercury	mg/L	NS	NS	–	–	–	–	–
Selenium	mg/L	NS	NS	–	–	–	–	–
Silver	mg/L	NS	NS	–	–	–	–	–
PesticidesR								
2,4,5-TP (Silvex)	mg/L	NS	NS	–	–	–	–	–
2,4-Dichlorophenylacetic acid	mg/L	NS	NS	–	–	–	–	–
Chlordane	mg/L	NS	NS	–	–	–	–	–
Endrin	mg/L	NS	NS	–	–	–	–	–
gamma-BHC (Lindane)	mg/L	NS	NS	–	–	–	–	–
Heptachlor	mg/L	NS	NS	–	–	–	–	–
Heptachlor epoxide	mg/L	NS	NS	–	–	–	–	–
Methoxychlor	mg/L	NS	NS	–	–	–	–	–
Toxaphene	mg/L	NS	NS	–	–	–	–	–

TABLE B.3

SUBSURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-19*	*MW-20*	*MW-22*	*MW-23*	*MW-24*
Sample ID:				*S-19867-07-03-PK-010*	*S-19867-0703-PK-017*	*S-19867-07-03-PK-002*	*S-19867-0703-PK-019*	*S-19867-07-03-PK-022*
Sample Date:				*7/28/2003*	*7/25/2003*	*7/22/2003*	*7/25/2003*	*7/28/2003*
Sample Depth:				*10-12 ft*	*8-10 ft*	*13-14 ft*	*22-24 ft*	*18-20 ft*
Sample Matrix:				*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*
	Units	*Eastern USA Background*	*TAGMa*					
SVOAs								
2-Methylnaphthalene	mg/kg	NS	36.4	--	--	--	--	--
2-Methylphenol	mg/kg	NS	0.1	--	--	--	--	--
4-Methylphenol	mg/kg	NS	0.09	--	--	--	--	--
Acenaphthene	mg/kg	NS	50	--	--	--	--	--
Acenaphthylene	mg/kg	NS	41	--	--	--	--	--
Anthracene	mg/kg	NS	50	--	--	--	--	--
Benzo(a)anthracene	mg/kg	NS	0.224	--	--	--	--	--
Benzo(a)pyrene	mg/kg	NS	0.061	--	--	--	--	--
Benzo(b)fluoranthene	mg/kg	NS	1.1	--	--	--	--	--
Benzo(g,h,i)perylene	mg/kg	NS	50	--	--	--	--	--
Benzo(k)fluoranthene	mg/kg	NS	1.1	--	--	--	--	--
bis(2-Ethylhexyl)phthalate	mg/kg	NS	50	--	--	--	--	--
Butyl benzylphthalate	mg/kg	NS	50	--	--	--	--	--
Carbazole	mg/kg	NS	NS	--	--	--	--	--
Chrysene	mg/kg	NS	0.04	--	--	--	--	--
Dibenz(a,h)anthracene	mg/kg	NS	0.014	--	--	--	--	--
Dibenzofuran	mg/kg	NS	6.2	--	--	--	--	--
Diethyl phthalate	mg/kg	NS	7.1	--	--	--	--	--
Fluoranthene	mg/kg	NS	50	--	--	--	--	--
Fluorene	mg/kg	NS	50	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	mg/kg	NS	3.2	--	--	--	--	--
Naphthalene	mg/kg	NS	13	--	--	--	--	--
Pentachlorophenol	mg/kg	NS	1	--	--	--	--	--
Phenanthrene	mg/kg	NS	50	--	--	--	--	--
Phenol	mg/kg	NS	0.03	--	--	--	--	--
Pyrene	mg/kg	NS	50	--	--	--	--	--

TABLE B.3

SUBSURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-19*	*MW-20*	*MW-22*	*MW-23*	*MW-24*
Sample ID:				*S-19867-07-03-PK-010*	*S-19867-0703-PK-017*	*S-19867-07-03-PK-002*	*S-19867-0703-PK-019*	*S-19867-07-03-PK-022*
Sample Date:				*7/28/2003*	*7/25/2003*	*7/22/2003*	*7/25/2003*	*7/28/2003*
Sample Depth:				*10-12 ft*	*8-10 ft*	*13-14 ft*	*22-24 ft*	*18-20 ft*
Sample Matrix:				*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*
	Units	*Eastern USA Background*	*TAGMa*					
VOAs								
2-Butanone (Methyl Ethyl Ketone)	mg/kg	NS	0.3	–	–	–	–	–
Acetone	mg/kg	NS	0.2	–	–	–	–	–
Ethylbenzene	mg/kg	NS	5.5	–	–	–	–	–
Methylene chloride	mg/kg	NS	0.1	–	–	–	–	–
Tetrachloroethene	mg/kg	NS	1.4	–	–	–	–	–
Toluene	mg/kg	NS	1.5	–	–	–	–	–
Trichloroethene	mg/kg	NS	0.7	–	–	–	–	–
Xylene (total)	mg/kg	NS	1.2	–	–	–	–	–
VOAsR								
1,1-Dichloroethene	mg/L	NS	NS	–	–	–	–	–
1,2-Dichloroethane	mg/L	NS	NS	–	–	–	–	–
1,4-Dichlorobenzene	mg/L	NS	NS	–	–	–	–	–
2,4,5-Trichlorophenol	mg/L	NS	NS	–	–	–	–	–
2,4,6-Trichlorophenol	mg/L	NS	NS	–	–	–	–	–
2,4-Dinitrotoluene	mg/L	NS	NS	–	–	–	–	–
2-Butanone (Methyl Ethyl Ketone)	mg/L	NS	NS	–	–	–	–	–
2-Methylphenol	mg/L	NS	NS	–	–	–	–	–
3-Methylphenol	mg/L	NS	NS	–	–	–	–	–
4-Methylphenol	mg/L	NS	NS	–	–	–	–	–
Benzene	mg/L	NS	NS	–	–	–	–	–
Carbon tetrachloride	mg/L	NS	NS	–	–	–	–	–
Chlorobenzene	mg/L	NS	NS	–	–	–	–	–
Chloroform (Trichloromethane)	mg/L	NS	NS	–	–	–	–	–
Hexachlorobenzene	mg/L	NS	NS	–	–	–	–	–
Hexachlorobutadiene	mg/L	NS	NS	–	–	–	–	–
Hexachloroethane	mg/L	NS	NS	–	–	–	–	–
Nitrobenzene	mg/L	NS	NS	–	–	–	–	–
Pentachlorophenol	mg/L	NS	NS	–	–	–	–	–

TABLE B.3

SUBSURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-19*	*MW-20*	*MW-22*	*MW-23*	*MW-24*
Sample ID:				*S-19867-07-03-PK-010*	*S-19867-0703-PK-017*	*S-19867-07-03-PK-002*	*S-19867-0703-PK-019*	*S-19867-07-03-PK-022*
Sample Date:				*7/28/2003*	*7/25/2003*	*7/22/2003*	*7/25/2003*	*7/28/2003*
Sample Depth:				*10-12 ft*	*8-10 ft*	*13-14 ft*	*22-24 ft*	*18-20 ft*
Sample Matrix:				*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*
	Units	*Eastern USA Background*	*TAGMa*					
Pyridine	mg/L	NS	NS	–	–	–	–	–
Tetrachloroethene	mg/L	NS	NS	–	–	–	–	–
Trichloroethene	mg/L	NS	NS	–	–	–	–	–
Vinyl chloride	mg/L	NS	NS	–	–	–	–	–
Wet								
Ignitability	Deg F	NS	NS	–	–	–	–	–
Percent Moisture	%	NS	NS	23.9	17.3	17.1	16.4	21.5
pH	S.U.	NS	NS	9.5	9.8	9.1 J	10	10
Reactive Cyanide	mg/kg	NS	NS	–	–	–	–	–
Reactive Hydrogen Cyanide	mg/L	NS	NS	–	–	–	–	–
Reactive Hydrogen Sulfide	mg/L	NS	NS	–	–	–	–	–
Reactive Sulfide	mg/kg	NS	NS	–	–	–	–	–
Total Solids	%	NS	NS	–	–	–	–	–

A: Eastern USA Background Concentration
B: TAGM

TABLE B.3

SUBSURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-25*	*MW-26*	*MW-27*	*MW-28*	*MW-102A*	*MW-103A*
Sample ID:				*S-19867-07-03-PK-004*	*S-19867-07-03-PK-006*	*S-19867-07-03-PK-030*	*S-19867-07-03-PK-028*	*MW-102*	*MW-103*
Sample Date:				*7/23/2003*	*7/23/2003*	*7/29/2003*	*7/29/2003*	*11/7/1996*	*11/7/1996*
Sample Depth:				*8-10 ft*	*10-12 ft*	*7-8 ft*	*7-8 ft*	*6-8 ft*	*12-14 ft*
Sample Matrix:				*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*
	Units	*Eastern USA Background*	*TAGMa*						
Metals									
Aluminum	mg/kg	33000	SB	17500	5970	20500	21000	10100	15800
Antimony	mg/kg	NS	SB	ND (0.931) UJ	2.82 J	ND (2.58) UJ	ND (1.74) UJ	ND (1.2)	ND (1.2)
Arsenic	mg/kg	3 - 12	7.5 or SB	**9.44**	5.42	**7.97**	5.27	5.0	2.7
Barium	mg/kg	15 - 600	300 or SB	108 J	37.4 J	159 J	224 J	86.9 E	134 E
Beryllium	mg/kg	0 - 1.75	0.16 or SB	**1.01**	**0.405**	**1.18**	**1.13**	**0.38 B**	**0.72 B**
Cadmium	mg/kg	0.1 -1.0	1 or SB	ND (0.465)	0.737	0.743	0.0609 J	**2.4**	**2.7**
Calcium	mg/kg	130 - 35000	SB	68000	124000	4710	31500	–	–
Chromium Total	mg/kg	1.5 - 40	50b or SB	24.5	9.66	28.4	30.4	16.2 N*	23.4 N*
Chromium VI (Hexavalent)	mg/kg	NS	NS	ND (4.9)	ND (4.7)	ND (4.7)	ND (4.9)	0.48 E*	0.37 E*
Cobalt	mg/kg	2.5 or 60	30 or SB	13.1	4.31	15.3	12.3	9.5 B	16.7
Copper	mg/kg	1.0 - 50	25 or SB	23.5	8.96	**30.1**	**26.5**	21.7 E	22.9 E
Cyanide (total)	mg/kg	NS	NS	ND (0.599)	ND (0.554)	ND (0.619)	ND (0.532)	–	–
Iron	mg/kg	2000 - 550000	2000 or SB	**30100**	**10600**	**33100**	**29900**	**21200**	**30400**
Lead	mg/kg	NS	SB	7.63	54.7	10.5	8.74	5.6 *	8.1 *
Magnesium	mg/kg	100 - 5000	SB	12200	77900	7910	11000	10900	13200
Manganese	mg/kg	50 - 5000	SB	575	475	824	510	689 *	496 *
Mercury	mg/kg	0.001 - 0.2	0.1	ND (0.0374)	ND (0.0345)	0.0126 J	0.0131 J	ND (0.05)	ND (0.05)
Nickel	mg/kg	0.5 - 25	13 or SB	**27.4 J**	9.97 J	**32.8 J**	**28.5 J**	**23.6**	**35.8**
Potassium	mg/kg	8500 - 43000	SB	3120	1460	3030	3260	978 BE	2300 E
Selenium	mg/kg	0.1 - 3.9	2 or SB	ND (1.86)	ND (2.37)	ND (1.29)	ND (1.74)	1.2	**2.6**
Silver	mg/kg	NS	SB	ND (0.931)	ND (0.592)	ND (0.861)	ND (0.871)	ND (0.26)	NND (0.27) N
Sodium	mg/kg	6000 - 8000	SB	235	237	155	319	ND (30.6)	ND (31.1)
Thallium	mg/kg	NS	SB	ND (3.72)	ND (1.78)	ND (2.58)	ND (1.74)	ND (0.73)	ND (0.75)
Vanadium	mg/kg	1.0 - 300	150 or SB	32.8 J	13.6 J	40.0 J	38.2 J	22.4 E	32.6 E
Zinc	mg/kg	9.0 - 50.0	20 or SB	**60.3 J**	**387 J**	**323 J**	**225 J**	**54.3**	**76.2**

TABLE B.3

SUBSURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-25*	*MW-26*	*MW-27*	*MW-28*	*MW-102A*	*MW-103A*
Sample ID:				*S-19867-07-03-PK-004*	*S-19867-07-03-PK-006*	*S-19867-07-03-PK-030*	*S-19867-07-03-PK-028*	*MW-102*	*MW-103*
Sample Date:				*7/23/2003*	*7/23/2003*	*7/29/2003*	*7/29/2003*	*11/7/1996*	*11/7/1996*
Sample Depth:				*8-10 ft*	*10-12 ft*	*7-8 ft*	*7-8 ft*	*6-8 ft*	*12-14 ft*
Sample Matrix:				*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*
	Units	*Eastern USA Background*	*TAGMa*						
MetalsR									
Arsenic	mg/L	NS	NS	--	--	--	--	--	--
Barium	mg/L	NS	NS	--	--	--	--	--	--
Cadmium	mg/L	NS	NS	--	--	--	--	--	--
Chromium Total	mg/L	NS	NS	--	--	--	--	--	--
Lead	mg/L	NS	NS	--	--	--	--	--	--
Mercury	mg/L	NS	NS	--	--	--	--	--	--
Selenium	mg/L	NS	NS	--	--	--	--	--	--
Silver	mg/L	NS	NS	--	--	--	--	--	--
PesticidesR									
2,4,5-TP (Silvex)	mg/L	NS	NS	--	--	--	--	--	--
2,4-Dichlorophenylacetic acid	mg/L	NS	NS	--	--	--	--	--	--
Chlordane	mg/L	NS	NS	--	--	--	--	--	--
Endrin	mg/L	NS	NS	--	--	--	--	--	--
gamma-BHC (Lindane)	mg/L	NS	NS	--	--	--	--	--	--
Heptachlor	mg/L	NS	NS	--	--	--	--	--	--
Heptachlor epoxide	mg/L	NS	NS	--	--	--	--	--	--
Methoxychlor	mg/L	NS	NS	--	--	--	--	--	--
Toxaphene	mg/L	NS	NS	--	--	--	--	--	--

TABLE B.3

SUBSURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-25*	*MW-26*	*MW-27*	*MW-28*	*MW-102A*	*MW-103A*
Sample ID:				*S-19867-07-03-PK-004*	*S-19867-07-03-PK-006*	*S-19867-07-03-PK-030*	*S-19867-07-03-PK-028*	*MW-102*	*MW-103*
Sample Date:				*7/23/2003*	*7/23/2003*	*7/29/2003*	*7/29/2003*	*11/7/1996*	*11/7/1996*
Sample Depth:				*8-10 ft*	*10-12 ft*	*7-8 ft*	*7-8 ft*	*6-8 ft*	*12-14 ft*
Sample Matrix:				*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*
	Units	*Eastern USA Background*	*TAGMa*						
SVOAs									
2-Methylnaphthalene	mg/kg	NS	36.4	–	–	–	–	–	–
2-Methylphenol	mg/kg	NS	0.1	–	–	–	–	–	–
4-Methylphenol	mg/kg	NS	0.09	–	–	–	–	–	–
Acenaphthene	mg/kg	NS	50	–	–	–	–	–	–
Acenaphthylene	mg/kg	NS	41	–	–	–	–	–	–
Anthracene	mg/kg	NS	50	–	–	–	–	–	–
Benzo(a)anthracene	mg/kg	NS	0.224	–	–	–	–	–	–
Benzo(a)pyrene	mg/kg	NS	0.061	–	–	–	–	–	–
Benzo(b)fluoranthene	mg/kg	NS	1.1	–	–	–	–	ND	ND
Benzo(g,h,i)perylene	mg/kg	NS	50	–	–	–	–	–	–
Benzo(k)fluoranthene	mg/kg	NS	1.1	–	–	–	–	–	–
bis(2-Ethylhexyl)phthalate	mg/kg	NS	50	–	–	–	–	0.073 BJ	0.092 BJ
Butyl benzylphthalate	mg/kg	NS	50	–	–	–	–	–	–
Carbazole	mg/kg	NS	NS	–	–	–	–	–	–
Chrysene	mg/kg	NS	0.04	–	–	–	–	–	–
Dibenz(a,h)anthracene	mg/kg	NS	0.014	–	–	–	–	–	–
Dibenzofuran	mg/kg	NS	6.2	–	–	–	–	–	–
Diethyl phthalate	mg/kg	NS	7.1	–	–	–	–	0.22 J	ND
Fluoranthene	mg/kg	NS	50	–	–	–	–	ND	ND
Fluorene	mg/kg	NS	50	–	–	–	–	–	–
Indeno(1,2,3-cd)pyrene	mg/kg	NS	3.2	–	–	–	–	–	–
Naphthalene	mg/kg	NS	13	–	–	–	–	–	–
Pentachlorophenol	mg/kg	NS	1	–	–	–	–	0.12 J	ND
Phenanthrene	mg/kg	NS	50	–	–	–	–	–	–
Phenol	mg/kg	NS	0.03	–	–	–	–	–	–
Pyrene	mg/kg	NS	50	–	–	–	–	ND	ND

TABLE B.3

SUBSURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-25*	*MW-26*	*MW-27*	*MW-28*	*MW-102A*	*MW-103A*
Sample ID:				*S-19867-07-03-PK-004*	*S-19867-07-03-PK-006*	*S-19867-07-03-PK-030*	*S-19867-07-03-PK-028*	*MW-102*	*MW-103*
Sample Date:				*7/23/2003*	*7/23/2003*	*7/29/2003*	*7/29/2003*	*11/7/1996*	*11/7/1996*
Sample Depth:				*8-10 ft*	*10-12 ft*	*7-8 ft*	*7-8 ft*	*6-8 ft*	*12-14 ft*
Sample Matrix:				*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*
	Units	*Eastern USA Background*	*TAGMa*						
VOAs									
2-Butanone (Methyl Ethyl Ketone)	mg/kg	NS	0.3	–	–	–	–	ND	ND
Acetone	mg/kg	NS	0.2	–	–	–	–	0.003 BJ	0.018 B
Ethylbenzene	mg/kg	NS	5.5	–	–	–	–	–	–
Methylene chloride	mg/kg	NS	0.1	–	–	–	–	ND	0.002 J
Tetrachloroethene	mg/kg	NS	1.4	–	–	–	–	–	–
Toluene	mg/kg	NS	1.5	–	–	–	–	ND	ND
Trichloroethene	mg/kg	NS	0.7	–	–	–	–	–	–
Xylene (total)	mg/kg	NS	1.2	–	–	–	–	–	–
VOAsR									
1,1-Dichloroethene	mg/L	NS	NS	–	–	–	–	–	–
1,2-Dichloroethane	mg/L	NS	NS	–	–	–	–	–	–
1,4-Dichlorobenzene	mg/L	NS	NS	–	–	–	–	–	–
2,4,5-Trichlorophenol	mg/L	NS	NS	–	–	–	–	–	–
2,4,6-Trichlorophenol	mg/L	NS	NS	–	–	–	–	–	–
2,4-Dinitrotoluene	mg/L	NS	NS	–	–	–	–	–	–
2-Butanone (Methyl Ethyl Ketone)	mg/L	NS	NS	–	–	–	–	–	–
2-Methylphenol	mg/L	NS	NS	–	–	–	–	–	–
3-Methylphenol	mg/L	NS	NS	–	–	–	–	–	–
4-Methylphenol	mg/L	NS	NS	–	–	–	–	–	–
Benzene	mg/L	NS	NS	–	–	–	–	–	–
Carbon tetrachloride	mg/L	NS	NS	–	–	–	–	–	–
Chlorobenzene	mg/L	NS	NS	–	–	–	–	–	–
Chloroform (Trichloromethane)	mg/L	NS	NS	–	–	–	–	–	–
Hexachlorobenzene	mg/L	NS	NS	–	–	–	–	–	–
Hexachlorobutadiene	mg/L	NS	NS	–	–	–	–	–	–
Hexachloroethane	mg/L	NS	NS	–	–	–	–	–	–
Nitrobenzene	mg/L	NS	NS	–	–	–	–	–	–
Pentachlorophenol	mg/L	NS	NS	–	–	–	–	–	–

TABLE B.3

SUBSURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-25*	*MW-26*	*MW-27*	*MW-28*	*MW-102A*	*MW-103A*
Sample ID:				*S-19867-07-03-PK-004*	*S-19867-07-03-PK-006*	*S-19867-07-03-PK-030*	*S-19867-07-03-PK-028*	*MW-102*	*MW-103*
Sample Date:				*7/23/2003*	*7/23/2003*	*7/29/2003*	*7/29/2003*	*11/7/1996*	*11/7/1996*
Sample Depth:				*8-10 ft*	*10-12 ft*	*7-8 ft*	*7-8 ft*	*6-8 ft*	*12-14 ft*
Sample Matrix:				*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*
	Units	*Eastern USA Background*	*TAGMa*						
Pyridine	mg/L	NS	NS	–	–	–	–	–	–
Tetrachloroethene	mg/L	NS	NS	–	–	–	–	–	–
Trichloroethene	mg/L	NS	NS	–	–	–	–	–	–
Vinyl chloride	mg/L	NS	NS	–	–	–	–	–	–
Wet									
Ignitability	Deg F	NS	NS	–	–	–	–	–	–
Percent Moisture	%	NS	NS	19.8	15.6	15.8	20.3	–	–
pH	S.U.	NS	NS	9.6 J	11 J	8.5	7.4	–	–
Reactive Cyanide	mg/kg	NS	NS	–	–	–	–	–	–
Reactive Hydrogen Cyanide	mg/L	NS	NS	–	–	–	–	–	–
Reactive Hydrogen Sulfide	mg/L	NS	NS	–	–	–	–	–	–
Reactive Sulfide	mg/kg	NS	NS	–	–	–	–	–	–
Total Solids	%	NS	NS	–	–	–	–	–	–

A: Eastern USA Background Concentration
B: TAGM

TABLE B.3

SUBSURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-104A*	*MW-104A*	*MW-105A*	*SB-2C*	*SB-3C*	*SB-4C*	*SB-5C*	*SB-6C*	*SB-7C*
Sample ID:				*MW-104*	*MW-104*	*MW-105*	*SB-2C*	*SB-3C*	*SB-4C*	*SB-5C*	*SB-6C*	*SB-7C*
Sample Date:				*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*
Sample Depth:				*16-18 ft*	*8-10 ft*	*12-14 ft*	*6-8 ft*	*10-12 ft*	*7-9 ft*	*2-4 ft*	*8-9 ft*	*16-18 ft*
Sample Matrix:				*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*
	Units	*Eastern USA Background*	*TAGMa*									
Metals												
Aluminum	mg/kg	33000	SB	14400	23300	4480	14400	13300	18300	14100	24500	26000
Antimony	mg/kg	NS	SB	3.6 B	3.3 B	ND (1.1)	ND (1.2)	1.6 B	ND (1.2)	ND (1.1)	2.4 B	ND (6.0)
Arsenic	mg/kg	3 - 12	7.5 or SB	5.2	**7.9**	ND (1.1)	3.4 *	5.7 *	6.7 *	3.9 *	**7.8 ***	6.8
Barium	mg/kg	15 - 600	300 or SB	121 E	219 E	59.0 E	81.7 *	125 *	129 *	124 *	193 *	193
Beryllium	mg/kg	0 - 1.75	0.16 or SB	**0.57 B**	**1.2 B**	**0.20 B**	**0.75 B**	**0.73 B**	**0.90 B**	**0.77 B**	**1.4**	**1.0 B**
Cadmium	mg/kg	0.1 -1.0	1 or SB	**2.7**	**5.0**	**1.9**	ND (0.51)	**2.2**	**4.1**	**3.7**	**5.4**	**4.0**
Calcium	mg/kg	130 - 35000	SB	–	–	–	–	–	–	–	–	–
Chromium Total	mg/kg	1.5 - 40	50b or SB	**72.4 N***	**54.3 N***	6.3 N*	31.6	46.4	26.5	33.4	**52.7**	34.8
Chromium VI (Hexavalent)	mg/kg	NS	NS	1.6 E*	0.42 E*	0.31 E*	0.28 N	–	–	–	–	0.24
Cobalt	mg/kg	2.5 or 60	30 or SB	13.4	13.6 B	5.3 B	13.3	16.2	18.5	14.9	19.1	14.2
Copper	mg/kg	1.0 - 50	25 or SB	22.5 E	**30.6 E**	9.1 E	21.6	**31.4**	**30.9**	24.7	**39.2**	**29.6 E**
Cyanide (total)	mg/kg	NS	NS	–	–	–	–	–	–	–	–	–
Iron	mg/kg	2000 - 550000	2000 or SB	**25700**	**31200**	**7800**	**25500**	**27200**	**33300**	**24500**	**39500**	**35300**
Lead	mg/kg	NS	SB	6.4 *	25.2 *	21.1 *	5.9 *	12.6 *	11.9 *	7.1 *	23.5 *	7.2
Magnesium	mg/kg	100 - 5000	SB	12900	8150	79300	13200	12900	16000	16600	8780	10500
Manganese	mg/kg	50 - 5000	SB	874 *	409 *	1040 *	581 E*	807 E*	1270 E*	848 E*	697 E*	773 *
Mercury	mg/kg	0.001 - 0.2	0.1	ND (0.06)	ND (0.06)	ND (0.05)	ND (0.05)	**0.13**	0.06 B	0.09 B	**0.11 B**	ND (0.05) N
Nickel	mg/kg	0.5 - 25	13 or SB	**26.0**	**34.0**	6.7 B	**22.4**	**25.9**	**38.7**	**26.2**	**48.6**	**32.7**
Potassium	mg/kg	8500 - 43000	SB	2110 E	2580 E	101 BE	1670	2620	2040	1260	3570	4040 E
Selenium	mg/kg	0.1 - 3.9	2 or SB	ND (1.2)	**2.3**	ND (1.1)	ND (1.1)	ND (1.1)	**2.6**	1.2	**2.6**	**3.5**
Silver	mg/kg	NS	SB	ND (0.28)	NND (0.32)	NND (0.25)	NND (0.24)	NND (0.25)	NND (0.25)	NND (0.23)	NND (0.25)	NND (0.26) N
Sodium	mg/kg	6000 - 8000	SB	ND (33.4)	262 B	ND (29.8)	166 B	ND (32.1)	105 B	ND (30.1)	925 B	476 B
Thallium	mg/kg	NS	SB	ND (0.80)	ND (0.89)	ND (0.72)	ND (0.73)	ND (0.75)	ND (0.74)	ND (0.70)	ND (0.76)	ND (0.78)
Vanadium	mg/kg	1.0 - 300	150 or SB	30.2 E	41.1 E	6.8 BE	36.3	32.4	34.4	32.4	47.7	47.1
Zinc	mg/kg	9.0 - 50.0	20 or SB	**68.9**	**750**	**648**	**57.0**	**74.4**	**78.9**	**64.0**	**91.7**	**81.8**

TABLE B.3

SUBSURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-104A*	*MW-104A*	*MW-105A*	*SB-2C*	*SB-3C*	*SB-4C*	*SB-5C*	*SB-6C*	*SB-7C*
Sample ID:				*MW-104*	*MW-104*	*MW-105*	*SB-2C*	*SB-3C*	*SB-4C*	*SB-5C*	*SB-6C*	*SB-7C*
Sample Date:				*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*
Sample Depth:				*16-18 ft*	*8-10 ft*	*12-14 ft*	*6-8 ft*	*10-12 ft*	*7-9 ft*	*2-4 ft*	*8-9 ft*	*16-18 ft*
Sample Matrix:				*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*
	Units	*Eastern USA Background*	*TAGMa*									
MetalsR												
Arsenic	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Barium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Cadmium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Chromium Total	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Lead	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Mercury	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Selenium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Silver	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
PesticidesR												
2,4,5-TP (Silvex)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
2,4-Dichlorophenylacetic acid	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Chlordane	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Endrin	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
gamma-BHC (Lindane)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Heptachlor	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Heptachlor epoxide	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Methoxychlor	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Toxaphene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–

TABLE B.3

SUBSURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-104A*	*MW-104A*	*MW-105A*	*SB-2C*	*SB-3C*	*SB-4C*	*SB-5C*	*SB-6C*	*SB-7C*
Sample ID:				*MW-104*	*MW-104*	*MW-105*	*SB-2C*	*SB-3C*	*SB-4C*	*SB-5C*	*SB-6C*	*SB-7C*
Sample Date:				*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*
Sample Depth:				*16-18 ft*	*8-10 ft*	*12-14 ft*	*6-8 ft*	*10-12 ft*	*7-9 ft*	*2-4 ft*	*8-9 ft*	*16-18 ft*
Sample Matrix:				*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*
	Units	*Eastern USA Background*	*TAGMa*									
SVOAs												
2-Methylnaphthalene	mg/kg	NS	36.4	–	–	–	–	–	–	–	–	–
2-Methylphenol	mg/kg	NS	0.1	–	–	–	–	–	–	–	–	–
4-Methylphenol	mg/kg	NS	0.09	–	–	–	–	–	–	–	–	–
Acenaphthene	mg/kg	NS	50	–	–	–	–	–	–	–	–	–
Acenaphthylene	mg/kg	NS	41	–	–	–	–	–	–	–	–	–
Anthracene	mg/kg	NS	50	–	–	–	–	–	–	–	–	–
Benzo(a)anthracene	mg/kg	NS	0.224	–	–	–	–	–	–	–	–	–
Benzo(a)pyrene	mg/kg	NS	0.061	–	–	–	–	–	–	–	–	–
Benzo(b)fluoranthene	mg/kg	NS	1.1	ND	ND	0.043 J	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene	mg/kg	NS	50	–	–	–	–	–	–	–	–	–
Benzo(k)fluoranthene	mg/kg	NS	1.1	–	–	–	–	–	–	–	–	–
bis(2-Ethylhexyl)phthalate	mg/kg	NS	50	0.11 BJ	0.11 BJ	0.31 J	0.062 J	0.06 J	0.053 J	0.083 J	2.6	0.16 J
Butyl benzylphthalate	mg/kg	NS	50	–	–	–	–	–	–	–	–	–
Carbazole	mg/kg	NS	NS	–	–	–	–	–	–	–	–	–
Chrysene	mg/kg	NS	0.04	–	–	–	–	–	–	–	–	–
Dibenz(a,h)anthracene	mg/kg	NS	0.014	–	–	–	–	–	–	–	–	–
Dibenzofuran	mg/kg	NS	6.2	–	–	–	–	–	–	–	–	–
Diethyl phthalate	mg/kg	NS	7.1	0.12 J	0.11 J	ND	ND	ND	ND	0.57	ND	ND
Fluoranthene	mg/kg	NS	50	ND	ND	0.048 J	ND	0.043 J	ND	ND	ND	ND
Fluorene	mg/kg	NS	50	–	–	–	–	–	–	–	–	–
Indeno(1,2,3-cd)pyrene	mg/kg	NS	3.2	–	–	–	–	–	–	–	–	–
Naphthalene	mg/kg	NS	13	–	–	–	–	–	–	–	–	–
Pentachlorophenol	mg/kg	NS	1	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phenanthrene	mg/kg	NS	50	–	–	–	–	–	–	–	–	–
Phenol	mg/kg	NS	0.03	–	–	–	–	–	–	–	–	–
Pyrene	mg/kg	NS	50	ND	ND	0.051 J	ND	ND	ND	ND	ND	ND

TABLE B.3

SUBSURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:					*MW-104A*	*MW-104A*	*MW-105A*	*SB-2C*	*SB-3C*	*SB-4C*	*SB-5C*	*SB-6C*	*SB-7C*
Sample ID:					*MW-104*	*MW-104*	*MW-105*	*SB-2C*	*SB-3C*	*SB-4C*	*SB-5C*	*SB-6C*	*SB-7C*
Sample Date:					*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*
Sample Depth:					*16-18 ft*	*8-10 ft*	*12-14 ft*	*6-8 ft*	*10-12 ft*	*7-9 ft*	*2-4 ft*	*8-9 ft*	*16-18 ft*
Sample Matrix:					*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*
	Units	*Eastern USA Background*	*TAGMa*										
VOAs													
2-Butanone (Methyl Ethyl Ketone)	mg/kg	NS	0.3	–	0.23	0.026	ND	ND	ND	ND	ND	ND
Acetone	mg/kg	NS	0.2	–	**0.72 BE**	0.02 B	0.007 BJ	0.011 BJ	0.027 B	0.003 BJ	0.008 BJ	0.028 B
Ethylbenzene	mg/kg	NS	5.5	–	–	–	–	–	–	–	–	–
Methylene chloride	mg/kg	NS	0.1	–	0.002 J	0.004 J	0.002 J	ND	ND	ND	ND	ND
Tetrachloroethene	mg/kg	NS	1.4	–	–	–	–	–	–	–	–	–
Toluene	mg/kg	NS	1.5	–	0.002 J	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	mg/kg	NS	0.7	–	–	–	–	–	–	–	–	–
Xylene (total)	mg/kg	NS	1.2	–	–	–	–	–	–	–	–	–
VOAsR													
1,1-Dichloroethene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
1,2-Dichloroethane	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
1,4-Dichlorobenzene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
2,4,5-Trichlorophenol	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
2,4,6-Trichlorophenol	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
2,4-Dinitrotoluene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
2-Butanone (Methyl Ethyl Ketone)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
2-Methylphenol	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
3-Methylphenol	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
4-Methylphenol	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Benzene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Carbon tetrachloride	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Chlorobenzene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Chloroform (Trichloromethane)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Hexachlorobenzene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Hexachlorobutadiene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Hexachloroethane	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Nitrobenzene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Pentachlorophenol	mg/L	NS	NS	–	–	–	–	–	–	–	–	–

TABLE B.3

SUBSURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-104A*	*MW-104A*	*MW-105A*	*SB-2C*	*SB-3C*	*SB-4C*	*SB-5C*	*SB-6C*	*SB-7C*
Sample ID:				*MW-104*	*MW-104*	*MW-105*	*SB-2C*	*SB-3C*	*SB-4C*	*SB-5C*	*SB-6C*	*SB-7C*
Sample Date:				*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*
Sample Depth:				*16-18 ft*	*8-10 ft*	*12-14 ft*	*6-8 ft*	*10-12 ft*	*7-9 ft*	*2-4 ft*	*8-9 ft*	*16-18 ft*
Sample Matrix:				*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*
	Units	*Eastern USA Background*	*TAGMa*									
Pyridine	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Tetrachloroethene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Trichloroethene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Vinyl chloride	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Wet												
Ignitability	Deg F	NS	NS	–	–	–	–	–	–	–	–	–
Percent Moisture	%	NS	NS	–	–	–	–	–	–	–	–	–
pH	S.U.	NS	NS	–	–	–	–	–	–	–	–	–
Reactive Cyanide	mg/kg	NS	NS	–	–	–	–	–	–	–	–	–
Reactive Hydrogen Cyanide	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Reactive Hydrogen Sulfide	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Reactive Sulfide	mg/kg	NS	NS	–	–	–	–	–	–	–	–	–
Total Solids	%	NS	NS	–	–	–	–	–	–	–	–	–

A: Eastern USA Background Concentration
B: TAGM

TABLE B.3

SUBSURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SB-8C*	*SB-9C*	*SB-10C*	*SB-11C*	*SB-12C*
Sample ID:				*SB-8C*	*SB-9C*	*SB-10C*	*SB-11C*	*SB-12C*
Sample Date:				*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*
Sample Depth:				*17-19 ft*	*17-19 ft*	*20-22 ft*	*18-20 ft*	*18-20 ft*
Sample Matrix:				*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*
	Units	*Eastern USA Background*	*TAGMa*					
Metals								
Aluminum	mg/kg	33000	SB	33700	27700	20700	19800	16300
Antimony	mg/kg	NS	SB	ND (6.0)	ND (5.4)	ND (1.2)	ND (1.2)	ND (1.3)
Arsenic	mg/kg	3 - 12	7.5 or SB	6.6	**9.4**	**8.9 ***	6.1 *	7.0 *
Barium	mg/kg	15 - 600	300 or SB	202	184	139 *	141 *	122 *
Beryllium	mg/kg	0 - 1.75	0.16 or SB	**1.2 B**	**1.0 B**	**1.1 B**	**0.94 B**	**0.81 B**
Cadmium	mg/kg	0.1 -1.0	1 or SB	**4.3**	**4.2**	ND (0.53)	ND (0.51)	ND (0.55)
Calcium	mg/kg	130 - 35000	SB	--	--	--	--	--
Chromium Total	mg/kg	1.5 - 40	50b or SB	**71.2**	34.8	38.8	33.6	29.7
Chromium VI (Hexavalent)	mg/kg	NS	NS	--	--	--	--	--
Cobalt	mg/kg	2.5 or 60	30 or SB	17.2	18.7	18.7	16.1	14.4
Copper	mg/kg	1.0 - 50	25 or SB	**34.3 E**	**34.3 E**	**30.9**	24.8	**29.2**
Cyanide (total)	mg/kg	NS	NS	--	--	--	--	--
Iron	mg/kg	2000 - 550000	2000 or SB	**37200**	**35200**	**35900**	**31300**	**29900**
Lead	mg/kg	NS	SB	8.3	8.8	10.8 *	5.1 *	5.7 *
Magnesium	mg/kg	100 - 5000	SB	15600	9910	12000	9360	11200
Manganese	mg/kg	50 - 5000	SB	793 *	1230 *	853 E*	630 E*	671 E*
Mercury	mg/kg	0.001 - 0.2	0.1	0.09 BN	0.10 BN	ND (0.06)	ND (0.06)	ND (0.06)
Nickel	mg/kg	0.5 - 25	13 or SB	**36.7**	**41**	**36.1**	**32.6**	**21.8**
Potassium	mg/kg	8500 - 43000	SB	6970 E	5530 E	2560	2250	3150
Selenium	mg/kg	0.1 - 3.9	2 or SB	**2.4**	**3.5**	**2.6**	**2.7**	**2.3**
Silver	mg/kg	NS	SB	ND (0.26)	NND (0.24)	NND (0.25)	NND (0.24)	NND (0.26) N
Sodium	mg/kg	6000 - 8000	SB	329 B	577 B	689 B	888 B	579 B
Thallium	mg/kg	NS	SB	ND (0.79)	ND (0.71)	ND (0.76)	ND (0.73)	ND (0.79)
Vanadium	mg/kg	1.0 - 300	150 or SB	60.0	52.5	39.8	34.6	33.0
Zinc	mg/kg	9.0 - 50.0	20 or SB	**86.5**	**72.5**	**75.9**	**73.9**	**64.6**

TABLE B.3

SUBSURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SB-8C*	*SB-9C*	*SB-10C*	*SB-11C*	*SB-12C*
Sample ID:				*SB-8C*	*SB-9C*	*SB-10C*	*SB-11C*	*SB-12C*
Sample Date:				*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*
Sample Depth:				*17-19 ft*	*17-19 ft*	*20-22 ft*	*18-20 ft*	*18-20 ft*
Sample Matrix:				*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*
	Units	*Eastern USA Background*	*TAGMa*					
MetalsR								
Arsenic	mg/L	NS	NS	--	--	--	--	--
Barium	mg/L	NS	NS	--	--	--	--	--
Cadmium	mg/L	NS	NS	--	--	--	--	--
Chromium Total	mg/L	NS	NS	--	--	--	--	--
Lead	mg/L	NS	NS	--	--	--	--	--
Mercury	mg/L	NS	NS	--	--	--	--	--
Selenium	mg/L	NS	NS	--	--	--	--	--
Silver	mg/L	NS	NS	--	--	--	--	--
PesticidesR								
2,4,5-TP (Silvex)	mg/L	NS	NS	--	--	--	--	--
2,4-Dichlorophenylacetic acid	mg/L	NS	NS	--	--	--	--	--
Chlordane	mg/L	NS	NS	--	--	--	--	--
Endrin	mg/L	NS	NS	--	--	--	--	--
gamma-BHC (Lindane)	mg/L	NS	NS	--	--	--	--	--
Heptachlor	mg/L	NS	NS	--	--	--	--	--
Heptachlor epoxide	mg/L	NS	NS	--	--	--	--	--
Methoxychlor	mg/L	NS	NS	--	--	--	--	--
Toxaphene	mg/L	NS	NS	--	--	--	--	--

TABLE B.3

SUBSURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SB-8C*	*SB-9C*	*SB-10C*	*SB-11C*	*SB-12C*
Sample ID:				*SB-8C*	*SB-9C*	*SB-10C*	*SB-11C*	*SB-12C*
Sample Date:				*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*
Sample Depth:				*17-19 ft*	*17-19 ft*	*20-22 ft*	*18-20 ft*	*18-20 ft*
Sample Matrix:				*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*
	Units	*Eastern USA Background*	*TAGMa*					
SVOAs								
2-Methylnaphthalene	mg/kg	NS	36.4	–	–	–	–	–
2-Methylphenol	mg/kg	NS	0.1	–	–	–	–	–
4-Methylphenol	mg/kg	NS	0.09	–	–	–	–	–
Acenaphthene	mg/kg	NS	50	–	–	–	–	–
Acenaphthylene	mg/kg	NS	41	–	–	–	–	–
Anthracene	mg/kg	NS	50	–	–	–	–	–
Benzo(a)anthracene	mg/kg	NS	0.224	–	–	–	–	–
Benzo(a)pyrene	mg/kg	NS	0.061	–	–	–	–	–
Benzo(b)fluoranthene	mg/kg	NS	1.1	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene	mg/kg	NS	50	–	–	–	–	–
Benzo(k)fluoranthene	mg/kg	NS	1.1	–	–	–	–	–
bis(2-Ethylhexyl)phthalate	mg/kg	NS	50	0.064 J	0.097 J	0.46	0.12 J	0.063 J
Butyl benzylphthalate	mg/kg	NS	50	–	–	–	–	–
Carbazole	mg/kg	NS	NS	–	–	–	–	–
Chrysene	mg/kg	NS	0.04	–	–	–	–	–
Dibenz(a,h)anthracene	mg/kg	NS	0.014	–	–	–	–	–
Dibenzofuran	mg/kg	NS	6.2	–	–	–	–	–
Diethyl phthalate	mg/kg	NS	7.1	ND	ND	ND	ND	ND
Fluoranthene	mg/kg	NS	50	ND	ND	ND	ND	ND
Fluorene	mg/kg	NS	50	–	–	–	–	–
Indeno(1,2,3-cd)pyrene	mg/kg	NS	3.2	–	–	–	–	–
Naphthalene	mg/kg	NS	13	–	–	–	–	–
Pentachlorophenol	mg/kg	NS	1	ND	ND	ND	ND	ND
Phenanthrene	mg/kg	NS	50	–	–	–	–	–
Phenol	mg/kg	NS	0.03	–	–	–	–	–
Pyrene	mg/kg	NS	50	ND	ND	ND	ND	ND

TABLE B.3

SUBSURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SB-8C*	*SB-9C*	*SB-10C*	*SB-11C*	*SB-12C*
Sample ID:				*SB-8C*	*SB-9C*	*SB-10C*	*SB-11C*	*SB-12C*
Sample Date:				*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*
Sample Depth:				*17-19 ft*	*17-19 ft*	*20-22 ft*	*18-20 ft*	*18-20 ft*
Sample Matrix:				*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*
	Units	*Eastern USA Background*	*TAGMa*					
VOAs								
2-Butanone (Methyl Ethyl Ketone)	mg/kg	NS	0.3	ND	0.005 J	0.007 J	ND	ND
Acetone	mg/kg	NS	0.2	0.027 B	0.034 B	0.05	0.023	0.006 J
Ethylbenzene	mg/kg	NS	5.5	–	–	–	–	–
Methylene chloride	mg/kg	NS	0.1	ND	ND	ND	ND	ND
Tetrachloroethene	mg/kg	NS	1.4	–	–	–	–	–
Toluene	mg/kg	NS	1.5	ND	ND	ND	ND	ND
Trichloroethene	mg/kg	NS	0.7	–	–	–	–	–
Xylene (total)	mg/kg	NS	1.2	–	–	–	–	–
VOAsR								
1,1-Dichloroethene	mg/L	NS	NS	–	–	–	–	–
1,2-Dichloroethane	mg/L	NS	NS	–	–	–	–	–
1,4-Dichlorobenzene	mg/L	NS	NS	–	–	–	–	–
2,4,5-Trichlorophenol	mg/L	NS	NS	–	–	–	–	–
2,4,6-Trichlorophenol	mg/L	NS	NS	–	–	–	–	–
2,4-Dinitrotoluene	mg/L	NS	NS	–	–	–	–	–
2-Butanone (Methyl Ethyl Ketone)	mg/L	NS	NS	–	–	–	–	–
2-Methylphenol	mg/L	NS	NS	–	–	–	–	–
3-Methylphenol	mg/L	NS	NS	–	–	–	–	–
4-Methylphenol	mg/L	NS	NS	–	–	–	–	–
Benzene	mg/L	NS	NS	–	–	–	–	–
Carbon tetrachloride	mg/L	NS	NS	–	–	–	–	–
Chlorobenzene	mg/L	NS	NS	–	–	–	–	–
Chloroform (Trichloromethane)	mg/L	NS	NS	–	–	–	–	–
Hexachlorobenzene	mg/L	NS	NS	–	–	–	–	–
Hexachlorobutadiene	mg/L	NS	NS	–	–	–	–	–
Hexachloroethane	mg/L	NS	NS	–	–	–	–	–
Nitrobenzene	mg/L	NS	NS	–	–	–	–	–
Pentachlorophenol	mg/L	NS	NS	–	–	–	–	–

TABLE B.3

SUBSURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SB-8C*	*SB-9C*	*SB-10C*	*SB-11C*	*SB-12C*
Sample ID:				*SB-8C*	*SB-9C*	*SB-10C*	*SB-11C*	*SB-12C*
Sample Date:				*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*
Sample Depth:				*17-19 ft*	*17-19 ft*	*20-22 ft*	*18-20 ft*	*18-20 ft*
Sample Matrix:				*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*	*SUBSO*
	Units	*Eastern USA Background*	*TAGMa*					
Pyridine	mg/L	NS	NS	--	--	--	--	--
Tetrachloroethene	mg/L	NS	NS	--	--	--	--	--
Trichloroethene	mg/L	NS	NS	--	--	--	--	--
Vinyl chloride	mg/L	NS	NS	--	--	--	--	--
Wet								
Ignitability	Deg F	NS	NS	--	--	--	--	--
Percent Moisture	%	NS	NS	--	--	--	--	--
pH	S.U.	NS	NS	--	--	--	--	--
Reactive Cyanide	mg/kg	NS	NS	--	--	--	--	--
Reactive Hydrogen Cyanide	mg/L	NS	NS	--	--	--	--	--
Reactive Hydrogen Sulfide	mg/L	NS	NS	--	--	--	--	--
Reactive Sulfide	mg/kg	NS	NS	--	--	--	--	--
Total Solids	%	NS	NS	--	--	--	--	--

A: Eastern USA Background Concentration
B: TAGM

TABLE B.3

SUBSURFACE SOIL ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Notes:

a	- NYSDEC Technical and Adminiatrative Guidance, Recommended Soil Cleanup Objectives, January 1994.
b	- Telephone conversation, Jim Harrington, NYSDEC, February 3, 2004.
–	- No Data
NS	- No Standard
ND ()	- Non detect at associated value
J	- Estimated Value
E	- Concentrations exceed the calibration range
N	- Spike sample recovery was not within the control limits
B	- Value greater than or equal to the instrument detection limit, but less than the contract required detection limit
D	- Analysis at a secondary dilution factor
U	- Not Detected
*	- Duplicate analysis not within the control limits
SB	- Soil background

TABLE B.4

SUBSURFACE SLAG ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*B-1A*	*B-1A*	*B-1A*	*B-1A*	*B-2*	*B-3*	*B-3*	*BH-12*
Sample ID:				*B-1*	*B-1*	*B-1A*	*B-1A*	*B-2*	*B-3*	*B-3*	*S-19867-07-03-PK-007*
Sample Date:				*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*7/23/2003*
Sample Depth:				*0-4 ft*	*4-8 ft*	*10-14 ft*	*14-18 ft*	*1-18 ft*	*1-12 ft*	*12-16 ft*	*4-6.5 ft*
Sample Matrix:				*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*
	Units	*Eastern USA Background*	*TAGMa*								
Metals											
Aluminum	mg/kg	33000	SB	15600	12400	17400	12000	15900	15400	13900	18300
Antimony	mg/kg		SB	3.0 BN	ND (2.4) N	2.9 BN	ND (2.3) N	16.6 N	6.6 BN	10.9 BN	1.77 J
Arsenic	mg/kg	3 - 12	7.5 or SB	1.3 B	0.34 B	2.5 B	4.1	1.1 B	0.83 B	0.78 B	**11.0**
Barium	mg/kg	15 - 600	300 or SB	20.3 B	16.0 B	19.9 B	102	26.8 B	72.8	169	131 J
Beryllium	mg/kg	0 - 1.75	0.16 or SB	ND (0.28)	ND (0.24)	ND (0.28)	**0.38 B**	ND (0.27)	ND (0.33)	ND (0.32)	**3.04**
Cadmium	mg/kg	0.1 -1.0	1 or SB	**1.3 B**	ND (0.24)	**1.2 B**	**2.4**	ND (0.27)	ND (0.33)	ND (0.32)	ND (0.458)
Calcium	mg/kg	130 - 35000	SB	–	–	–	–	–	–	–	142000
Chromium Total	mg/kg	1.5 - 40	50b or SB	**542 E**	**482 E**	**498 E**	17.6 E	**2430 E**	**1070 E**	**1720 E**	46.6
Chromium VI (Hexavalent	mg/kg			14	6.4	11	ND (1.1)	28	39	ND (1.5)	R
Cobalt	mg/kg	2.5 or 60	30 or SB	ND (2.8)	ND (2.4)	ND (2.8)	7.4 B	3.3 B	ND (3.3)	4.2 B	6.14
Copper	mg/kg	1.0 - 50	25 or SB	10.6	5.6 B	8.2	17.6	11.1	7.8 B	9.5	**109**
Cyanide (total)	mg/kg			–	–	–	–	–	–	–	0.440 J
Iron	mg/kg	2000 - 550000	2000 or SB	1520 E	1030 E	1920 E	**15200**	**2680 E**	1710 E	**2700 E**	**21400**
Lead	mg/kg		SB	80.2 N*	4.5 N*	2.9 N*	7.6 N*	6.1 N*	4.8 N*	4.6 N*	19.7
Magnesium	mg/kg	100 - 5000	SB	58700 E	48100 E	52400 E	8690	63900 E	48000 E	57800 E	16900
Manganese	mg/kg	50 - 5000	SB	198	139	131	335	246	326	545	1030
Mercury	mg/kg	0.001 - 0.2	0.1	ND (0.14)	ND (0.12)	ND (0.14)	ND (0.12)	ND (0.13)	ND (0.16)	ND (0.16)	ND (0.0358)
Nickel	mg/kg	0.5 - 25	13 or SB	ND (5.6)	ND (4.8)	ND (5.6)	**16.7**	**16.9**	8.7 B	**21.2**	**51.0 J**
Potassium	mg/kg	8500 - 43000	SB	ND (28.1)	ND (24.1)	ND (28.1)	1600	ND (27.4)	ND (33.3)	ND (31.7)	1140
Selenium	mg/kg	0.1 - 3.9	2 or SB	ND (1.1)	ND (0.96)	ND (1.1)	ND (0.93)	ND (1.1)	ND (1.3)	ND (1.3)	ND (1.83)
Silver	mg/kg		SB	ND (0.28) N	ND (0.24) N	ND (0.28) N	ND (0.24) N	ND (0.27) N	ND (0.33) N	ND (0.32) N	0.321 J
Sodium	mg/kg	6000 - 8000	SB	ND (141)	429 B	ND (140)	ND (116)	ND (137)	ND (166)	ND (159)	635
Thallium	mg/kg		SB	ND (0.28) N	ND (0.24) NW	ND (0.28) NW	ND (0.24) N	ND (0.27) N	ND (0.33) N	ND (0.33) N	ND (7.33)
Vanadium	mg/kg	1.0 - 300	150 or SB	25.8	32.3	27.5	18.7	42.4	32.0	40.3	29.3 J
Zinc	mg/kg	9.0 - 50.0	20 or SB	**139 N***	16.8 N	**20.5 N**	**47.1**	**29.8 N**	**29.7 N**	**27.7**	**87.6 J**

TABLE B.4

SUBSURFACE SLAG ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*B-1A*	*B-1A*	*B-1A*	*B-1A*	*B-2*	*B-3*	*B-3*	*BH-12*
Sample ID:				*B-1*	*B-1*	*B-1A*	*B-1A*	*B-2*	*B-3*	*B-3*	*S-19867-07-03-PK-007*
Sample Date:				*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*7/23/2003*
Sample Depth:				*0-4 ft*	*4-8 ft*	*10-14 ft*	*14-18 ft*	*1-18 ft*	*1-12 ft*	*12-16 ft*	*4-6.5 ft*
Sample Matrix:				*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*
	Units	*Eastern USA Background*	*TAGMa*								
MetalsR											
Chromium Total	mg/L			0.643 N	0.129 N	0.169 N	–	0.563 N	0.817 N	0.0759 N	–
SVOAs											
2-Methylnaphthalene	mg/kg		36.4	–	–	–	–	–	–	–	–
Acenaphthene	mg/kg		50	–	–	–	–	–	–	–	–
Anthracene	mg/kg		50	–	–	–	–	–	–	–	–
Benzo(a)anthracene	mg/kg		0.224	–	–	–	–	–	–	–	–
Benzo(a)pyrene	mg/kg		0.061	–	–	–	–	–	–	–	–
Benzo(b)fluoranthene	mg/kg		1.1	–	–	–	–	–	–	–	–
Benzo(g,h,i)perylene	mg/kg		50	–	–	–	–	–	–	–	–
Benzo(k)fluoranthene	mg/kg		1.1	–	–	–	–	–	–	–	–
bis(2-Ethylhexyl)phthalate	mg/kg		50	–	–	–	–	–	–	–	–
Butyl benzylphthalate	mg/kg		50	–	–	–	–	–	–	–	–
Carbazole	mg/kg			–	–	–	–	–	–	–	–
Chrysene	mg/kg		0.04	–	–	–	–	–	–	–	–
Dibenz(a,h)anthracene	mg/kg		0.014	–	–	–	–	–	–	–	–
Dibenzofuran	mg/kg		6.2	–	–	–	–	–	–	–	–
Diethyl phthalate	mg/kg		7.1	–	–	–	–	–	–	–	–
Di-n-butylphthalate	mg/kg			–	–	–	–	–	–	–	–
Fluoranthene	mg/kg		50	–	–	–	–	–	–	–	–
Fluorene	mg/kg		50	–	–	–	–	–	–	–	–
Indeno(1,2,3-cd)pyrene	mg/kg		3.2	–	–	–	–	–	–	–	–
Naphthalene	mg/kg		13	–	–	–	–	–	–	–	–
Pentachlorophenol	mg/kg		1	–	–	–	–	–	–	–	–
Phenanthrene	mg/kg		50	–	–	–	–	–	–	–	–
Pyrene	mg/kg		50	–	–	–	–	–	–	–	–

TABLE B.4

SUBSURFACE SLAG ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*B-1A*	*B-1A*	*B-1A*	*B-1A*	*B-2*	*B-3*	*B-3*	*BH-12*
Sample ID:				*B-1*	*B-1*	*B-1A*	*B-1A*	*B-2*	*B-3*	*B-3*	*S-19867-07-03-PK-007*
Sample Date:				*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*7/23/2003*
Sample Depth:				*0-4 ft*	*4-8 ft*	*10-14 ft*	*14-18 ft*	*1-18 ft*	*1-12 ft*	*12-16 ft*	*4-6.5 ft*
Sample Matrix:				*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*
	Units	*Eastern USA Background*	*TAGMa*								
VOAs											
Acetone	mg/kg		0.2	–	–	–	–	–	–	–	–
Methylene chloride	mg/kg		0.1	–	–	–	–	–	–	–	–
Toluene	mg/kg		1.5	–	–	–	–	–	–	–	–
Wet											
Percent Moisture	%			–	–	–	–	–	–	–	18.6
pH	s.u.			11.7	12.3	12.1	9.8	12.2	12.1	12.0	9.1 J
Reactive Cyanide	mg/kg			ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	–
Reactive Sulfide	mg/kg			ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	–
Total Solids	%			71	83	71	85	73	60	63	–

TABLE B.4

SUBSURFACE SLAG ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-18*	*MW-18*	*MW-19*	*MW-20*	*MW-21*	*MW-21*
Sample ID:				*S-19867-07-03-PK-023*	*S-19867-07-03-PK-024*	*S-19867-07-03-PK-009*	*S-19867-0703-PK-016*	*S-19867-07-03-PK-025*	*S-19867-07-03-PK-026*
Sample Date:				*7/28/2003*	*7/28/2003*	*7/28/2003*	*7/25/2003*	*7/28/2003*	*7/28/2003*
Sample Depth:				*2-4 ft*	*12-14 ft*	*0.5-2 ft*	*4.5-6 ft*	*8-10 ft*	*18-20 ft*
Sample Matrix:				*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*
	Units	*Eastern USA Background*	*TAGMa*						
Metals									
Aluminum	mg/kg	33000	SB	34500	25900	16100	13100	21900	24500
Antimony	mg/kg		SB	4.91 J	ND (2.57) UJ	3.83 J	ND (24.2) UJ	5.98 J	ND (3.17) UJ
Arsenic	mg/kg	3 - 12	7.5 or SB	3.38	4.76	4.29	**70.0**	3.00	4.29
Barium	mg/kg	15 - 600	300 or SB	19.9 J	158 J	34.4 J	117	24.7 J	102 J
Beryllium	mg/kg	0 - 1.75	0.16 or SB	**0.946**	**1.35**	**0.825**	**2.56 J**	**0.729**	**1.18**
Cadmium	mg/kg	0.1 -1.0	1 or SB	ND (0.618)	ND (0.429)	ND (0.651)	**2.08 J**	ND (0.437)	ND (0.528)
Calcium	mg/kg	130 - 35000	SB	249000	16500	176000	105000	203000	7850
Chromium Total	mg/kg	1.5 - 40	50b or SB	**500**	34.1	**3100**	**1200**	**4110**	33.4
Chromium VI (Hexavalent	mg/kg			33	ND (4.9)	170	4.9	430	ND (4.7)
Cobalt	mg/kg	2.5 or 60	30 or SB	0.265 J	15.7	2.53 J	**31.5 J**	3.00	19.1
Copper	mg/kg	1.0 - 50	25 or SB	ND (2.47)	**30.0**	22.8	**354**	12.5	22.1
Cyanide (total)	mg/kg			ND (0.674)	ND (0.639)	ND (0.591)	1.40	ND (0.631)	ND (0.597)
Iron	mg/kg	2000 - 550000	2000 or SB	533	**33600**	**6990**	**25300**	**5030**	**33600**
Lead	mg/kg		SB	12.2	13.0	9.77	81.4	3.07	14.7
Magnesium	mg/kg	100 - 5000	SB	78000	13100	70700	37700	118000	8370
Manganese	mg/kg	50 - 5000	SB	154	811	524	49000	296	600
Mercury	mg/kg	0.001 - 0.2	0.1	ND (0.0434)	ND (0.0375)	ND (0.0435)	0.0345 J	ND (0.0394)	ND (0.0365)
Nickel	mg/kg	0.5 - 25	13 or SB	7.27 J	**34.9 J**	**42.7 J**	**76.7**	**33.9 J**	**26.8 J**
Potassium	mg/kg	8500 - 43000	SB	89.7 J	3730	250	1270 J	84.5 J	2950
Selenium	mg/kg	0.1 - 3.9	2 or SB	ND (4.95)	ND (0.429)	ND (1.30)	ND (24.2)	ND (2.62)	ND (1.06)
Silver	mg/kg		SB	0.371 J	ND (0.857)	0.279 J	7.06 J	0.262 J	ND (1.06)
Sodium	mg/kg	6000 - 8000	SB	83.7 J	304	118 J	ND (2420)	89.8	552
Thallium	mg/kg		SB	ND (9.89)	ND (2.57)	ND (6.51)	89.6	ND (5.25)	ND (4.22)
Vanadium	mg/kg	1.0 - 300	150 or SB	16.3 J	45.9 J	62.8 J	58.8	73.9 J	48.1 J
Zinc	mg/kg	9.0 - 50.0	20 or SB	ND (1.86) UJ	**78.8 J**	**24.4 J**	**154**	**26.5 J**	**79.5 J**

TABLE B.4

SUBSURFACE SLAG ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:			*MW-18*	*MW-18*	*MW-19*	*MW-20*	*MW-21*	*MW-21*
Sample ID:			*S-19867-07-03-PK-023*	*S-19867-07-03-PK-024*	*S-19867-07-03-PK-009*	*S-19867-0703-PK-016*	*S-19867-07-03-PK-025*	*S-19867-07-03-PK-026*
Sample Date:			*7/28/2003*	*7/28/2003*	*7/28/2003*	*7/25/2003*	*7/28/2003*	*7/28/2003*
Sample Depth:			*2-4 ft*	*12-14 ft*	*0.5-2 ft*	*4.5-6 ft*	*8-10 ft*	*18-20 ft*
Sample Matrix:			*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*
	Units	*Eastern USA Background*	*TAGMa*					
MetalsR								
Chromium Total	mg/L			–	–	–	–	–	–
SVOAs								
2-Methylnaphthalene	mg/kg		36.4	–	–	–	–	–	–
Acenaphthene	mg/kg		50	–	–	–	–	–	–
Anthracene	mg/kg		50	–	–	–	–	–	–
Benzo(a)anthracene	mg/kg		0.224	–	–	–	–	–	–
Benzo(a)pyrene	mg/kg		0.061	–	–	–	–	–	–
Benzo(b)fluoranthene	mg/kg		1.1	–	–	–	–	–	–
Benzo(g,h,i)perylene	mg/kg		50	–	–	–	–	–	–
Benzo(k)fluoranthene	mg/kg		1.1	–	–	–	–	–	–
bis(2-Ethylhexyl)phthalate	mg/kg		50	–	–	–	–	–	–
Butyl benzylphthalate	mg/kg		50	–	–	–	–	–	–
Carbazole	mg/kg			–	–	–	–	–	–
Chrysene	mg/kg		0.04	–	–	–	–	–	–
Dibenz(a,h)anthracene	mg/kg		0.014	–	–	–	–	–	–
Dibenzofuran	mg/kg		6.2	–	–	–	–	–	–
Diethyl phthalate	mg/kg		7.1	–	–	–	–	–	–
Di-n-butylphthalate	mg/kg			–	–	–	–	–	–
Fluoranthene	mg/kg		50	–	–	–	–	–	–
Fluorene	mg/kg		50	–	–	–	–	–	–
Indeno(1,2,3-cd)pyrene	mg/kg		3.2	–	–	–	–	–	–
Naphthalene	mg/kg		13	–	–	–	–	–	–
Pentachlorophenol	mg/kg		1	–	–	–	–	–	–
Phenanthrene	mg/kg		50	–	–	–	–	–	–
Pyrene	mg/kg		50	–	–	–	–	–	–

TABLE B.4

SUBSURFACE SLAG ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:			*MW-18*	*MW-18*	*MW-19*	*MW-20*	*MW-21*	*MW-21*
Sample ID:			*S-19867-07-03-PK-023*	*S-19867-07-03-PK-024*	*S-19867-07-03-PK-009*	*S-19867-0703-PK-016*	*S-19867-07-03-PK-025*	*S-19867-07-03-PK-026*
Sample Date:			*7/28/2003*	*7/28/2003*	*7/28/2003*	*7/25/2003*	*7/28/2003*	*7/28/2003*
Sample Depth:			*2-4 ft*	*12-14 ft*	*0.5-2 ft*	*4.5-6 ft*	*8-10 ft*	*18-20 ft*
Sample Matrix:			*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*
	Units	*Eastern USA Background*	*TAGMa*					
VOAs								
Acetone	mg/kg		0.2	--	--	--	--	--	--
Methylene chloride	mg/kg		0.1	--	--	--	--	--	--
Toluene	mg/kg		1.5	--	--	--	--	--	--
Wet								
Percent Moisture	%			26.5	20.1	28.9	17.5	23.8	15.4
pH	s.u.			12	12	12	12	12	8.8
Reactive Cyanide	mg/kg			--	--	--	--	--	--
Reactive Sulfide	mg/kg			--	--	--	--	--	--
Total Solids	%			--	--	--	--	--	--

TABLE B.4

SUBSURFACE SLAG ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-22*	*MW-23*	*MW-24*	*MW-24*	*MW-25*	*MW-26*
Sample ID:				*S-19867-07-03-PK-001*	*S-19867-0703-PK-018*	*S-19867-07-03-PK-020*	*S-19867-07-03-PK-021*	*S-19867-07-03-PK-003*	*S-19867-07-03-PK-005*
Sample Date:				*7/22/2003*	*7/25/2003*	*7/28/2003*	*7/28/2003*	*7/23/2003*	*7/23/2003*
Sample Depth:				*6-8 ft*	*4-6 ft*	*2-4 ft*	*2-4 ft*	*2-3 ft*	*2-4 ft*
Sample Matrix:				*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag Duplicate*	*SUBSO-Slag*	*SUBSO-Slag*
	Units	*Eastern USA Background*	*TAGMa*						
Metals									
Aluminum	mg/kg	33000	SB	21400	21500	19300	17300	13000	5100
Antimony	mg/kg		SB	5.55 J	4.49 J	ND (2.74) UJ	3.85 J	ND (3.54) UJ	3.01 J
Arsenic	mg/kg	3 - 12	7.5 or SB	4.09	ND (1.30)	6.72	5.91	**26.2**	6.00
Barium	mg/kg	15 - 600	300 or SB	49.5 J	66.7 J	208 J	95.7 J	169 J	174 J
Beryllium	mg/kg	0 - 1.75	0.16 or SB	**1.11**	ND (0.649)	**1.54**	**1.08**	**1.23**	**0.380 J**
Cadmium	mg/kg	0.1 -1.0	1 or SB	ND (0.782)	ND (0.649)	ND (0.607)	ND (0.662)	0.429 J	**3.75**
Calcium	mg/kg	130 - 35000	SB	244000	215000	180000	207000	70800	133000
Chromium Total	mg/kg	1.5 - 40	50b or SB	**5790**	**3990**	**2490**	**1780**	**1670**	20.1
Chromium VI (Hexavalen	mg/kg			23	150	67	86	ND (5.6)	ND (4.4)
Cobalt	mg/kg	2.5 or 60	30 or SB	6.49	2.85	3.18	1.85 J	14.7	4.45
Copper	mg/kg	1.0 - 50	25 or SB	15.9	9.20	**32.0**	**35.0**	**52.1**	**25.5**
Cyanide (total)	mg/kg			ND (0.826)	ND (0.669)	0.461 J	0.328 J	ND (0.673)	ND (0.540)
Iron	mg/kg	2000 - 550000	2000 or SB	**6400**	**4410**	**6590**	**5350**	**65500**	**11100**
Lead	mg/kg		SB	7.92	1.25	18.3	18.2	12.0	85.1
Magnesium	mg/kg	100 - 5000	SB	83400	109000	114000 J	65300 J	8970	62700
Manganese	mg/kg	50 - 5000	SB	494	510 J	2050	1480	1040	544
Mercury	mg/kg	0.001 - 0.2	0.1	ND (0.0595)	ND (0.0414)	ND (0.0462)	ND (0.0393)	0.0228 J	**0.166**
Nickel	mg/kg	0.5 - 25	13 or SB	**68.5 J**	**32.7**	**51.8 J**	**21.7 J**	**261 J**	11.7 J
Potassium	mg/kg	8500 - 43000	SB	177	176	432	324	1180	1050
Selenium	mg/kg	0.1 - 3.9	2 or SB	ND (2.35)	ND (1.30)	ND (2.43)	ND (3.97)	ND (1.18)	ND (2.54)
Silver	mg/kg		SB	0.283 J	0.572 J	0.763 J	0.525 J	0.575 J	ND (0.847)
Sodium	mg/kg	6000 - 8000	SB	257	115 J	578 J	250 J	219	228
Thallium	mg/kg		SB	ND (9.38)	ND (2.60)	ND (9.70)	ND (10.6)	ND (9.45)	ND (2.54)
Vanadium	mg/kg	1.0 - 300	150 or SB	82.7 J	80.9 J	107 J	74.3 J	74.4 J	15.7 J
Zinc	mg/kg	9.0 - 50.0	20 or SB	15.0 J	16.7	**28.1 J**	**132 J**	**106 J**	**1160 J**

TABLE B.4

SUBSURFACE SLAG ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:			*MW-22*	*MW-23*	*MW-24*	*MW-24*	*MW-25*	*MW-26*
Sample ID:			*S-19867-07-03-PK-001*	*S-19867-0703-PK-018*	*S-19867-07-03-PK-020*	*S-19867-07-03-PK-021*	*S-19867-07-03-PK-003*	*S-19867-07-03-PK-005*
Sample Date:			*7/22/2003*	*7/25/2003*	*7/28/2003*	*7/28/2003*	*7/23/2003*	*7/23/2003*
Sample Depth:			*6-8 ft*	*4-6 ft*	*2-4 ft*	*2-4 ft*	*2-3 ft*	*2-4 ft*
Sample Matrix:			*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag Duplicate*	*SUBSO-Slag*	*SUBSO-Slag*
	Units	*Eastern USA Background*	*TAGMa*					
MetalsR								
Chromium Total	mg/L			–	–	–	–	–	–
SVOAs								
2-Methylnaphthalene	mg/kg		36.4	–	–	–	–	–	–
Acenaphthene	mg/kg		50	–	–	–	–	–	–
Anthracene	mg/kg		50	–	–	–	–	–	–
Benzo(a)anthracene	mg/kg		0.224	–	–	–	–	–	–
Benzo(a)pyrene	mg/kg		0.061	–	–	–	–	–	–
Benzo(b)fluoranthene	mg/kg		1.1	–	–	–	–	–	–
Benzo(g,h,i)perylene	mg/kg		50	–	–	–	–	–	–
Benzo(k)fluoranthene	mg/kg		1.1	–	–	–	–	–	–
bis(2-Ethylhexyl)phthalate	mg/kg		50	–	–	–	–	–	–
Butyl benzylphthalate	mg/kg		50	–	–	–	–	–	–
Carbazole	mg/kg			–	–	–	–	–	–
Chrysene	mg/kg		0.04	–	–	–	–	–	–
Dibenz(a,h)anthracene	mg/kg		0.014	–	–	–	–	–	–
Dibenzofuran	mg/kg		6.2	–	–	–	–	–	–
Diethyl phthalate	mg/kg		7.1	–	–	–	–	–	–
Di-n-butylphthalate	mg/kg			–	–	–	–	–	–
Fluoranthene	mg/kg		50	–	–	–	–	–	–
Fluorene	mg/kg		50	–	–	–	–	–	–
Indeno(1,2,3-cd)pyrene	mg/kg		3.2	–	–	–	–	–	–
Naphthalene	mg/kg		13	–	–	–	–	–	–
Pentachlorophenol	mg/kg		1	–	–	–	–	–	–
Phenanthrene	mg/kg		50	–	–	–	–	–	–
Pyrene	mg/kg		50	–	–	–	–	–	–

TABLE B.4

SUBSURFACE SLAG ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-22*	*MW-23*	*MW-24*	*MW-24*	*MW-25*	*MW-26*
Sample ID:				*S-19867-07-03-PK-001*	*S-19867-0703-PK-018*	*S-19867-07-03-PK-020*	*S-19867-07-03-PK-021*	*S-19867-07-03-PK-003*	*S-19867-07-03-PK-005*
Sample Date:				*7/22/2003*	*7/25/2003*	*7/28/2003*	*7/28/2003*	*7/23/2003*	*7/23/2003*
Sample Depth:				*6-8 ft*	*4-6 ft*	*2-4 ft*	*2-4 ft*	*2-3 ft*	*2-4 ft*
Sample Matrix:				*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag Duplicate*	*SUBSO-Slag*	*SUBSO-Slag*
	Units	*Eastern USA Background*	*TAGMa*						
VOAs									
Acetone	mg/kg		0.2	–	–	–	–	–	–
Methylene chloride	mg/kg		0.1	–	–	–	–	–	–
Toluene	mg/kg		1.5	–	–	–	–	–	–
Wet									
Percent Moisture	%			42.9	23.0	26.4	25.9	30.6	9.18
pH	s.u.			12 J	12	12	12	8.9 J	9.9 J
Reactive Cyanide	mg/kg			–	–	–	–	–	–
Reactive Sulfide	mg/kg			–	–	–	–	–	–
Total Solids	%			–	–	–	–	–	–

TABLE B.4

SUBSURFACE SLAG ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-27*	*MW-28*	*MW-104A*	*SB-1B*	*SB-2B*	*SB-3B*	*SB-4B*	*SB-6B*	*SB-7B*
Sample ID:				*S-19867-07-03-PK-029*	*S-19867-07-03-PK-027*	*MW-104*	*SB-1B*	*SB-2B*	*SB-3B*	*SB-4B*	*SB-6B*	*SB-7B*
Sample Date:				*7/29/2003*	*7/29/2003*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*
Sample Depth:				*1.5-4 ft*	*1-2 ft*	*6-8 ft*	*4-6 ft*	*4-6 ft*	*6-8 ft*	*2-4 ft*	*7-8 ft*	*14-16 ft*
Sample Matrix:				*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*
	Units	*Eastern USA Background*	*TAGMa*									
Metals												
Aluminum	mg/kg	33000	SB	20200	15400	17400	19300	13300	11000	18200	24900	14500
Antimony	mg/kg		SB	3.44 J	3.85 J	45.1	ND (1.3)	59.8	72.4	98.7	185	22.2
Arsenic	mg/kg	3 - 12	7.5 or SB	4.25	3.63	ND (1.4)	**7.8 ***	ND (0.60) *	ND (0.67) *	**17.6 ***	ND (0.64) *	ND (0.66)
Barium	mg/kg	15 - 600	300 or SB	62.2 J	29.4 J	25 BE	75.0 *	48.9 B	**302 ***	157 *	234 *	18.9 B
Beryllium	mg/kg	0 - 1.75	0.16 or SB	**0.864**	**0.718**	ND (0.06)	**1.4**	0.06 B	**0.26 B**	**0.51 B**	ND (0.06)	ND (0.06)
Cadmium	mg/kg	0.1 -1.0	1 or SB	ND (0.787)	ND (0.701)	ND (0.65)	ND (0.55)	ND (0.60)	**1.4 B**	**3.6**	**2.8**	ND (0.66)
Calcium	mg/kg	130 - 35000	SB	190000	191000	–	–	–	–	–	–	–
Chromium Total	mg/kg	1.5 - 40	50b or SB	**1450**	**719**	**1350 N***	40.8	**2630**	**2980**	**4140**	**7550**	**858**
Chromium VI (Hexavalent	mg/kg			25	52	2.7 E*	0.47 N	13.5 N	1.0 N	11.8 N	19.8 N	2.9
Cobalt	mg/kg	2.5 or 60	30 or SB	3.59	1.38 J	4.8 B	4.7 B	5.7 B	10.2 B	**132**	**41.5**	1.1 B
Copper	mg/kg	1.0 - 50	25 or SB	9.50	2.31 J	6 BE	**57.7**	18.2	**44.0**	**196**	**77.3**	4.2 BE
Cyanide (total)	mg/kg			0.327 J	ND (0.708)	–	–	–	–	–	–	–
Iron	mg/kg	2000 - 550000	2000 or SB	**8150**	**3390**	1480	**14900**	**7540**	**7390**	**29600**	**19900**	798
Lead	mg/kg		SB	10.5	21.8	ND (0.75) *	21.6 *	3.6 *	110 *	21.6 *	ND (0.73) *	ND (0.76)
Magnesium	mg/kg	100 - 5000	SB	69200	62900	90200	27700	55300	49100	29900	27100	69900
Manganese	mg/kg	50 - 5000	SB	463	318	342 *	826 E*	347 E*	2060 E*	78300 E*	4260 E*	186 *
Mercury	mg/kg	0.001 - 0.2	0.1	ND (0.0506)	ND (0.0492)	ND (0.07)	ND (0.07)	ND (0.05)	**0.14**	0.08 B	0.10 B	ND (0.07) N
Nickel	mg/kg	0.5 - 25	13 or SB	**21.8 J**	9.71 J	10.4 B	**25.2**	**17.6**	**45.6**	**597**	**1220**	ND (0.32)
Potassium	mg/kg	8500 - 43000	SB	942	500	ND (49.9) E	597 B	74.9 B	ND (51.0)	ND (39.6)	ND (48.8)	ND (50.6) E
Selenium	mg/kg	0.1 - 3.9	2 or SB	ND (3.15)	ND (4.21)	ND (1.4)	**2.2**	ND (1.3)	**2.2**	**40.4**	**16.9**	2.0
Silver	mg/kg		SB	ND (1.57)	ND (1.40)	ND (0.34) N	ND (0.26) N	ND (0.28) N	ND (0.32) N	11.9 N	5.5 N	ND (0.32) N
Sodium	mg/kg	6000 - 8000	SB	281	95.8 J	ND (40.2)	484 B	ND (36.3)	ND (41.1)	ND (31.9)	ND (39.3)	ND (40.8)
Thallium	mg/kg		SB	ND (6.29)	ND (7.01)	ND (0.97)	ND (0.78)	1.1 B	1.7 B	31.7	ND (0.91)	ND (0.95)
Vanadium	mg/kg	1.0 - 300	150 or SB	48.9 J	35.7 J	48.6 E*	21.4	36.7	37.4	**168**	**278**	36.6
Zinc	mg/kg	9.0 - 50.0	20 or SB	**66.3 J**	**41.6 J**	16.7	**132**	19.2	**229**	**42.1**	18.4	6.5

TABLE B.4

SUBSURFACE SLAG ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-27*	*MW-28*	*MW-104A*	*SB-1B*	*SB-2B*	*SB-3B*	*SB-4B*	*SB-6B*	*SB-7B*
Sample ID:				*S-19867-07-03-PK-029*	*S-19867-07-03-PK-027*	*MW-104*	*SB-1B*	*SB-2B*	*SB-3B*	*SB-4B*	*SB-6B*	*SB-7B*
Sample Date:				*7/29/2003*	*7/29/2003*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*
Sample Depth:				*1.5-4 ft*	*1-2 ft*	*6-8 ft*	*4-6 ft*	*4-6 ft*	*6-8 ft*	*2-4 ft*	*7-8 ft*	*14-16 ft*
Sample Matrix:				*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*
	Units	*Eastern USA Background*	*TAGMa*									
MetalsR												
Chromium Total	mg/L			--	--	1.1	0.0015	0.0072	0.12	2.9	2.3	0.012
SVOAs												
2-Methylnaphthalene	mg/kg		36.4	--	--	--	--	--	--	--	--	--
Acenaphthene	mg/kg		50	--	--	ND	ND	ND	0.31 J	ND	ND	ND
Anthracene	mg/kg		50	--	--	ND	ND	ND	0.11 J	ND	ND	ND
Benzo(a)anthracene	mg/kg		0.224	--	--	ND	ND	0.13 J	**1.2**	0.064 J	ND	ND
Benzo(a)pyrene	mg/kg		0.061	--	--	ND	ND	**0.15 J**	**0.8**	**0.064 J**	ND	ND
Benzo(b)fluoranthene	mg/kg		1.1	--	--	ND	ND	0.15 J	**1.4**	0.13 J	ND	ND
Benzo(g,h,i)perylene	mg/kg		50	--	--	ND	ND	0.11 J	0.63	0.049 J	ND	ND
Benzo(k)fluoranthene	mg/kg		1.1	--	--	ND	ND	0.097 J	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate	mg/kg		50	--	--	0.14 BJ	0.075 J	0.097 J	0.14 J	0.29 J	**62.051 J**	0.38 J
Butyl benzylphthalate	mg/kg		50	--	--	--	ND	ND	0.15 J	ND	ND	ND
Carbazole	mg/kg			--	--	ND	ND	ND	ND	ND	ND	ND
Chrysene	mg/kg		0.04	--	--	ND	ND	**0.14 J**	**1.3**	**0.08 J**	ND	ND
Dibenz(a,h)anthracene	mg/kg		0.014	--	--	ND	ND	**0.051 J**	**0.29 J**	ND	ND	ND
Dibenzofuran	mg/kg		6.2	--	--	--	ND	ND	0.13 J	ND	ND	ND
Diethyl phthalate	mg/kg		7.1	--	--	ND	ND	ND	ND	ND	ND	0.057 J
Di-n-butylphthalate	mg/kg			--	--	--	--	--	--	--	--	--
Fluoranthene	mg/kg		50	--	--	ND	ND	0.28 J	1.4	0.12 J	0.076 J	ND
Fluorene	mg/kg		50	--	--	ND	ND	ND	0.2 J	ND	ND	ND
Indeno(1,2,3-cd)pyrene	mg/kg		3.2	--	--	ND	ND	0.099 J	0.57	0.045 J	ND	ND
Naphthalene	mg/kg		13	--	--	--	0.092 J	ND	0.11 J	ND	ND	ND
Pentachlorophenol	mg/kg		1	--	--	--	ND	ND	ND	ND	0.065 J	--
Phenanthrene	mg/kg		50	--	--	ND	0.045 J	0.2 J	1.8	0.071 J	0.056 J	ND
Pyrene	mg/kg		50	--	--	ND	ND	0.21 J	1.8	0.1 J	0.071 J	ND

TABLE B.4

SUBSURFACE SLAG ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:			*MW-27*	*MW-28*	*MW-104A*	*SB-1B*	*SB-2B*	*SB-3B*	*SB-4B*	*SB-6B*	*SB-7B*
Sample ID:			*S-19867-07-03-PK-029*	*S-19867-07-03-PK-027*	*MW-104*	*SB-1B*	*SB-2B*	*SB-3B*	*SB-4B*	*SB-6B*	*SB-7B*
Sample Date:			*7/29/2003*	*7/29/2003*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*
Sample Depth:			*1.5-4 ft*	*1-2 ft*	*6-8 ft*	*4-6 ft*	*4-6 ft*	*6-8 ft*	*2-4 ft*	*7-8 ft*	*14-16 ft*
Sample Matrix:			*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*
	Units	*Eastern USA Background*	*TAGMa*								
VOAs											
Acetone	mg/kg		0.2	–	–	0.023 B	0.005 BJ	0.007 BJ	0.004 BJ	0.007 BJ	0.035 B	0.035 B
Methylene chloride	mg/kg		0.1	–	–	ND	0.002 J	ND	ND	ND	ND	ND
Toluene	mg/kg		1.5	–	–	–	ND	ND	0.003 J	ND	ND	ND
Wet											
Percent Moisture	%			38.9	35.2	–	–	–	–	–	–	–
pH	s.u.			12	12	–	11	–	12	12	12	12
Reactive Cyanide	mg/kg			–	–	–	ND	–	ND	ND	ND	ND
Reactive Sulfide	mg/kg			–	–	–	380	–	25	ND	ND	72.7
Total Solids	%			–	–	–	76	70	63	81	66	63

TABLE B.4

SUBSURFACE SLAG ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SB-8B*	*SB-9B*	*SB-9B*	*SB-10B*	*SB-11B*	*SB-12B*	*SB-12D*	*SB-12E*	*TP-1*	*TP-1*
Sample ID:				*SB-8B*	*SB-9B*	*SB-9B*	*SB-10B*	*SB-11B*	*SB-12B*	*SB-12D*	*SB-12E*	*TP-1*	*TP-1*
Sample Date:				*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*
Sample Depth:				*15-17 ft*	*10-12 ft*	*10-12 ft*	*18-20 ft*	*10-12 ft*	*16-18 ft*	*18-20 ft*	*4-6 ft*		
Sample Matrix:				*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag Duplicate*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag Duplicate*
	Units	*Eastern USA Background*	*TAGMa*										
Metals													
Aluminum	mg/kg	33000	SB	13800	18600	15900	14600	18000	14800	11700	20000	13100	16000
Antimony	mg/kg		SB	19.3 B	94.7	90.8	45.9	26.6	40.0	2.7 B	182	63.3	78.6
Arsenic	mg/kg	3 - 12	7.5 or SB	ND (0.84)	ND (0.57)	ND (0.59)	ND (0.63) *	ND (0.86) *	ND (0.97) *	5.2 *	ND (0.55) *	ND (0.55)	ND (0.56)
Barium	mg/kg	15 - 600	300 or SB	34.5 B	53.2 B	34.4 B	20.3 B*	22.5 B*	147 *	283 *	**348 ***	34.1 B	43.6 B
Beryllium	mg/kg	0 - 1.75	0.16 or SB	ND (0.08)	0.13 B	ND (0.06)	ND (0.06)	ND (0.08)	0.15 B	**0.53 B**	0.14 B	ND (0.05)	ND (0.05)
Cadmium	mg/kg	0.1 -1.0	1 or SB	ND (0.84)	0.80 B	ND (0.59)	ND (0.63)	ND (0.86)	ND (0.97)	ND (0.55)	ND (0.55)	ND (0.55)	0.78 B
Calcium	mg/kg	130 - 35000	SB	–	–	–	–	–	–	–	–	–	–
Chromium Total	mg/kg	1.5 - 40	50b or SB	**748**	**3270**	**2970**	**1230**	**760**	**1080**	83.3	**4690**	**2140**	**2620**
Chromium VI (Hexavalent	mg/kg			4.7	68.7	–	1.0 N	13.5 N	55.5 N	0.08 BN	124 N	26.8	99.2
Cobalt	mg/kg	2.5 or 60	30 or SB	2.5 B	6.0 B	4.9 B	3.6 B	3.4 B*	4.3 B	10.2 B	8.3 B	4.6 B	5.1 B
Copper	mg/kg	1.0 - 50	25 or SB	5.4 BE	9.5 E	7.5 E	6.2 B	1.8 B*	7.3 B	17.2	15.6	11.3 E*	16.4 E*
Cyanide (total)	mg/kg			–	–	–	–	–	–	–	–	–	–
Iron	mg/kg	2000 - 550000	2000 or SB	791	**3070**	**2840**	1210	668	**2660**	**20300**	**6130**	**2790**	**3440**
Lead	mg/kg		SB	ND (0.96)	ND (0.65)	ND (0.68)	ND (0.72) *	ND (0.98) *	1.7 *	4.2 *	ND (0.63) *	1.7	2.7
Magnesium	mg/kg	100 - 5000	SB	47700	78800	84900	72200	56700	55700	12600	57600	55400	65600
Manganese	mg/kg	50 - 5000	SB	169 *	260 *	301 *	230 E*	269 E*	963 E*	622 E*	1440 E*	331 *	476 *
Mercury	mg/kg	0.001 - 0.2	0.1	ND (0.07) N	ND (0.06) N	ND (0.06) N	ND (0.06)	ND (0.07)	ND (0.10)	ND (0.05)	ND (0.05)	ND (0.06) N	ND (0.05) N
Nickel	mg/kg	0.5 - 25	13 or SB	ND (0.40)	6.7 B	3.2 B	ND (1.4)	ND (2.0)	ND (2.2)	**13.7**	**23.5**	5.5 B	**13.1**
Potassium	mg/kg	8500 - 43000	SB	ND (63.8) E	ND (43.4) E	ND (45.3) E	ND (47.7)	ND (65.4)	ND (73.9)	1790	42.0	ND (41.7) E	ND (42.7) E
Selenium	mg/kg	0.1 - 3.9	2 or SB	ND (1.8)	ND (1.2)	1.7	**3.1**	**2.5**	**2.1**	1.7	1.6	1.8	**2.5**
Silver	mg/kg		SB	ND (0.40) N	ND (0.27) N	ND (0.28) N	ND (0.30) N	ND (0.41) N	ND (0.46) N	ND (0.26) N	ND (0.26) N	ND (0.26) N	ND (0.27) N
Sodium	mg/kg	6000 - 8000	SB	ND (51.4)	ND (35.0)	ND (36.5)	ND (38.5)	ND (52.7)	ND (59.6)	ND (34.1)	ND (33.8)	ND (33.6)	ND (34.4)
Thallium	mg/kg		SB	ND (1.2)	ND (0.81)	ND (0.85)	ND (0.89)	ND (1.2)	ND (1.4)	ND (0.79)	ND (0.79)	ND (0.78)	ND (0.80)
Vanadium	mg/kg	1.0 - 300	150 or SB	56.3	45.0	47.1	54.6	28.2	33.4	23.9	62.2	56.4	64.8
Zinc	mg/kg	9.0 - 50.0	20 or SB	10.5	**23.8**	17.5	5.7 B	4.7 B	15.8	**40.8**	14.5	13.2	16.1

TABLE B.4

SUBSURFACE SLAG ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:			*SB-8B*	*SB-9B*	*SB-9B*	*SB-10B*	*SB-11B*	*SB-12B*	*SB-12D*	*SB-12E*	*TP-1*	*TP-1*
Sample ID:			*SB-8B*	*SB-9B*	*SB-9B*	*SB-10B*	*SB-11B*	*SB-12B*	*SB-12D*	*SB-12E*	*TP-1*	*TP-1*
Sample Date:			*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*
Sample Depth:			*15-17 ft*	*10-12 ft*	*10-12 ft*	*18-20 ft*	*10-12 ft*	*16-18 ft*	*18-20 ft*	*4-6 ft*		
Sample Matrix:			*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag Duplicate*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag Duplicate*
	Units	*Eastern USA Background*	*TAGMa*									
MetalsR												
Chromium Total	mg/L			0.066	0.71	–	0.0066	0.076	0.54	–	–	1.6	–
SVOAs												
2-Methylnaphthalene	mg/kg		36.4	–	–	–	ND	–	–	–	–	–	–
Acenaphthene	mg/kg		50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Anthracene	mg/kg		50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)anthracene	mg/kg		0.224	ND	ND	ND	ND	ND	ND	ND	ND	0.082 J	0.072 J
Benzo(a)pyrene	mg/kg		0.061	ND	ND	ND	ND	ND	ND	ND	ND	**0.068 J**	**0.069 J**
Benzo(b)fluoranthene	mg/kg		1.1	ND	0.054 J	ND	ND	ND	ND	ND	0.072 J	0.12 J	0.12 J
Benzo(g,h,i)perylene	mg/kg		50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	mg/kg		1.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate	mg/kg		50	0.38 J	0.048 J	0.065 J	0.082 J	0.16 J	0.095 J	0.13 J	0.06 J	ND	0.14 BJ
Butyl benzylphthalate	mg/kg		50	ND	ND	ND	–	–	–	–	–	–	–
Carbazole	mg/kg			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chrysene	mg/kg		0.04	ND	ND	ND	ND	ND	ND	ND	**0.054 J**	**0.097 J**	**0.089 J**
Dibenz(a,h)anthracene	mg/kg		0.014	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibenzofuran	mg/kg		6.2	ND	ND	ND	ND	–	–	–	–	–	–
Diethyl phthalate	mg/kg		7.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Di-n-butylphthalate	mg/kg			–	–	–	ND	–	–	–	–	–	–
Fluoranthene	mg/kg		50	ND	0.11 J	0.054 J	ND	ND	ND	ND	0.13 J	0.22 J	0.18 J
Fluorene	mg/kg		50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	mg/kg		3.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	mg/kg		13	ND	ND	ND	ND	–	–	–	–	–	–
Pentachlorophenol	mg/kg		1	–	–	–	–	–	–	–	–	–	–
Phenanthrene	mg/kg		50	ND	0.066 J	ND	ND	ND	0.099 J	ND	0.098 J	0.1 J	0.1 J
Pyrene	mg/kg		50	ND	0.053 J	ND	ND	ND	ND	ND	0.068 J	0.11 J	0.092 J

TABLE B.4

SUBSURFACE SLAG ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SB-8B*	*SB-9B*	*SB-9B*	*SB-10B*	*SB-11B*	*SB-12B*	*SB-12D*	*SB-12E*	*TP-1*	*TP-1*
Sample ID:				*SB-8B*	*SB-9B*	*SB-9B*	*SB-10B*	*SB-11B*	*SB-12B*	*SB-12D*	*SB-12E*	*TP-1*	*TP-1*
Sample Date:				*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*	*11/7/1996*
Sample Depth:				*15-17 ft*	*10-12 ft*	*10-12 ft*	*18-20 ft*	*10-12 ft*	*16-18 ft*	*18-20 ft*	*4-6 ft*		
Sample Matrix:				*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag Duplicate*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag*	*SUBSO-Slag Duplicate*
	Units	*Eastern USA Background*	*TAGMa*										
VOAs													
Acetone	mg/kg		0.2	0.042 B	0.011 BJ	0.013 BJ	0.019	0.069	0.058	–	ND	0.005 BJ	0.007 BJ
Methylene chloride	mg/kg		0.1	ND	ND	ND	ND	ND	ND	–	ND	ND	0.001 J
Toluene	mg/kg		1.5	ND	ND	ND	ND	–	–	–	–	–	–
Wet													
Percent Moisture	%			–	–	–	–	–	–	–	–	–	–
pH	s.u.			12	12	12	12	12	12	–	12	12	12
Reactive Cyanide	mg/kg			ND	ND	ND	ND	ND	ND	–	ND	ND	ND
Reactive Sulfide	mg/kg			47.1	32.1	4.5	ND	950	ND	–	ND	ND	ND
Total Solids	%			49	72	70	66	47	43	75	75	75	75

TABLE B.4

SUBSURFACE SLAG ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:	***TP-2***
Sample ID:	***TP-2***
Sample Date:	***11/7/1996***
Sample Depth:	
Sample Matrix:	***SUBSO-Slag***

	Units	*Eastern USA Background*	*TAGMa*	
Metals				
Aluminum	mg/kg	33000	SB	16200
Antimony	mg/kg		SB	46.6
Arsenic	mg/kg	3 - 12	7.5 or SB	ND (0.64)
Barium	mg/kg	15 - 600	300 or SB	27.7 B
Beryllium	mg/kg	0 - 1.75	0.16 or SB	0.09 B
Cadmium	mg/kg	0.1 -1.0	1 or SB	ND (0.64)
Calcium	mg/kg	130 - 35000	SB	--
Chromium Total	mg/kg	1.5 - 40	50b or SB	**1590**
Chromium VI (Hexavalent	mg/kg			13.4
Cobalt	mg/kg	2.5 or 60	30 or SB	4.0 B
Copper	mg/kg	1.0 - 50	25 or SB	11.0 E*
Cyanide (total)	mg/kg			--
Iron	mg/kg	2000 - 550000	2000 or SB	**2890**
Lead	mg/kg		SB	1.7
Magnesium	mg/kg	100 - 5000	SB	70400
Manganese	mg/kg	50 - 5000	SB	251 *
Mercury	mg/kg	0.001 - 0.2	0.1	**0.16 N**
Nickel	mg/kg	0.5 - 25	13 or SB	ND (0.31)
Potassium	mg/kg	8500 - 43000	SB	ND (49.1) E
Selenium	mg/kg	0.1 - 3.9	2 or SB	1.6
Silver	mg/kg		SB	ND (0.31) N
Sodium	mg/kg	6000 - 8000	SB	ND (39.6)
Thallium	mg/kg		SB	ND (0.92)
Vanadium	mg/kg	1.0 - 300	150 or SB	45.6
Zinc	mg/kg	9.0 - 50.0	20 or SB	**26.2**

TABLE B.4

SUBSURFACE SLAG ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:	***TP-2***
Sample ID:	***TP-2***
Sample Date:	***11/7/1996***
Sample Depth:	
Sample Matrix:	***SUBSO-Slag***

	Units	*Eastern USA Background*	*TAGMa*	
MetalsR				
Chromium Total	mg/L			0.92
SVOAs				
2-Methylnaphthalene	mg/kg		36.4	–
Acenaphthene	mg/kg		50	ND
Anthracene	mg/kg		50	ND
Benzo(a)anthracene	mg/kg		0.224	0.081 J
Benzo(a)pyrene	mg/kg		0.061	**0.072 J**
Benzo(b)fluoranthene	mg/kg		1.1	0.083 J
Benzo(g,h,i)perylene	mg/kg		50	ND
Benzo(k)fluoranthene	mg/kg		1.1	0.059 J
bis(2-Ethylhexyl)phthalate	mg/kg		50	ND
Butyl benzylphthalate	mg/kg		50	–
Carbazole	mg/kg			ND
Chrysene	mg/kg		0.04	**0.096 J**
Dibenz(a,h)anthracene	mg/kg		0.014	ND
Dibenzofuran	mg/kg		6.2	–
Diethyl phthalate	mg/kg		7.1	ND
Di-n-butylphthalate	mg/kg			–
Fluoranthene	mg/kg		50	0.23 J
Fluorene	mg/kg		50	ND
Indeno(1,2,3-cd)pyrene	mg/kg		3.2	ND
Naphthalene	mg/kg		13	–
Pentachlorophenol	mg/kg		1	–
Phenanthrene	mg/kg		50	0.28 J
Pyrene	mg/kg		50	0.19 J

TABLE B.4

SUBSURFACE SLAG ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				***TP-2***
Sample ID:				***TP-2***
Sample Date:				***11/7/1996***
Sample Depth:				
Sample Matrix:				***SUBSO-Slag***
	Units	***Eastern USA Background***	***TAGMa***	
VOAs				
Acetone	mg/kg		0.2	0.013 BJ
Methylene chloride	mg/kg		0.1	ND
Toluene	mg/kg		1.5	--
Wet				
Percent Moisture	%			--
pH	s.u.			12
Reactive Cyanide	mg/kg			ND
Reactive Sulfide	mg/kg			29.3
Total Solids	%			65

TABLE B.4

SUBSURFACE SLAG ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Notes:

a - NYSDEC Technical and Adminiatrative Guidance, Recommended Soil Cleanup Objectives, January 1994.
b - Telephone conversation, Jim Harrington, NYSDEC, February 3, 2004.
-- - No Data.
NS - No Standard.
ND () - Non detect at associated value.
J - Estimated Value.
E - Concentrations exceed the calibration range.
N - Spike sample recovery was not within the control limits.
B - Value greater than or equal to the instrument detection limit, but less than the contract required detection limit.
D - Analysis at a secondary dilution factor.
U - Not Detected
* - Duplicate analysis not within the control limits.
SB - Soil background.

TABLE B.5

SEDIMENT ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:			*SW-8*	*SW-8*	*SW-9*	*SW-9*	*SB-2 Pond*	*SD-103*	*SD-105*
Sample ID:			*S-19867-08-03-PK-008*	*SD-19867-0504-008*	*S-19867-08-03-PK-009*	*SD-19867-0504-009*	*SB-2 POND*	*SD-103*	*SD-105*
Sample Date:			*8/14/2003*	*5/12/2004*	*8/14/2003*	*5/12/2004*	*11/7/1996*	*1/1/1989*	*1/1/1989*
Matrix:			*SE*	*SE*	*SE*	*SE*	*SE*	*SE*	*SE*
	Units	a							
Metals									
Aluminum	mg/kg	SB	9380	7250	10200	8320 J	13300	20000	13500 J
Antimony	mg/kg	SB	16.9	ND (2.21)	1.05	3.79 J	56.5	ND (12)	ND (12)
Arsenic	mg/kg	7.5 or SB	**14.9**[a]	**8.58**[a]	**16.2**[a]	ND (3.42) UJ	ND (1.3)	**8.8 J**[a]	4.2 J
Barium	mg/kg	300 or SB	**402**[a]	**328**[a]	204	209 J	**421 E**[a]	144 J	277 J
Beryllium	mg/kg	0.16 or SB	**0.375**[a]	**0.575**[a]	**0.520**[a]	**0.42 J**[a]	0.09 B	**0.62**[a]	ND (1)
Cadmium	mg/kg	1 or SB	**25.3**[a]	**7.55**[a]	**3.37**[a]	**6.95 J**[a]	**2.1**[a]	ND (1)	ND (1)
Calcium	mg/kg	SB	41300	38000	66500	220000 J	--	7890	93000 J
Chromium Total	mg/kg	10 or SB	**312**[a]	**297**[a]	**125**[a]	**167 J**[a]	**2380 N***[a]	**130 J**[a]	**167 J**[a]
Chromium VI (Hexavalent)	mg/kg		ND (4.9)	ND (5.1)	ND (7.1)	ND (8.4) UJ	0.45 E*	3.23	6.83 J
Cobalt	mg/kg	30 or SB	13.5	13	10.3	7.36 J	10.3 B	14.7	6.2 J
Copper	mg/kg	25 or SB	**162**[a]	**122**[a]	**228**[a]	**323 J**[a]	**39.4 E**[a]	**25.6**[a]	**93.4 J**[a]
Cyanide (total)	mg/kg		0.924	0.847	0.465	ND (1.13) UJ	--	--	--
Iron	mg/kg	2000 or SB	**23000**[a]	**25500**[a]	**42500**[a]	**13800 J**[a]	**7190**[a]	**28300**[a]	**20300 J**[a]
Lead	mg/kg	500	**1710**[a]	**1490**[a]	194	257 J	23.6 *	39.7 J	199 J
Magnesium	mg/kg	SB	22100	20400	7920	7440 J	46100	5190	29500 J
Manganese	mg/kg	SB	1320	1390	738	669 J	1970 *	736	504 J
Mercury	mg/kg	0.1	**2.02**[a]	**0.959**[a]	**1.71**[a]	**2.77 J**[a]	ND (0.07)	**0.42**[a]	ND (0.04)
Nickel	mg/kg	13 or SB	**158**[a]	**188**[a]	**59.3**[a]	**51.2 J**[a]	**216**[a]	**36.1 J**[a]	**48.8 J**[a]
Potassium	mg/kg	SB	1170	775	1860	1340 J	ND (45.6) E	3240	1960 J
Selenium	mg/kg	2 or SB	**7.58**[a]	ND (2.21)	**10.3**[a]	ND (5.47) UJ	**2.2**[a]	R	R
Silver	mg/kg	SB	0.545	0.985 J	0.868	4.79 J	ND (0.31) N	--	--
Sodium	mg/kg	SB	372	267	276	824 J	ND (36.8)	ND (1000)	308 J
Thallium	mg/kg	SB	ND (1.04)	0.988 J	ND (1.42)	ND (8.21) UJ	ND (0.88)	--	--
Vanadium	mg/kg	150 or SB	36.9	37	35.5	32.4 J	53.6 E	40.5	33.6 J
Zinc	mg/kg	20 or SB	**972**[a]	**1060**[a]	**778**[a]	**2220 J**[a]	**58.9**[a]	**90.0 J**[a]	**631 J**[a]

TABLE B.5

SEDIMENT ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:			*SW-8*	*SW-8*	*SW-9*	*SW-9*	*SB-2 Pond*	*SD-103*	*SD-105*
Sample ID:			*S-19867-08-03-PK-008*	*SD-19867-0504-008*	*S-19867-08-03-PK-009*	*SD-19867-0504-009*	*SB-2 POND*	*SD-103*	*SD-105*
Sample Date:			*8/14/2003*	*5/12/2004*	*8/14/2003*	*5/12/2004*	*11/7/1996*	*1/1/1989*	*1/1/1989*
Matrix:			*SE*	*SE*	*SE*	*SE*	*SE*	*SE*	*SE*
	Units	a							
Metals R									
Arsenic	mg/L		--	--	--	--	--	ND (0.043)	ND (0.043)
Barium	mg/L		--	--	--	--	--	0.778	0.767
Cadmium	mg/L		--	--	--	--	--	ND (0.003)	ND (0.003)
Chromium Total	mg/L		--	--	--	--	--	ND (0.005)	ND (0.005)
Lead	mg/L		--	--	--	--	--	ND (0.04)	ND (0.04)
Mercury	mg/L		--	--	--	--	--	ND (0.0002)	ND (0.0002)
Selenium	mg/L		--	--	--	--	--	ND (0.051)	ND (0.051)
Silver	mg/L		--	--	--	--	--	ND (0.004)	ND (0.004)
Semi Volatile Organic Compounds									
1,2,4-Trichlorobenzene	mg/kg		--	--	--	--	--	ND (0.33)	0.019 JJ
2,4-Dimethylphenol	mg/kg		--	--	--	--	--	ND (0.33)	ND (0.33)
2-Methylnaphthalene	mg/kg	36.4	--	--	--	--	--	0.015 JJ	ND (0.33)
2-Methylphenol	mg/kg	0.1	--	--	--	--	--	ND (0.33)	ND (0.33)
4-Methylphenol	mg/kg	0.09	--	--	--	--	--	0.025 JJ	**0.43 JJ[a]**
Acenaphthene	mg/kg	50	--	--	--	--	0.05 J	0.12 JJ	0.053 JJ
Acenaphthylene	mg/kg	41	--	--	--	--	--	0.001 JJ	0.011 JJ
Anthracene	mg/kg	50	--	--	--	--	0.057 J	0.11 JJ	0.045 JJ
Benzo(a)anthracene	mg/kg	0.224	--	--	--	--	**0.41 J[a]**	**0.61 JJ[a]**	**0.28 JJ[a]**
Benzo(a)pyrene	mg/kg	0.061	--	--	--	--	**0.51[a]**	**0.66 J[a]**	**0.32 JJ[a]**
Benzo(b)fluoranthene	mg/kg	1.1	--	--	--	--	0.6	0.62 JJ	0.35 JJ
Benzo(g,h,i)perylene	mg/kg	50	--	--	--	--	0.41 J	0.5 JJ	0.32 JJ
Benzo(k)fluoranthene	mg/kg	1.1	--	--	--	--	0.32 J	0.55 JJ	0.31 JJ
bis(2-Ethylhexyl)phthalate	mg/kg	50	--	--	--	--	0.15 J	--	--
Butyl benzylphthalate	mg/kg	50	--	--	--	--	--	ND (0.33)	ND (0.33)
Carbazole	mg/kg		--	--	--	--	--	0.07 JJ	ND (0.33)
Chrysene	mg/kg	0.04	--	--	--	--	**0.46 J[a]**	**0.99 J[a]**	**0.58 JJ[a]**
Dibenz(a,h)anthracene	mg/kg	0.014	--	--	--	--	**0.14 J[a]**	**0.12 JJ[a]**	ND (0.33)
Dibenzofuran	mg/kg	6.2	--	--	--	--	--	0.027 JJ	0.025 JJ
Diethyl phthalate	mg/kg	7.1	--	--	--	--	--	ND (0.33)	ND (0.33)
Di-n-butylphthalate	mg/kg		--	--	--	--	--	ND (0.33)	ND (0.33)
Di-n-octyl phthalate	mg/kg		--	--	--	--	--	ND (0.33)	0.12 JJ
Fluoranthene	mg/kg	50	--	--	--	--	0.69	1.6 J	0.6 JJ
Fluorene	mg/kg	50	--	--	--	--	--	0.064 JJ	0.041 JJ

TABLE B.5

SEDIMENT ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:			*SW-8*	*SW-8*	*SW-9*	*SW-9*	*SB-2 Pond*	*SD-103*	*SD-105*
Sample ID:			*S-19867-08-03-PK-008*	*SD-19867-0504-008*	*S-19867-08-03-PK-009*	*SD-19867-0504-009*	*SB-2 POND*	*SD-103*	*SD-105*
Sample Date:			*8/14/2003*	*5/12/2004*	*8/14/2003*	*5/12/2004*	*11/7/1996*	*1/1/1989*	*1/1/1989*
Matrix:			*SE*	*SE*	*SE*	*SE*	*SE*	*SE*	*SE*
	Units	a							
Indeno(1,2,3-cd)pyrene	mg/kg	3.2	--	--	--	--	0.37 J	0.6 JJ	0.37 JJ
Naphthalene	mg/kg	13	--	--	--	--	--	ND (0.33)	ND (0.33)
N-Nitrosodiphenylamine	mg/kg		--	--	--	--	--	ND (0.33)	0.098 JJ
Phenanthrene	mg/kg	50	--	--	--	--	0.32 J	0.77 J	0.36 JJ
Phenol	mg/kg	0.03	--	--	--	--	--	ND (0.33)	ND (0.33)
Pyrene	mg/kg	50	--	--	--	--	0.58	1.3 J	0.56 JJ
General Chemistry									
Percent Moisture	%		19.9	20.5	41.4	57.5	--	--	--
pH	S.U.		--	8.2	--	7.1	--	6.00	9.35
pH Corrosivity	s.u.		--	--	--	--	--	--	--

TABLE B.5

SEDIMENT ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:			*SW-10*	*SW-11*	*SW-12*	*SW-13*	*SW-14*
Sample ID:			*SED-19867-08-03-PK-010*	*SED-19867-08-03-PK-011*	*SD-19867-0504-012*	*SED-19867-08-03-PK-013*	*SED-19867-08-03-PK-014*
Sample Date:			*8/21/2003*	*8/21/2003*	*5/12/2004*	*8/21/2003*	*8/21/2003*
Matrix:			*SE*	*SE*	*SE*	*SE*	*SE*
	Units	a					
Metals							
Aluminum	mg/kg	SB	15900	25000	846 J	11400	10900
Antimony	mg/kg	SB	ND (1.17)	ND (3.66)	4.2 J	1.63 J	0.971 J
Arsenic	mg/kg	7.5 or SB	**8.9[a]**	**27.9[a]**	ND (17.2) UJ	4.28	4.95
Barium	mg/kg	300 or SB	181	**666[a]**	109 J	150	199
Beryllium	mg/kg	0.16 or SB	**0.633[a]**	**0.989 J[a]**	ND (0.686) UJ	**0.421 J[a]**	**0.414 J[a]**
Cadmium	mg/kg	1 or SB	0.23 J	0.955 J	0.0526 J	ND (0.939)	ND (0.799)
Calcium	mg/kg	SB	17500	53000	319000 J	180000	157000
Chromium Total	mg/kg	10 or SB	**335 J[a]**	**1840 J[a]**	**46 J[a]**	**90.3 J[a]**	**97.7 J[a]**
Chromium VI (Hexavalent)	mg/kg		ND (5.1)	ND (15)	ND (7.4) UJ	ND (8.5)	ND (7.1)
Cobalt	mg/kg	30 or SB	13.2	27.8	ND (2.75) UJ	4.53	5.7
Copper	mg/kg	25 or SB	**185[a]**	**307[a]**	2.65 J	10.6	12.4
Cyanide (total)	mg/kg		0.361 J	ND (1.78)	ND (0.988) UJ	ND (0.947)	ND (0.916)
Iron	mg/kg	2000 or SB	**24600[a]**	**42600[a]**	1020 J	**14800[a]**	**14500[a]**
Lead	mg/kg	500	81.8	240	17.2 J	15.6	21.8
Magnesium	mg/kg	SB	8870 J	16700 J	1850 J	11300 J	8890 J
Manganese	mg/kg	SB	1180 J	6330 J	47.5 J	246 J	564 J
Mercury	mg/kg	0.1	**0.197[a]**	**0.264[a]**	ND (0.0599) UJ	ND (0.0585)	0.0129 J
Nickel	mg/kg	13 or SB	**81.4[a]**	**209[a]**	ND (2.75) UJ	12.8	**15.4[a]**
Potassium	mg/kg	SB	2350 J	3200 J	279 J	2130 J	1740 J
Selenium	mg/kg	2 or SB	**7.01[a]**	**25.1[a]**	ND (5.49) UJ	**12.7[a]**	**13[a]**
Silver	mg/kg	SB	ND (1.17)	3.36 J	1.8 J	ND (1.88)	ND (1.6)
Sodium	mg/kg	SB	145	327 J	213 J	175 J	273
Thallium	mg/kg	SB	ND (1.17)	ND (3.66)	ND (13.7) UJ	ND (1.88)	ND (1.6)
Vanadium	mg/kg	150 or SB	41.8	88.6	3.62 J	22.2	22.7
Zinc	mg/kg	20 or SB	**203[a]**	**798[a]**	16.5 J	**63[a]**	**77.3[a]**

TABLE B.5

SEDIMENT ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:			*SW-10*	*SW-11*	*SW-12*	*SW-13*	*SW-14*
Sample ID:			*SED-19867-08-03-PK-010*	*SED-19867-08-03-PK-011*	*SD-19867-0504-012*	*SED-19867-08-03-PK-013*	*SED-19867-08-03-PK-014*
Sample Date:			*8/21/2003*	*8/21/2003*	*5/12/2004*	*8/21/2003*	*8/21/2003*
Matrix:			*SE*	*SE*	*SE*	*SE*	*SE*
	Units	a					
Metals R							
Arsenic	mg/L		--	--	--	--	--
Barium	mg/L		--	--	--	--	--
Cadmium	mg/L		--	--	--	--	--
Chromium Total	mg/L		--	--	--	--	--
Lead	mg/L		--	--	--	--	--
Mercury	mg/L		--	--	--	--	--
Selenium	mg/L		--	--	--	--	--
Silver	mg/L		--	--	--	--	--
Semi Volatile Organic Compounds							
1,2,4-Trichlorobenzene	mg/kg		--	--	--	--	--
2,4-Dimethylphenol	mg/kg		--	--	--	--	--
2-Methylnaphthalene	mg/kg	36.4	--	--	--	--	--
2-Methylphenol	mg/kg	0.1	--	--	--	--	--
4-Methylphenol	mg/kg	0.09	--	--	--	--	--
Acenaphthene	mg/kg	50	--	--	--	--	--
Acenaphthylene	mg/kg	41	--	--	--	--	--
Anthracene	mg/kg	50	--	--	--	--	--
Benzo(a)anthracene	mg/kg	0.224	--	--	--	--	--
Benzo(a)pyrene	mg/kg	0.061	--	--	--	--	--
Benzo(b)fluoranthene	mg/kg	1.1	--	--	--	--	--
Benzo(g,h,i)perylene	mg/kg	50	--	--	--	--	--
Benzo(k)fluoranthene	mg/kg	1.1	--	--	--	--	--
bis(2-Ethylhexyl)phthalate	mg/kg	50	--	--	--	--	--
Butyl benzylphthalate	mg/kg	50	--	--	--	--	--
Carbazole	mg/kg		--	--	--	--	--
Chrysene	mg/kg	0.04	--	--	--	--	--
Dibenz(a,h)anthracene	mg/kg	0.014	--	--	--	--	--
Dibenzofuran	mg/kg	6.2	--	--	--	--	--
Diethyl phthalate	mg/kg	7.1	--	--	--	--	--
Di-n-butylphthalate	mg/kg		--	--	--	--	--
Di-n-octyl phthalate	mg/kg		--	--	--	--	--
Fluoranthene	mg/kg	50	--	--	--	--	--
Fluorene	mg/kg	50	--	--	--	--	--

TABLE B.5

SEDIMENT ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:			*SW-10*	*SW-11*	*SW-12*	*SW-13*	*SW-14*
Sample ID:			*SED-19867-08-03-PK-010*	*SED-19867-08-03-PK-011*	*SD-19867-0504-012*	*SED-19867-08-03-PK-013*	*SED-19867-08-03-PK-014*
Sample Date:			*8/21/2003*	*8/21/2003*	*5/12/2004*	*8/21/2003*	*8/21/2003*
Matrix:			*SE*	*SE*	*SE*	*SE*	*SE*
	Units	a					
Indeno(1,2,3-cd)pyrene	mg/kg	3.2	--	--	--	--	--
Naphthalene	mg/kg	13	--	--	--	--	--
N-Nitrosodiphenylamine	mg/kg		--	--	--	--	--
Phenanthrene	mg/kg	50	--	--	--	--	--
Phenol	mg/kg	0.03	--	--	--	--	--
Pyrene	mg/kg	50	--	--	--	--	--
General Chemistry							
Percent Moisture	%		24.8	72.7	52.7	54.1	47
pH	S.U.		8.7	7.3	8.2	12	11
pH Corrosivity	s.u.		--	--	--	--	--

TABLE B.5

SEDIMENT ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:			*SW-15*	*SW-16*	*SW-16*	*SW-17*	*SW-17*
Sample ID:			*SED-19867-08-03-PK-015*	*S-19867-08-03-PK-016*	*SD-19867-0504-016*	*S-19867-08-03-PK-017*	*SD-19867-0504-017*
Sample Date:			*8/21/2003*	*8/14/2003*	*5/12/2004*	*8/14/2003*	*5/12/2004*
Matrix:			*SE*	*SE*	*SE*	*SE*	*SE*
	Units	a					
Metals							
Aluminum	mg/kg	SB	20000	593	334	16800	17500
Antimony	mg/kg	SB	ND (1.56)	3.55	6.21	ND (1.08)	ND (2.66)
Arsenic	mg/kg	7.5 or SB	**18.1**[a]	4.55	ND (15.6)	5.60	5.63
Barium	mg/kg	300 or SB	194	121	98.9	106	113
Beryllium	mg/kg	0.16 or SB	**0.952**[a]	0.120	ND (0.623)	**0.665**[a]	**0.847**[a]
Cadmium	mg/kg	1 or SB	ND (0.779)	ND (0.700)	ND (0.623)	0.136	0.542 J
Calcium	mg/kg	SB	37400	342000	353000	4980	4870
Chromium Total	mg/kg	10 or SB	**266 J**[a]	**11.8**[a]	7.17	**46.9**[a]	**48.7**[a]
Chromium VI (Hexavalent)	mg/kg		ND (7.1)	ND (6.0)	ND (6.8)	ND (5.3)	ND (5.9)
Cobalt	mg/kg	30 or SB	14.5	0.183	ND (2.49)	12.6	10.9
Copper	mg/kg	25 or SB	**69.4**[a]	ND (2.80)	ND (4.99)	**29.0**[a]	**26.8**[a]
Cyanide (total)	mg/kg		ND (0.879)	ND (0.770)	ND (0.986)	0.242	ND (0.79)
Iron	mg/kg	2000 or SB	**41000**[a]	763	417	**31400**[a]	**26200**[a]
Lead	mg/kg	500	67	8.55	10.4	33.1	33.1
Magnesium	mg/kg	SB	5390 J	721	385	4680	4980
Manganese	mg/kg	SB	979 J	47.3	20.4	679	514
Mercury	mg/kg	0.1	**0.216**[a]	ND (0.0524)	ND (0.0572)	**0.101**[a]	0.0766
Nickel	mg/kg	13 or SB	**56.3**[a]	1.63	ND (4.99)	**28.9**[a]	**26.2**[a]
Potassium	mg/kg	SB	2840 J	223	73.3 J	2020	2290
Selenium	mg/kg	2 or SB	**8.76**[a]	**10.7**[a]	ND (4.99)	**4.34**[a]	ND (2.66)
Silver	mg/kg	SB	ND (1.56)	ND (1.40)	2.18	ND (1.08)	ND (1.33)
Sodium	mg/kg	SB	204	205	243	22.5	ND (199)
Thallium	mg/kg	SB	ND (1.56)	3.26	ND (12.5)	ND (1.08)	2.51 J
Vanadium	mg/kg	150 or SB	57.9	2.30	1.72 J	36.7	35.5
Zinc	mg/kg	20 or SB	**133**[a]	**47.2**[a]	**23.7**[a]	**148**[a]	**232**[a]

TABLE B.5

SEDIMENT ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:			*SW-15*	*SW-16*	*SW-16*	*SW-17*	*SW-17*
Sample ID:			*SED-19867-08-03-PK-015*	*S-19867-08-03-PK-016*	*SD-19867-0504-016*	*S-19867-08-03-PK-017*	*SD-19867-0504-017*
Sample Date:			*8/21/2003*	*8/14/2003*	*5/12/2004*	*8/14/2003*	*5/12/2004*
Matrix:			*SE*	*SE*	*SE*	*SE*	*SE*
	Units	a					
Metals R							
Arsenic	mg/L		--	--	--	--	--
Barium	mg/L		--	--	--	--	--
Cadmium	mg/L		--	--	--	--	--
Chromium Total	mg/L		--	--	--	--	--
Lead	mg/L		--	--	--	--	--
Mercury	mg/L		--	--	--	--	--
Selenium	mg/L		--	--	--	--	--
Silver	mg/L		--	--	--	--	--
Semi Volatile Organic Compounds							
1,2,4-Trichlorobenzene	mg/kg		--	--	--	--	--
2,4-Dimethylphenol	mg/kg		--	--	--	--	--
2-Methylnaphthalene	mg/kg	36.4	--	--	--	--	--
2-Methylphenol	mg/kg	0.1	--	--	--	--	--
4-Methylphenol	mg/kg	0.09	--	--	--	--	--
Acenaphthene	mg/kg	50	--	--	--	--	--
Acenaphthylene	mg/kg	41	--	--	--	--	--
Anthracene	mg/kg	50	--	--	--	--	--
Benzo(a)anthracene	mg/kg	0.224	--	--	--	--	--
Benzo(a)pyrene	mg/kg	0.061	--	--	--	--	--
Benzo(b)fluoranthene	mg/kg	1.1	--	--	--	--	--
Benzo(g,h,i)perylene	mg/kg	50	--	--	--	--	--
Benzo(k)fluoranthene	mg/kg	1.1	--	--	--	--	--
bis(2-Ethylhexyl)phthalate	mg/kg	50	--	--	--	--	--
Butyl benzylphthalate	mg/kg	50	--	--	--	--	--
Carbazole	mg/kg		--	--	--	--	--
Chrysene	mg/kg	0.04	--	--	--	--	--
Dibenz(a,h)anthracene	mg/kg	0.014	--	--	--	--	--
Dibenzofuran	mg/kg	6.2	--	--	--	--	--
Diethyl phthalate	mg/kg	7.1	--	--	--	--	--
Di-n-butylphthalate	mg/kg		--	--	--	--	--
Di-n-octyl phthalate	mg/kg		--	--	--	--	--
Fluoranthene	mg/kg	50	--	--	--	--	--
Fluorene	mg/kg	50	--	--	--	--	--

TABLE B.5

SEDIMENT ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:			*SW-15*	*SW-16*	*SW-16*	*SW-17*	*SW-17*
Sample ID:			*SED-19867-08-03-PK-015*	*S-19867-08-03-PK-016*	*SD-19867-0504-016*	*S-19867-08-03-PK-017*	*SD-19867-0504-017*
Sample Date:			*8/21/2003*	*8/14/2003*	*5/12/2004*	*8/14/2003*	*5/12/2004*
Matrix:			*SE*	*SE*	*SE*	*SE*	*SE*
	Units	a					
Indeno(1,2,3-cd)pyrene	mg/kg	3.2	--	--	--	--	--
Naphthalene	mg/kg	13	--	--	--	--	--
N-Nitrosodiphenylamine	mg/kg		--	--	--	--	--
Phenanthrene	mg/kg	50	--	--	--	--	--
Phenol	mg/kg	0.03	--	--	--	--	--
Pyrene	mg/kg	50	--	--	--	--	--
General Chemistry							
Percent Moisture	%		43.7	35.1	44.3	21.6	40.3
pH	S.U.		8.2	--	11	--	7.3
pH Corrosivity	s.u.		--	--	--	--	--

TABLE B.5

SEDIMENT ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:			*SW-18*	*SW-19*	*SW-20*	*SW-21*	*SW-22*
Sample ID:			*SED-19867-08-03-PK-018*	*SED-19867-08-03-PK-019*	*SED-19867-08-03-PK-020*	*SED-19867-08-03-PK-021*	*SED-19867-08-03-PK-022*
Sample Date:			*8/21/2003*	*8/21/2003*	*8/21/2003*	*8/21/2003*	*8/28/2003*
Matrix:			*SE*	*SE*	*SE*	*SE*	*SE*
	Units	a					
Metals							
Aluminum	mg/kg	SB	12400	19100	7240	2300	18800
Antimony	mg/kg	SB	ND (1.3)	ND (1.47)	4.16	3.57	2.67
Arsenic	mg/kg	7.5 or SB	6.16	6.41	ND (2.09)	ND (1.79)	ND (1.34)
Barium	mg/kg	300 or SB	120	134	165	160	174
Beryllium	mg/kg	0.16 or SB	**0.538 J[a]**	**0.864[a]**	0.103 J	0.0558 J	**0.306 J[a]**
Cadmium	mg/kg	1 or SB	ND (0.651)	ND (0.734)	ND (1.05)	ND (0.897)	0.213 J
Calcium	mg/kg	SB	95200	57200	267000	277000	127000
Chromium Total	mg/kg	10 or SB	**65.4 J[a]**	**49.1 J[a]**	**483 J[a]**	**63.5 J[a]**	**1120[a]**
Chromium VI (Hexavalent)	mg/kg		ND (5.3)	ND (5.8)	ND (7.9)	ND (7.7)	2.3 J
Cobalt	mg/kg	30 or SB	6.61	11.5	4.03 J	0.779 J	6.97
Copper	mg/kg	25 or SB	12.4	24.9	22.9	6.43	**37.6[a]**
Cyanide (total)	mg/kg		ND (0.638)	ND (0.699)	ND (1.06)	ND (0.948)	0.358 J
Iron	mg/kg	2000 or SB	**21300[a]**	**28500[a]**	**8070[a]**	**3110[a]**	**20100[a]**
Lead	mg/kg	500	22.7	12.3	65.3	25.9	89.0
Magnesium	mg/kg	SB	8000 J	13000 J	10700 J	9620 J	32300
Manganese	mg/kg	SB	583 J	690 J	606 J	215 J	731
Mercury	mg/kg	0.1	0.062	0.00865 J	0.0526 J	ND (0.0559)	0.0482
Nickel	mg/kg	13 or SB	12.6	**27.7[a]**	**30.2[a]**	3.16 J	**52.6[a]**
Potassium	mg/kg	SB	1700 J	4580 J	1010 J	300 J	1740
Selenium	mg/kg	2 or SB	**9.08[a]**	**10.1[a]**	**18.6[a]**	**16.7[a]**	**14.2[a]**
Silver	mg/kg	SB	ND (1.3)	ND (1.47)	ND (2.09)	ND (1.79)	ND (1.34)
Sodium	mg/kg	SB	178	297	399	366	156
Thallium	mg/kg	SB	ND (1.3)	ND (1.47)	ND (2.09)	1.42 J	ND (4.01)
Vanadium	mg/kg	150 or SB	28.5	40.9	25.2	5.86	48.7
Zinc	mg/kg	20 or SB	**97.7[a]**	**72[a]**	**312[a]**	**85.6[a]**	**227[a]**

TABLE B.5

SEDIMENT ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:			*SW-18*	*SW-19*	*SW-20*	*SW-21*	*SW-22*
Sample ID:			*SED-19867-08-03-PK-018*	*SED-19867-08-03-PK-019*	*SED-19867-08-03-PK-020*	*SED-19867-08-03-PK-021*	*SED-19867-08-03-PK-022*
Sample Date:			*8/21/2003*	*8/21/2003*	*8/21/2003*	*8/21/2003*	*8/28/2003*
Matrix:			*SE*	*SE*	*SE*	*SE*	*SE*
	Units	a					
Metals R							
Arsenic	mg/L		--	--	--	--	--
Barium	mg/L		--	--	--	--	--
Cadmium	mg/L		--	--	--	--	--
Chromium Total	mg/L		--	--	--	--	--
Lead	mg/L		--	--	--	--	--
Mercury	mg/L		--	--	--	--	--
Selenium	mg/L		--	--	--	--	--
Silver	mg/L		--	--	--	--	--
Semi Volatile Organic Compounds							
1,2,4-Trichlorobenzene	mg/kg		--	--	--	--	--
2,4-Dimethylphenol	mg/kg		--	--	--	--	--
2-Methylnaphthalene	mg/kg	36.4	--	--	--	--	--
2-Methylphenol	mg/kg	0.1	--	--	--	--	--
4-Methylphenol	mg/kg	0.09	--	--	--	--	--
Acenaphthene	mg/kg	50	--	--	--	--	--
Acenaphthylene	mg/kg	41	--	--	--	--	--
Anthracene	mg/kg	50	--	--	--	--	--
Benzo(a)anthracene	mg/kg	0.224	--	--	--	--	--
Benzo(a)pyrene	mg/kg	0.061	--	--	--	--	--
Benzo(b)fluoranthene	mg/kg	1.1	--	--	--	--	--
Benzo(g,h,i)perylene	mg/kg	50	--	--	--	--	--
Benzo(k)fluoranthene	mg/kg	1.1	--	--	--	--	--
bis(2-Ethylhexyl)phthalate	mg/kg	50	--	--	--	--	--
Butyl benzylphthalate	mg/kg	50	--	--	--	--	--
Carbazole	mg/kg		--	--	--	--	--
Chrysene	mg/kg	0.04	--	--	--	--	--
Dibenz(a,h)anthracene	mg/kg	0.014	--	--	--	--	--
Dibenzofuran	mg/kg	6.2	--	--	--	--	--
Diethyl phthalate	mg/kg	7.1	--	--	--	--	--
Di-n-butylphthalate	mg/kg		--	--	--	--	--
Di-n-octyl phthalate	mg/kg		--	--	--	--	--
Fluoranthene	mg/kg	50	--	--	--	--	--
Fluorene	mg/kg	50	--	--	--	--	--

TABLE B.5

SEDIMENT ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:			*SW-18*	*SW-19*	*SW-20*	*SW-21*	*SW-22*
Sample ID:			*SED-19867-08-03-PK-018*	*SED-19867-08-03-PK-019*	*SED-19867-08-03-PK-020*	*SED-19867-08-03-PK-021*	*SED-19867-08-03-PK-022*
Sample Date:			*8/21/2003*	*8/21/2003*	*8/21/2003*	*8/21/2003*	*8/28/2003*
Matrix:			*SE*	*SE*	*SE*	*SE*	*SE*
	Units	a					
Indeno(1,2,3-cd)pyrene	mg/kg	3.2	--	--	--	--	--
Naphthalene	mg/kg	13	--	--	--	--	--
N-Nitrosodiphenylamine	mg/kg		--	--	--	--	--
Phenanthrene	mg/kg	50	--	--	--	--	--
Phenol	mg/kg	0.03	--	--	--	--	--
Pyrene	mg/kg	50	--	--	--	--	--
General Chemistry							
Percent Moisture	%		26.1	31.9	53.2	49.3	26.6
pH	S.U.		8.2	8.3	11	12	7.7 J
pH Corrosivity	s.u.		--	--	--	--	--

TABLE B.5

SEDIMENT ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:			SW-23	SW-23	SW-24
Sample ID:			*SED-19867-08-03-PK-023*	*SED-19867-08-03-PK-025*	*SED-19867-08-03-PK-024*
Sample Date:			*8/21/2003*	*8/21/2003*	*8/21/2003*
Matrix:			*SE*	*SE*	*SE*
				Duplicate	
	Units	a			
Metals					
Aluminum	mg/kg	SB	8390	15900	23300
Antimony	mg/kg	SB	2.07	ND (1.97)	ND (1.45)
Arsenic	mg/kg	7.5 or SB	4.54	**8.88**[a]	**7.89**[a]
Barium	mg/kg	300 or SB	146	125	182
Beryllium	mg/kg	0.16 or SB	**0.23 J**[a]	**0.288 J**[a]	**1.09**[a]
Cadmium	mg/kg	1 or SB	ND (0.917)	ND (0.985)	ND (0.726)
Calcium	mg/kg	SB	186000	142000	15200
Chromium Total	mg/kg	10 or SB	**364 J**[a]	**289 J**[a]	**55.1 J**[a]
Chromium VI (Hexavalent)	mg/kg		4.9 J	ND (8.2)	ND (5.8)
Cobalt	mg/kg	30 or SB	3.05 J	4.46	15.9
Copper	mg/kg	25 or SB	**26**[a]	**25.6**[a]	**27.5**[a]
Cyanide (total)	mg/kg		1.16	0.563 J	ND (0.68)
Iron	mg/kg	2000 or SB	**9170**[a]	**10300**[a]	**32200**[a]
Lead	mg/kg	500	75.5	64.5	28.4
Magnesium	mg/kg	SB	26900 J	28100 J	11900 J
Manganese	mg/kg	SB	558 J	562 J	923 J
Mercury	mg/kg	0.1	ND (0.0624)	0.0256 J	0.0354 J
Nickel	mg/kg	13 or SB	12.4	**18**[a]	**33.3**[a]
Potassium	mg/kg	SB	779 J	1070 J	3520 J
Selenium	mg/kg	2 or SB	**17.8**[a]	**14.9**[a]	**8.16**[a]
Silver	mg/kg	SB	ND (1.83)	ND (1.97)	ND (1.45)
Sodium	mg/kg	SB	396	382	181
Thallium	mg/kg	SB	ND (1.83)	ND (1.97)	ND (1.45)
Vanadium	mg/kg	150 or SB	17.2	19	47.8
Zinc	mg/kg	20 or SB	**296**[a]	**248**[a]	**170**[a]

TABLE B.5

SEDIMENT ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:			*SW-23*	*SW-23*	*SW-24*
Sample ID:			*SED-19867-08-03-PK-023*	*SED-19867-08-03-PK-025*	*SED-19867-08-03-PK-024*
Sample Date:			*8/21/2003*	*8/21/2003*	*8/21/2003*
Matrix:			*SE*	*SE*	*SE*
				Duplicate	
	Units	a			
Metals R					
Arsenic	mg/L		--	--	--
Barium	mg/L		--	--	--
Cadmium	mg/L		--	--	--
Chromium Total	mg/L		--	--	--
Lead	mg/L		--	--	--
Mercury	mg/L		--	--	--
Selenium	mg/L		--	--	--
Silver	mg/L		--	--	--
Semi Volatile Organic Compounds					
1,2,4-Trichlorobenzene	mg/kg		--	--	--
2,4-Dimethylphenol	mg/kg		--	--	--
2-Methylnaphthalene	mg/kg	36.4	--	--	--
2-Methylphenol	mg/kg	0.1	--	--	--
4-Methylphenol	mg/kg	0.09	--	--	--
Acenaphthene	mg/kg	50	--	--	--
Acenaphthylene	mg/kg	41	--	--	--
Anthracene	mg/kg	50	--	--	--
Benzo(a)anthracene	mg/kg	0.224	--	--	--
Benzo(a)pyrene	mg/kg	0.061	--	--	--
Benzo(b)fluoranthene	mg/kg	1.1	--	--	--
Benzo(g,h,i)perylene	mg/kg	50	--	--	--
Benzo(k)fluoranthene	mg/kg	1.1	--	--	--
bis(2-Ethylhexyl)phthalate	mg/kg	50	--	--	--
Butyl benzylphthalate	mg/kg	50	--	--	--
Carbazole	mg/kg		--	--	--
Chrysene	mg/kg	0.04	--	--	--
Dibenz(a,h)anthracene	mg/kg	0.014	--	--	--
Dibenzofuran	mg/kg	6.2	--	--	--
Diethyl phthalate	mg/kg	7.1	--	--	--
Di-n-butylphthalate	mg/kg		--	--	--
Di-n-octyl phthalate	mg/kg		--	--	--
Fluoranthene	mg/kg	50	--	--	--
Fluorene	mg/kg	50	--	--	--

TABLE B.5

SEDIMENT ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:			*SW-23*	*SW-23*	*SW-24*
Sample ID:			*SED-19867-08-03-PK-023*	*SED-19867-08-03-PK-025*	*SED-19867-08-03-PK-024*
Sample Date:			*8/21/2003*	*8/21/2003*	*8/21/2003*
Matrix:			*SE*	*SE*	*SE*
				Duplicate	
	Units	a			
Indeno(1,2,3-cd)pyrene	mg/kg	3.2	--	--	--
Naphthalene	mg/kg	13	--	--	--
N-Nitrosodiphenylamine	mg/kg		--	--	--
Phenanthrene	mg/kg	50	--	--	--
Phenol	mg/kg	0.03	--	--	--
Pyrene	mg/kg	50	--	--	--
General Chemistry					
Percent Moisture	%		45.5	52.1	32.5
pH	S.U.		11	11	7.7
pH Corrosivity	s.u.		--	--	--

TABLE B.5

SEDIMENT ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Notes:

a	- Indicates an exceedance of NYSDEC Lowest Effect Level
b	- Indicates an exceedance of NYSDEC Severe Effect Level
c	- Indicates an exceedance of NYSDEC Human Health Bioaccumulation Sediment Criteria
d	- Technical Guidance for Screening Contaminated Sediments, NYSDEC, January 25, 1999
NS	- No Standard
ND ()	- Non detect at associated value
--	- No Data
J	- Estimated Value
B	- Value equal or greater than instrument detection limit, but less than contract required detection limit
E	- Estimated above quantification limit
N	- Spike sample recovery not within control limits
U	- Not detected

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				1	3	4	5	6	7	8	9	10
Sample ID:				1	3	4	5	6	7	8	9	10
Sample Date:				3/27/1998	3/27/1998	3/27/1998	3/27/1998	3/27/1998	3/27/1998	3/27/1998	3/27/1998	3/27/1998
Sample Matrix:				Surface water	Surface water	Surface water	Surface water	Surface water	Surface water	Surface water	Surface water	Surface water
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*									
Metals												
Aluminum	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Antimony	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Arsenic	mg/L	0.340	NS	–	–	–	–	–	–	–	–	–
Barium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Beryllium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Cadmium	mg/L	NCV(1)	NS	–	–	–	–	–	–	–	–	–
Calcium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Chromium Total	mg/L	NCV(2)	NS	–	–	–	–	–	–	–	–	–
Chromium VI (Hexavalent)	mg/L	0.016	NS	–	–	–	–	–	–	–	–	–
Cobalt	mg/L	0.110	NS	–	–	–	–	–	–	–	–	–
Copper	mg/L	NCV(3)	NS	–	–	–	–	–	–	–	–	–
Cyanide (total)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Iron	mg/L	0.300	NS	–	–	–	–	–	–	–	–	–
Lead	mg/L	NCV(4)	NS	–	–	–	–	–	–	–	–	–
Magnesium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Manganese	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Mercury	mg/L	0.0014	NS	–	–	–	–	–	–	–	–	–
Nickel	mg/L	NCV(5)	NS	–	–	–	–	–	–	–	–	–
Potassium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Selenium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Silicon	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Silver	mg/L	NCV(6)	NS	–	–	–	–	–	–	–	–	–
Sodium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Thallium	mg/L	0.020	NS	–	–	–	–	–	–	–	–	–
Vanadium	mg/L	0.190	NS	–	–	–	–	–	–	–	–	–
Zinc	mg/L	NCV(7)	NS	–	–	–	–	–	–	–	–	–

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*1*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Sample ID:				*1*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Sample Date:				*3/27/1998*	*3/27/1998*	*3/27/1998*	*3/27/1998*	*3/27/1998*	*3/27/1998*	*3/27/1998*	*3/27/1998*	*3/27/1998*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*									
SVOAs												
1,2,4-Trichlorobenzene	mg/L	NS	0.07	–	–	–	–	–	–	–	–	–
2,4-Dinitrophenol	mg/L	0.4	NS	–	–	–	–	–	–	–	–	–
2-Methylnaphthalene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
4-Methylphenol	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
4-Nitrophenol	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Acenaphthene	mg/L	NS	0.99	–	–	–	–	–	–	–	–	–
bis(2-Ethylhexyl)phthalate	mg/L	NS	0.022	–	–	–	–	–	–	–	–	–
Diethyl phthalate	mg/L	NS	44	–	–	–	–	–	–	–	–	–
Fluoranthene	mg/L	NS	0.14	–	–	–	–	–	–	–	–	–
Naphthalene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Phenanthrene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Phenol	mg/L	NS	1,700	–	–	–	–	–	–	–	–	–
VOAs												
Acetone	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
General Chemistry												
Alkalinity, Total (As CaCO3)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Ammonia	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Chemical Oxygen Demand (COI	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Chloride	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Conductivity	umhos/cm	NS	NS	–	–	–	–	–	–	–	–	–
Dissolved Oxygen	mg/L	5.0	NS	–	–	–	–	–	–	–	–	–
Hardness	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Nitrate (as N)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Oxidation reduction potential	millivolts	NS	NS	–	–	–	–	–	–	–	–	–
pH	s.u.	NS	NS	7.45	12.16	11.52	11.65	11.72	9.81	7.08	11.8	8.38
Phenolics (Total)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Sulfate	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Temperature	deg F	NS	NS	–	–	–	–	–	–	–	–	–
Total Dissolved Solids (TDS)	mg/L	500	NS	–	–	–	–	–	–	–	–	–
Total Organic Carbon (TOC)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Turbidity	NTU	NS	NS	–	–	–	–	–	–	–	–	–

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*
Sample ID:				*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*
Sample Date:				*3/27/1998*	*3/27/1998*	*3/27/1998*	*3/27/1998*	*3/27/1998*	*3/27/1998*	*3/27/1998*	*3/27/1998*	*3/27/1998*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*									
Metals												
Aluminum	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Antimony	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Arsenic	mg/L	0.340	NS	–	–	–	–	–	–	–	–	–
Barium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Beryllium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Cadmium	mg/L	NCV(1)	NS	–	–	–	–	–	–	–	–	–
Calcium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Chromium Total	mg/L	NCV(2)	NS	–	–	–	–	–	–	–	–	–
Chromium VI (Hexavalent)	mg/L	0.016	NS	–	–	–	–	–	–	–	–	–
Cobalt	mg/L	0.110	NS	–	–	–	–	–	–	–	–	–
Copper	mg/L	NCV(3)	NS	–	–	–	–	–	–	–	–	–
Cyanide (total)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Iron	mg/L	0.300	NS	–	–	–	–	–	–	–	–	–
Lead	mg/L	NCV(4)	NS	–	–	–	–	–	–	–	–	–
Magnesium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Manganese	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Mercury	mg/L	0.0014	NS	–	–	–	–	–	–	–	–	–
Nickel	mg/L	NCV(5)	NS	–	–	–	–	–	–	–	–	–
Potassium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Selenium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Silicon	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Silver	mg/L	NCV(6)	NS	–	–	–	–	–	–	–	–	–
Sodium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Thallium	mg/L	0.020	NS	–	–	–	–	–	–	–	–	–
Vanadium	mg/L	0.190	NS	–	–	–	–	–	–	–	–	–
Zinc	mg/L	NCV(7)	NS	–	–	–	–	–	–	–	–	–

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				12	13	14	15	16	17	18	19	20
Sample ID:				12	13	14	15	16	17	18	19	20
Sample Date:				3/27/1998	3/27/1998	3/27/1998	3/27/1998	3/27/1998	3/27/1998	3/27/1998	3/27/1998	3/27/1998
Sample Matrix:				Surface water	Surface water	Surface water	Surface water	Surface water	Surface water	Surface water	Surface water	Surface water
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*									
SVOAs												
1,2,4-Trichlorobenzene	mg/L	NS	0.07	–	–	–	–	–	–	–	–	–
2,4-Dinitrophenol	mg/L	0.4	NS	–	–	–	–	–	–	–	–	–
2-Methylnaphthalene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
4-Methylphenol	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
4-Nitrophenol	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Acenaphthene	mg/L	NS	0.99	–	–	–	–	–	–	–	–	–
bis(2-Ethylhexyl)phthalate	mg/L	NS	0.022	–	–	–	–	–	–	–	–	–
Diethyl phthalate	mg/L	NS	44	–	–	–	–	–	–	–	–	–
Fluoranthene	mg/L	NS	0.14	–	–	–	–	–	–	–	–	–
Naphthalene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Phenanthrene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Phenol	mg/L	NS	1,700	–	–	–	–	–	–	–	–	–
VOAs												
Acetone	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
General Chemistry												
Alkalinity, Total (As CaCO3)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Ammonia	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Chemical Oxygen Demand (COI	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Chloride	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Conductivity	umhos/cm	NS	NS	–	–	–	–	–	–	–	–	–
Dissolved Oxygen	mg/L	5.0	NS	–	–	–	–	–	–	–	–	–
Hardness	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Nitrate (as N)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Oxidation reduction potential	millivolts	NS	NS	–	–	–	–	–	–	–	–	–
pH	s.u.	NS	NS	8.13	12.33	10.77	11.15	10.94	10.23	9.98	11.75	8.5
Phenolics (Total)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Sulfate	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Temperature	deg F	NS	NS	–	–	–	–	–	–	–	–	–
Total Dissolved Solids (TDS)	mg/L	500	NS	–	–	–	–	–	–	–	–	–
Total Organic Carbon (TOC)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Turbidity	NTU	NS	NS	–	–	–	–	–	–	–	–	–

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				21	22	23	24	25	26	27	28	29
Sample ID:				21	22	23	24	25	26	27	28	29
Sample Date:				3/27/1998	3/27/1998	3/27/1998	3/27/1998	3/27/1998	3/27/1998	3/27/1998	3/27/1998	3/27/1998
Sample Matrix:				Surface water	Surface water	Surface water	Surface water	Surface water	Surface water	Surface water	Surface water	Surface water
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*									
Metals												
Aluminum	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Antimony	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Arsenic	mg/L	0.340	NS	–	–	–	–	–	–	–	–	–
Barium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Beryllium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Cadmium	mg/L	NCV[1]	NS	–	–	–	–	–	–	–	–	–
Calcium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Chromium Total	mg/L	NCV[2]	NS	–	–	–	–	–	–	–	–	–
Chromium VI (Hexavalent)	mg/L	0.016	NS	–	–	–	–	–	–	–	–	–
Cobalt	mg/L	0.110	NS	–	–	–	–	–	–	–	–	–
Copper	mg/L	NCV[3]	NS	–	–	–	–	–	–	–	–	–
Cyanide (total)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Iron	mg/L	0.300	NS	–	–	–	–	–	–	–	–	–
Lead	mg/L	NCV[4]	NS	–	–	–	–	–	–	–	–	–
Magnesium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Manganese	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Mercury	mg/L	0.0014	NS	–	–	–	–	–	–	–	–	–
Nickel	mg/L	NCV[5]	NS	–	–	–	–	–	–	–	–	–
Potassium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Selenium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Silicon	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Silver	mg/L	NCV[6]	NS	–	–	–	–	–	–	–	–	–
Sodium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Thallium	mg/L	0.020	NS	–	–	–	–	–	–	–	–	–
Vanadium	mg/L	0.190	NS	–	–	–	–	–	–	–	–	–
Zinc	mg/L	NCV[7]	NS	–	–	–	–	–	–	–	–	–

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				21	22	23	24	25	26	27	28	29
Sample ID:				21	22	23	24	25	26	27	28	29
Sample Date:				3/27/1998	3/27/1998	3/27/1998	3/27/1998	3/27/1998	3/27/1998	3/27/1998	3/27/1998	3/27/1998
Sample Matrix:				Surface water	Surface water	Surface water	Surface water	Surface water	Surface water	Surface water	Surface water	Surface water
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*									
SVOAs												
1,2,4-Trichlorobenzene	mg/L	NS	0.07	–	–	–	–	–	–	–	–	–
2,4-Dinitrophenol	mg/L	0.4	NS	–	–	–	–	–	–	–	–	–
2-Methylnaphthalene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
4-Methylphenol	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
4-Nitrophenol	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Acenaphthene	mg/L	NS	0.99	–	–	–	–	–	–	–	–	–
bis(2-Ethylhexyl)phthalate	mg/L	NS	0.022	–	–	–	–	–	–	–	–	–
Diethyl phthalate	mg/L	NS	44	–	–	–	–	–	–	–	–	–
Fluoranthene	mg/L	NS	0.14	–	–	–	–	–	–	–	–	–
Naphthalene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Phenanthrene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Phenol	mg/L	NS	1,700	–	–	–	–	–	–	–	–	–
VOAs												
Acetone	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
General Chemistry												
Alkalinity, Total (As CaCO3)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Ammonia	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Chemical Oxygen Demand (COI	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Chloride	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Conductivity	umhos/cm	NS	NS	–	–	–	–	–	–	–	–	–
Dissolved Oxygen	mg/L	5.0	NS	–	–	–	–	–	–	–	–	–
Hardness	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Nitrate (as N)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Oxidation reduction potential	millivolts	NS	NS	–	–	–	–	–	–	–	–	–
pH	s.u.	NS	NS	10.21	9.18	10.49	10.05	10.55	10.7	9.53	9.42	9.06
Phenolics (Total)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Sulfate	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Temperature	deg F	NS	NS	–	–	–	–	–	–	–	–	–
Total Dissolved Solids (TDS)	mg/L	500	NS	–	–	–	–	–	–	–	–	–
Total Organic Carbon (TOC)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Turbidity	NTU	NS	NS	–	–	–	–	–	–	–	–	–

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*30*	*31*	*32*	*33*	*34*	*35*	*36*	*SB-2 Pond*	*SW-6*
Sample ID:				*30*	*31*	*32*	*33*	*34*	*35*	*36*	*SB-2 POND*	*Location6*
Sample Date:				*3/27/1998*	*3/27/1998*	*3/27/1998*	*3/27/1998*	*3/27/1998*	*3/27/1998*	*3/27/1998*	*11/7/1996*	*3/7/1979*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*									
Metals												
Aluminum	mg/L	NS	NS	–	–	–	–	–	–	–	0.302 E	–
Antimony	mg/L	NS	NS	–	–	–	–	–	–	–	0.0357 B	–
Arsenic	mg/L	0.340	NS	–	–	–	–	–	–	–	ND(0.0046)	–
Barium	mg/L	NS	NS	–	–	–	–	–	–	–	0.0398 B	0.15
Beryllium	mg/L	NS	NS	–	–	–	–	–	–	–	0.00047 B	–
Cadmium	mg/L	NCV[1]	NS	–	–	–	–	–	–	–	ND(0.0021)	–
Calcium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Chromium Total	mg/L	NCV[2]	NS	–	–	–	–	–	–	–	0.878	0.25
Chromium VI (Hexavalent)	mg/L	0.016	NS	–	–	–	–	–	–	–	**0.752**[a]	–
Cobalt	mg/L	0.110	NS	–	–	–	–	–	–	–	ND(0.0034)	–
Copper	mg/L	NCV[3]	NS	–	–	–	–	–	–	–	0.0099 B	–
Cyanide (total)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Iron	mg/L	0.300	NS	–	–	–	–	–	–	–	0.132	0.07
Lead	mg/L	NCV[4]	NS	–	–	–	–	–	–	–	ND(0.0024)	–
Magnesium	mg/L	NS	NS	–	–	–	–	–	–	–	1.47 B	–
Manganese	mg/L	NS	NS	–	–	–	–	–	–	–	0.0202	0.03
Mercury	mg/L	0.0014	NS	–	–	–	–	–	–	–	ND(0.0001)	–
Nickel	mg/L	NCV[5]	NS	–	–	–	–	–	–	–	ND(0.0048)	–
Potassium	mg/L	NS	NS	–	–	–	–	–	–	–	6.66	–
Selenium	mg/L	NS	NS	–	–	–	–	–	–	–	0.0059	–
Silicon	mg/L	NS	NS	–	–	–	–	–	–	–	–	2.9
Silver	mg/L	NCV[6]	NS	–	–	–	–	–	–	–	ND(0.0011) N	–
Sodium	mg/L	NS	NS	–	–	–	–	–	–	–	38.1 E	–
Thallium	mg/L	0.020	NS	–	–	–	–	–	–	–	ND(0.0031)	–
Vanadium	mg/L	0.190	NS	–	–	–	–	–	–	–	0.026 B	–
Zinc	mg/L	NCV[7]	NS	–	–	–	–	–	–	–	0.0081 B	0.02

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*30*	*31*	*32*	*33*	*34*	*35*	*36*	*SB-2 Pond*	*SW-6*
Sample ID:				*30*	*31*	*32*	*33*	*34*	*35*	*36*	*SB-2 POND*	*Location6*
Sample Date:				*3/27/1998*	*3/27/1998*	*3/27/1998*	*3/27/1998*	*3/27/1998*	*3/27/1998*	*3/27/1998*	*11/7/1996*	*3/7/1979*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*									
SVOAs												
1,2,4-Trichlorobenzene	mg/L	NS	0.07	–	–	–	–	–	–	–	–	–
2,4-Dinitrophenol	mg/L	0.4	NS	–	–	–	–	–	–	–	–	–
2-Methylnaphthalene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
4-Methylphenol	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
4-Nitrophenol	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Acenaphthene	mg/L	NS	0.99	–	–	–	–	–	–	–	–	–
bis(2-Ethylhexyl)phthalate	mg/L	NS	0.022	–	–	–	–	–	–	–	–	–
Diethyl phthalate	mg/L	NS	44	–	–	–	–	–	–	–	–	–
Fluoranthene	mg/L	NS	0.14	–	–	–	–	–	–	–	–	–
Naphthalene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Phenanthrene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Phenol	mg/L	NS	1,700	–	–	–	–	–	–	–	–	–
VOAs												
Acetone	mg/L	NS	NS	–	–	–	–	–	–	–	0.012	–
General Chemistry												
Alkalinity, Total (As CaCO3)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Ammonia	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Chemical Oxygen Demand (COI	mg/L	NS	NS	–	–	–	–	–	–	–	–	14
Chloride	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Conductivity	umhos/cm	NS	NS	–	–	–	–	–	–	–	–	4100
Dissolved Oxygen	mg/L	5.0	NS	–	–	–	–	–	–	–	–	–
Hardness	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Nitrate (as N)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Oxidation reduction potential	millivolts	NS	NS	–	–	–	–	–	–	–	–	–
pH	s.u.	NS	NS	9.88	7.95	8.48	6.16	6.49	6.48	12	–	11.75
Phenolics (Total)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Sulfate	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Temperature	deg F	NS	NS	–	–	–	–	–	–	–	–	–
Total Dissolved Solids (TDS)	mg/L	500	NS	–	–	–	–	–	–	–	–	–
Total Organic Carbon (TOC)	mg/L	NS	NS	–	–	–	–	–	–	–	–	8
Turbidity	NTU	NS	NS	–	–	–	–	–	–	–	–	–

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-6*	*SW-6*	*SW-6*	*SW-6*	*SW-6*	*SW-6*	*SW-6*	*SW-6*	*SW-6*
Sample ID:				*Location6*	*Location6*	*Location6*	*Location6*	*Location6*	*Location6*	*Location6*	*Location6*	*Location6*
Sample Date:				*4/11/1979*	*5/14/1979*	*6/11/1979*	*12/14/1979*	*1/16/1980*	*4/11/1980*	*7/8/1980*	*10/30/1980*	*4/7/1981*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*									
Metals												
Aluminum	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Antimony	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Arsenic	mg/L	0.340	NS	–	–	–	–	–	–	–	–	–
Barium	mg/L	NS	NS	0.10	0.10	0.10	0.15	0.1	0.1	0.3	ND(0.1)	0.29
Beryllium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Cadmium	mg/L	NCV[1]	NS	–	–	–	–	–	–	–	–	–
Calcium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Chromium Total	mg/L	NCV[2]	NS	0.23	0.30	0.13	0.07	0.19	0.25	0.16	0.06	0.144
Chromium VI (Hexavalent)	mg/L	0.016	NS	–	–	–	–	–	**0.18[a]**	–	ND(0.02)	**0.040[a]**
Cobalt	mg/L	0.110	NS	–	–	–	–	–	–	–	–	–
Copper	mg/L	NCV[3]	NS	–	–	–	–	–	–	–	–	–
Cyanide (total)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Iron	mg/L	0.300	NS	0.06	0.04	0.05	0.08	0.06	0.02	0.02	0.03	ND(0.05)
Lead	mg/L	NCV[4]	NS	–	–	–	–	–	–	–	–	–
Magnesium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Manganese	mg/L	NS	NS	0.01	0.01	ND(0.01)	ND(0.005)	0.02	0.01	0.02	0.02	ND(0.02)
Mercury	mg/L	0.0014	NS	–	–	–	–	–	–	–	–	–
Nickel	mg/L	NCV[5]	NS	–	–	–	–	–	–	–	–	–
Potassium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Selenium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Silicon	mg/L	NS	NS	1.5	1.6	4.4	–	0.5	0.8	0.6	0.9	0.70
Silver	mg/L	NCV[6]	NS	–	–	–	–	–	–	–	–	–
Sodium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Thallium	mg/L	0.020	NS	–	–	–	–	–	–	–	–	–
Vanadium	mg/L	0.190	NS	–	–	–	–	–	–	–	–	–
Zinc	mg/L	NCV[7]	NS	ND(0.005)	0.01	ND(0.01)	0.015	0.02	ND(0.01)	0.01	ND(0.01)	0.012

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-6*	*SW-6*	*SW-6*	*SW-6*	*SW-6*	*SW-6*	*SW-6*	*SW-6*	*SW-6*
Sample ID:				*Location6*	*Location6*	*Location6*	*Location6*	*Location6*	*Location6*	*Location6*	*Location6*	*Location6*
Sample Date:				*4/11/1979*	*5/14/1979*	*6/11/1979*	*12/14/1979*	*1/16/1980*	*4/11/1980*	*7/8/1980*	*10/30/1980*	*4/7/1981*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*									
SVOAs												
1,2,4-Trichlorobenzene	mg/L	NS	0.07	–	–	–	–	–	–	–	–	–
2,4-Dinitrophenol	mg/L	0.4	NS	–	–	–	–	–	–	–	–	–
2-Methylnaphthalene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
4-Methylphenol	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
4-Nitrophenol	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Acenaphthene	mg/L	NS	0.99	–	–	–	–	–	–	–	–	–
bis(2-Ethylhexyl)phthalate	mg/L	NS	0.022	–	–	–	–	–	–	–	–	–
Diethyl phthalate	mg/L	NS	44	–	–	–	–	–	–	–	–	–
Fluoranthene	mg/L	NS	0.14	–	–	–	–	–	–	–	–	–
Naphthalene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Phenanthrene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Phenol	mg/L	NS	1,700	–	–	–	–	–	–	–	–	–
VOAs												
Acetone	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
General Chemistry												
Alkalinity, Total (As CaCO3)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Ammonia	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Chemical Oxygen Demand (COI	mg/L	NS	NS	6	41	24	34	10	18	19	8	95.3
Chloride	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Conductivity	umhos/cm	NS	NS	4100	4000	3350	6000	6000	3700	4400	4300	4000
Dissolved Oxygen	mg/L	5.0	NS	–	–	–	–	–	–	–	–	–
Hardness	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Nitrate (as N)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Oxidation reduction potential	millivolts	NS	NS	–	–	–	–	–	–	–	–	–
pH	s.u.	NS	NS	12.05	11.55	11.85	11.40	12.30	11.70	11.30	12.10	12.05
Phenolics (Total)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Sulfate	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Temperature	deg F	NS	NS	–	–	–	–	–	–	–	–	–
Total Dissolved Solids (TDS)	mg/L	500	NS	–	–	–	**1310[a]**	**1230[a]**	**991[a]**	**1160[a]**	**856[a]**	**1104[a]**
Total Organic Carbon (TOC)	mg/L	NS	NS	7	2	8	8	15	16	10	8	18.3
Turbidity	NTU	NS	NS	–	–	–	–	–	–	–	–	–

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-6*	*SW-6*	*SW-6*	*SW-6*	*SW-6*	*SW-6*	*SW-6*	*SW-6*	*SW-6*
Sample ID:				*Location6*	*Location6*	*Location6*	*Location6*	*Location6*	*Location6*	*Location6*	*Location6*	*Location6*
Sample Date:				*6/22/1981*	*10/29/1981*	*1/6/1982*	*4/14/1982*	*3/1/1983*	*10/26/1983*	*2/24/1984*	*4/11/1984*	*1/8/1985*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*									
Metals												
Aluminum	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Antimony	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Arsenic	mg/L	0.340	NS	–	–	–	–	–	–	–	–	–
Barium	mg/L	NS	NS	ND(0.20)	–	ND(0.2)	0.250	ND(0.2)	–	4.9	0.12	0.137
Beryllium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Cadmium	mg/L	NCV(1)	NS	–	–	–	–	–	–	–	–	–
Calcium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Chromium Total	mg/L	NCV(2)	NS	0.033	–	0.248	0.195	0.023	–	0.33	–	0.135
Chromium VI (Hexavalent)	mg/L	0.016	NS	ND(0.005)	–	**0.042**[a]	**0.053**[a]	0.014	–	**0.17**[a]	–	**0.086**[a]
Cobalt	mg/L	0.110	NS	–	–	–	–	–	–	–	–	–
Copper	mg/L	NCV(3)	NS	–	–	–	–	–	–	–	–	–
Cyanide (total)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Iron	mg/L	0.300	NS	ND(0.05)	–	0.058	ND(0.050)	ND(0.05)	–	ND(0.05)	–	ND(0.050)
Lead	mg/L	NCV(4)	NS	–	–	–	–	–	–	–	–	–
Magnesium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Manganese	mg/L	NS	NS	ND(0.02)	–	ND(0.020)	ND(0.020)	ND(0.02)	–	0.017	–	ND(0.050)
Mercury	mg/L	0.0014	NS	–	–	–	–	–	–	–	–	–
Nickel	mg/L	NCV(5)	NS	–	–	–	–	–	–	–	–	–
Potassium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Selenium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Silicon	mg/L	NS	NS	3.4	–	2.5	1.80	1.61	–	2.1	–	ND(0.4)
Silver	mg/L	NCV(6)	NS	–	–	–	–	–	–	–	–	–
Sodium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Thallium	mg/L	0.020	NS	–	–	–	–	–	–	–	–	–
Vanadium	mg/L	0.190	NS	–	–	–	–	–	–	–	–	–
Zinc	mg/L	NCV(7)	NS	0.020	–	0.050	ND(0.010)	ND(0.050)	–	ND(0.02)	–	0.016

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-6*	*SW-6*	*SW-6*	*SW-6*	*SW-6*	*SW-6*	*SW-6*	*SW-6*	*SW-6*
Sample ID:				*Location6*	*Location6*	*Location6*	*Location6*	*Location6*	*Location6*	*Location6*	*Location6*	*Location6*
Sample Date:				*6/22/1981*	*10/29/1981*	*1/6/1982*	*4/14/1982*	*3/1/1983*	*10/26/1983*	*2/24/1984*	*4/11/1984*	*1/8/1985*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*									
SVOAs												
1,2,4-Trichlorobenzene	mg/L	NS	0.07	–	–	–	–	–	–	–	–	–
2,4-Dinitrophenol	mg/L	0.4	NS	–	–	–	–	–	–	–	–	–
2-Methylnaphthalene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
4-Methylphenol	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
4-Nitrophenol	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Acenaphthene	mg/L	NS	0.99	–	–	–	–	–	–	–	–	–
bis(2-Ethylhexyl)phthalate	mg/L	NS	0.022	–	–	–	–	–	–	–	–	–
Diethyl phthalate	mg/L	NS	44	–	–	–	–	–	–	–	–	–
Fluoranthene	mg/L	NS	0.14	–	–	–	–	–	–	–	–	–
Naphthalene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Phenanthrene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Phenol	mg/L	NS	1,700	–	–	–	–	–	–	–	–	–
VOAs												
Acetone	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
General Chemistry												
Alkalinity, Total (As CaCO3)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Ammonia	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Chemical Oxygen Demand (COI	mg/L	NS	NS	19.6	–	24.2	18.1	34.3	21.5	34.0	22.5	20
Chloride	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Conductivity	umhos/cm	NS	NS	135	–	2100	1450	2210	1460	2200	1200	2500
Dissolved Oxygen	mg/L	5.0	NS	–	–	–	–	–	–	–	–	–
Hardness	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Nitrate (as N)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Oxidation reduction potential	millivolts	NS	NS	–	–	–	–	–	–	–	–	–
pH	s.u.	NS	NS	9.10	11.30	–	11.05	11.18	11.99	12.29	11.68	12.27
Phenolics (Total)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Sulfate	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Temperature	deg F	NS	NS	–	–	–	–	–	–	–	–	–
Total Dissolved Solids (TDS)	mg/L	500	NS	62	–	**690[a]**	**658[a]**	**746[a]**	**506[a]**	**970[a]**	**1020[a]**	**1100[a]**
Total Organic Carbon (TOC)	mg/L	NS	NS	ND(1)	–	14.1	11.0	60.3	18.4	40.0	15.3	34
Turbidity	NTU	NS	NS	–	–	–	–	–	–	–	–	–

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-6*	*SW-6*	*SW-6*	*SW-6*	*SW-6*	*SW-6*	*SW-6*	*SW-6*	*SW-6A*
Sample ID:				*Location6*	*Location6*	*Location6*	*Location6*	*Location6*	*Location6*	*Location6*	*SW-6*	*Location6A*
Sample Date:				*4/3/1985*	*10/31/1985*	*1/23/1986*	*4/2/1986*	*8/4/1986*	*10/2/1986*	*4/15/1987*	*4/2/1989*	*1/16/1980*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*									
Metals												
Aluminum	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Antimony	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Arsenic	mg/L	0.340	NS	–	–	–	–	–	–	–	–	–
Barium	mg/L	NS	NS	–	–	–	0.113	–	–	0.085	–	0.1
Beryllium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Cadmium	mg/L	NCV[1]	NS	–	–	–	–	–	–	–	–	–
Calcium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Chromium Total	mg/L	NCV[2]	NS	–	–	–	0.179	–	–	0.103	–	0.30
Chromium VI (Hexavalent)	mg/L	0.016	NS	–	–	–	**0.116[a]**	–	–	**0.095[a]**	–	–
Cobalt	mg/L	0.110	NS	–	–	–	–	–	–	–	–	–
Copper	mg/L	NCV[3]	NS	–	–	–	–	–	–	–	–	–
Cyanide (total)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Iron	mg/L	0.300	NS	–	–	–	0.063	–	–	0.051	–	0.05
Lead	mg/L	NCV[4]	NS	–	–	–	–	–	–	–	–	–
Magnesium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Manganese	mg/L	NS	NS	–	–	–	ND(0.03)	–	–	ND(0.005)	–	ND(0.01)
Mercury	mg/L	0.0014	NS	–	–	–	–	–	–	–	–	–
Nickel	mg/L	NCV[5]	NS	–	–	–	–	–	–	–	–	–
Potassium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Selenium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Silicon	mg/L	NS	NS	–	–	–	1.59	–	–	2.27	–	0.6
Silver	mg/L	NCV[6]	NS	–	–	–	–	–	–	–	–	–
Sodium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Thallium	mg/L	0.020	NS	–	–	–	–	–	–	–	–	–
Vanadium	mg/L	0.190	NS	–	–	–	–	–	–	–	–	–
Zinc	mg/L	NCV[7]	NS	–	–	–	0.080	–	–	ND(0.01)	–	0.01

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-6*	*SW-6*	*SW-6*	*SW-6*	*SW-6*	*SW-6*	*SW-6*	*SW-6*	*SW-6A*
Sample ID:				*Location6*	*Location6*	*Location6*	*Location6*	*Location6*	*Location6*	*Location6*	*SW-6*	*Location6A*
Sample Date:				*4/3/1985*	*10/31/1985*	*1/23/1986*	*4/2/1986*	*8/4/1986*	*10/2/1986*	*4/15/1987*	*4/2/1989*	*1/16/1980*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*									
SVOAs												
1,2,4-Trichlorobenzene	mg/L	NS	0.07	–	–	–	–	–	–	–	–	–
2,4-Dinitrophenol	mg/L	0.4	NS	–	–	–	–	–	–	–	–	–
2-Methylnaphthalene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
4-Methylphenol	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
4-Nitrophenol	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Acenaphthene	mg/L	NS	0.99	–	–	–	–	–	–	–	–	–
bis(2-Ethylhexyl)phthalate	mg/L	NS	0.022	–	–	–	–	–	–	–	–	–
Diethyl phthalate	mg/L	NS	44	–	–	–	–	–	–	–	–	–
Fluoranthene	mg/L	NS	0.14	–	–	–	–	–	–	–	–	–
Naphthalene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Phenanthrene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Phenol	mg/L	NS	1,700	–	–	–	–	–	–	–	–	–
VOAs												
Acetone	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
General Chemistry												
Alkalinity, Total (As CaCO3)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Ammonia	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Chemical Oxygen Demand (COI	mg/L	NS	NS	110	83	18	36	50	30	33	–	10
Chloride	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Conductivity	umhos/cm	NS	NS	1600	240	2100	2800	320	540	2100	–	5500
Dissolved Oxygen	mg/L	5.0	NS	–	–	–	–	–	–	–	–	–
Hardness	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Nitrate (as N)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Oxidation reduction potential	millivolts	NS	NS	–	–	–	–	–	–	–	–	–
pH	s.u.	NS	NS	11.41	9.40	8.46	12.5	7.90	11.30	11.50	12.5	12.20
Phenolics (Total)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Sulfate	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Temperature	deg F	NS	NS	–	–	–	–	–	–	–	–	–
Total Dissolved Solids (TDS)	mg/L	500	NS	**540[a]**	180	**700[a]**	**840[a]**	230	190	**530[a]**	–	**1070[a]**
Total Organic Carbon (TOC)	mg/L	NS	NS	27	24	9.1	27	16	11	22	–	15
Turbidity	NTU	NS	NS	–	–	–	–	–	–	–	–	–

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*
Sample ID:				*Location6A*	*Location6A*	*Location6A*	*Location6A*	*Location6A*	*Location6A*	*Location6A*	*Location6A*	*Location6A*
Sample Date:				*4/11/1980*	*7/8/1980*	*10/30/1980*	*4/7/1981*	*6/22/1981*	*10/29/1981*	*1/6/1982*	*4/14/1982*	*3/1/1983*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*									
Metals												
Aluminum	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Antimony	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Arsenic	mg/L	0.340	NS	–	–	–	–	–	–	–	–	–
Barium	mg/L	NS	NS	0.1	0.4	ND(0.1)	0.21	0.26	ND(0.2)	ND(0.2)	–	ND(0.2)
Beryllium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Cadmium	mg/L	NCV[1]	NS	–	–	–	–	–	–	–	–	–
Calcium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Chromium Total	mg/L	NCV[2]	NS	0.39	0.72	0.19	0.300	0.158	0.658	0.461	0.469	0.599
Chromium VI (Hexavalent)	mg/L	0.016	NS	–	–	ND(0.02)	**0.100[a]**	**0.021[a]**	**0.426[a]**	**0.098[a]**	**0.243[a]**	**0.283[a]**
Cobalt	mg/L	0.110	NS	–	–	–	–	–	–	–	–	–
Copper	mg/L	NCV[3]	NS	–	–	–	–	–	–	–	–	–
Cyanide (total)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Iron	mg/L	0.300	NS	0.04	0.02	0.04	ND(0.05)	ND(0.05)	ND(0.05)	0.053	ND(0.050)	ND(0.05)
Lead	mg/L	NCV[4]	NS	–	–	–	–	–	–	–	–	–
Magnesium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Manganese	mg/L	NS	NS	0.01	0.01	0.02	ND(0.02)	ND(0.02)	0.020	ND(0.020)	ND(0.020)	ND(0.02)
Mercury	mg/L	0.0014	NS	–	–	–	–	–	–	–	–	–
Nickel	mg/L	NCV[5]	NS	–	–	–	–	–	–	–	–	–
Potassium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Selenium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Silicon	mg/L	NS	NS	0.05	1.1	1.5	3.6	6.0	0.2	3.5	2.50	1.71
Silver	mg/L	NCV[6]	NS	–	–	–	–	–	–	–	–	–
Sodium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Thallium	mg/L	0.020	NS	–	–	–	–	–	–	–	–	–
Vanadium	mg/L	0.190	NS	–	–	–	–	–	–	–	–	–
Zinc	mg/L	NCV[7]	NS	ND(0.01)	ND(0.01)	0.01	ND(0.01)	0.012	ND(0.050)	0.067	ND(0.010)	ND(0.050)

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*
Sample ID:				*Location6A*	*Location6A*	*Location6A*	*Location6A*	*Location6A*	*Location6A*	*Location6A*	*Location6A*	*Location6A*
Sample Date:				*4/11/1980*	*7/8/1980*	*10/30/1980*	*4/7/1981*	*6/22/1981*	*10/29/1981*	*1/6/1982*	*4/14/1982*	*3/1/1983*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*									
SVOAs												
1,2,4-Trichlorobenzene	mg/L	NS	0.07	–	–	–	–	–	–	–	–	–
2,4-Dinitrophenol	mg/L	0.4	NS	–	–	–	–	–	–	–	–	–
2-Methylnaphthalene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
4-Methylphenol	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
4-Nitrophenol	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Acenaphthene	mg/L	NS	0.99	–	–	–	–	–	–	–	–	–
bis(2-Ethylhexyl)phthalate	mg/L	NS	0.022	–	–	–	–	–	–	–	–	–
Diethyl phthalate	mg/L	NS	44	–	–	–	–	–	–	–	–	–
Fluoranthene	mg/L	NS	0.14	–	–	–	–	–	–	–	–	–
Naphthalene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Phenanthrene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Phenol	mg/L	NS	1,700	–	–	–	–	–	–	–	–	–
VOAs												
Acetone	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
General Chemistry												
Alkalinity, Total (As CaCO3)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Ammonia	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Chemical Oxygen Demand (COI	mg/L	NS	NS	10	9	6	18.9	19.6	35.1	44.4	13.6	29.9
Chloride	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Conductivity	umhos/cm	NS	NS	3650	4200	3200	2900	225	3400	2380	1900	1925
Dissolved Oxygen	mg/L	5.0	NS	–	–	–	–	–	–	–	–	–
Hardness	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Nitrate (as N)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Oxidation reduction potential	millivolts	NS	NS	–	–	–	–	–	–	–	–	–
pH	s.u.	NS	NS	11.75	11.55	11.90	11.91	10.05	11.40	11.25	11.15	11.15
Phenolics (Total)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Sulfate	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Temperature	deg F	NS	NS	–	–	–	–	–	–	–	–	–
Total Dissolved Solids (TDS)	mg/L	500	NS	**1410[a]**	**1140[a]**	**546[a]**	**858[a]**	118	125	**742[a]**	**798[a]**	**718[a]**
Total Organic Carbon (TOC)	mg/L	NS	NS	12	15	6	18.3	1	25	25.6	15.5	6.94
Turbidity	NTU	NS	NS	–	–	–	–	–	–	–	–	–

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*
Sample ID:				*Location6A*	*Location6A*	*Location6A*	*Location6A*	*Location6A*	*Location6A*	*Location6A*	*Location6A*	*Location6A*
Sample Date:				*10/26/1983*	*2/24/1984*	*4/11/1984*	*1/8/1985*	*4/3/1985*	*10/31/1985*	*4/2/1986*	*8/4/1986*	*10/2/1986*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*									
Metals												
Aluminum	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Antimony	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Arsenic	mg/L	0.340	NS	–	–	–	–	–	–	–	–	–
Barium	mg/L	NS	NS	–	6.3	0.06	0.180	–	–	0.275	–	–
Beryllium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Cadmium	mg/L	NCV(1)	NS	–	–	–	–	–	–	–	–	–
Calcium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Chromium Total	mg/L	NCV(2)	NS	–	0.21	–	0.305	–	–	0.463	–	–
Chromium VI (Hexavalent)	mg/L	0.016	NS	–	**0.10[a]**	–	**0.258[a]**	–	–	**0.450[a]**	–	–
Cobalt	mg/L	0.110	NS	–	–	–	–	–	–	–	–	–
Copper	mg/L	NCV(3)	NS	–	–	–	–	–	–	–	–	–
Cyanide (total)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Iron	mg/L	0.300	NS	–	ND(0.05)	–	0.215	–	–	0.159	–	–
Lead	mg/L	NCV(4)	NS	–	–	–	–	–	–	–	–	–
Magnesium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Manganese	mg/L	NS	NS	–	0.018	–	ND(0.050)	–	–	ND(0.03)	–	–
Mercury	mg/L	0.0014	NS	–	–	–	–	–	–	–	–	–
Nickel	mg/L	NCV(5)	NS	–	–	–	–	–	–	–	–	–
Potassium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Selenium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Silicon	mg/L	NS	NS	–	1.9	–	ND(0.4)	–	–	1.38	–	–
Silver	mg/L	NCV(6)	NS	–	–	–	–	–	–	–	–	–
Sodium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Thallium	mg/L	0.020	NS	–	–	–	–	–	–	–	–	–
Vanadium	mg/L	0.190	NS	–	–	–	–	–	–	–	–	–
Zinc	mg/L	NCV(7)	NS	–	ND(0.02)	–	0.016	–	–	0.105	–	–

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*
Sample ID:				*Location6A*	*Location6A*	*Location6A*	*Location6A*	*Location6A*	*Location6A*	*Location6A*	*Location6A*	*Location6A*
Sample Date:				*10/26/1983*	*2/24/1984*	*4/11/1984*	*1/8/1985*	*4/3/1985*	*10/31/1985*	*4/2/1986*	*8/4/1986*	*10/2/1986*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*									
SVOAs												
1,2,4-Trichlorobenzene	mg/L	NS	0.07	–	–	–	–	–	–	–	–	–
2,4-Dinitrophenol	mg/L	0.4	NS	–	–	–	–	–	–	–	–	–
2-Methylnaphthalene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
4-Methylphenol	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
4-Nitrophenol	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Acenaphthene	mg/L	NS	0.99	–	–	–	–	–	–	–	–	–
bis(2-Ethylhexyl)phthalate	mg/L	NS	0.022	–	–	–	–	–	–	–	–	–
Diethyl phthalate	mg/L	NS	44	–	–	–	–	–	–	–	–	–
Fluoranthene	mg/L	NS	0.14	–	–	–	–	–	–	–	–	–
Naphthalene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Phenanthrene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Phenol	mg/L	NS	1,700	–	–	–	–	–	–	–	–	–
VOAs												
Acetone	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
General Chemistry												
Alkalinity, Total (As CaCO3)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Ammonia	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Chemical Oxygen Demand (COI	mg/L	NS	NS	21.9	75.3	23	25	18	29	28	45	27
Chloride	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Conductivity	umhos/cm	NS	NS	1760	2700	880	2200	1500	2800	4300	310	1900
Dissolved Oxygen	mg/L	5.0	NS	–	–	–	–	–	–	–	–	–
Hardness	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Nitrate (as N)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Oxidation reduction potential	millivolts	NS	NS	–	–	–	–	–	–	–	–	–
pH	s.u.	NS	NS	12.06	12.4	11.67	12.48	11.48	11.54	12.3	12.45	12.00
Phenolics (Total)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Sulfate	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Temperature	deg F	NS	NS	–	–	–	–	–	–	–	–	–
Total Dissolved Solids (TDS)	mg/L	500	NS	**662[a]**	**1100[a]**	**920[a]**	**870[a]**	**530[a]**	**720[a]**	**1100[a]**	**1200[a]**	**520[a]**
Total Organic Carbon (TOC)	mg/L	NS	NS	12.0	33.0	7.6	31	22	ND(10)	26	8	16
Turbidity	NTU	NS	NS	–	–	–	–	–	–	–	–	–

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*
Sample ID:				*Location6A*	*SW-6A*	*Point 6A*	*SW-6A*	*Point 6A*	*Point 6A*	*Point 6A*	*Point 6A*	*Point 6A*
Sample Date:				*4/15/1987*	*1/19/1989*	*6/1/1989*	*1/11/1990*	*12/1/1992*	*6/30/1993*	*12/7/1993*	*3/23/1994*	*6/28/1994*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*									
Metals												
Aluminum	mg/L	NS	NS	–	–	–	–	–	0.2	–	–	–
Antimony	mg/L	NS	NS	–	–	–	–	–	ND(0.05)	–	–	–
Arsenic	mg/L	0.340	NS	–	–	–	–	–	ND(0.005)	–	–	–
Barium	mg/L	NS	NS	0.226	–	–	–	–	0.4	–	–	–
Beryllium	mg/L	NS	NS	–	–	–	–	–	ND(0.005)	–	–	–
Cadmium	mg/L	NCV[1]	NS	–	–	–	–	–	ND(0.005)	ND(0.001)	ND(0.0005)	ND(0.0005)
Calcium	mg/L	NS	NS	–	–	–	–	–	810	126	82	330
Chromium Total	mg/L	NCV[2]	NS	0.333	–	0.18	–	0.16	0.92	–	–	–
Chromium VI (Hexavalent)	mg/L	0.016	NS	**0.306[a]**	–	**0.2[a]**	–	**0.11[a]**	**0.84[a]**	–	–	–
Cobalt	mg/L	0.110	NS	–	–	–	–	–	–	–	–	–
Copper	mg/L	NCV[3]	NS	–	–	–	–	–	ND(0.01)	–	–	–
Cyanide (total)	mg/L	NS	NS	–	–	–	–	–	ND(0.010)	–	–	–
Iron	mg/L	0.300	NS	**0.308[a]**	–	–	–	–	**0.31[a]**	**0.46[a]**	0.1	**1.4[a]**
Lead	mg/L	NCV[4]	NS	–	–	–	–	–	ND(0.005)	ND(0.005)	ND(0.005)	0.014
Magnesium	mg/L	NS	NS	–	–	–	–	–	1.3	6.1	3.8	3.9
Manganese	mg/L	NS	NS	0.021	–	–	–	–	0.03	ND(0.005)	0.02	0.09
Mercury	mg/L	0.0014	NS	–	–	–	–	–	ND(0.001)	–	–	–
Nickel	mg/L	NCV[5]	NS	–	–	–	–	–	ND(0.02)	–	–	–
Potassium	mg/L	NS	NS	–	–	–	–	–	64	30	15	37
Selenium	mg/L	NS	NS	–	–	–	–	–	0.04	–	–	–
Silicon	mg/L	NS	NS	2.22	–	–	–	–	–	–	–	–
Silver	mg/L	NCV[6]	NS	–	–	–	–	–	ND(0.005)	–	–	–
Sodium	mg/L	NS	NS	–	–	–	–	–	77	37	44	60
Thallium	mg/L	0.020	NS	–	–	–	–	–	ND(0.05)	–	–	–
Vanadium	mg/L	0.190	NS	–	–	–	–	–	–	–	–	–
Zinc	mg/L	NCV[7]	NS	0.011	–	–	–	–	0.13	–	–	–

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*
Sample ID:				*Location6A*	*SW-6A*	*Point 6A*	*SW-6A*	*Point 6A*	*Point 6A*	*Point 6A*	*Point 6A*	*Point 6A*
Sample Date:				*4/15/1987*	*1/19/1989*	*6/1/1989*	*1/11/1990*	*12/1/1992*	*6/30/1993*	*12/7/1993*	*3/23/1994*	*6/28/1994*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*									
SVOAs												
1,2,4-Trichlorobenzene	mg/L	NS	0.07	–	–	–	–	–	–	–	–	–
2,4-Dinitrophenol	mg/L	0.4	NS	–	–	–	–	–	–	–	–	–
2-Methylnaphthalene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
4-Methylphenol	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
4-Nitrophenol	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Acenaphthene	mg/L	NS	0.99	–	–	–	–	–	–	–	–	–
bis(2-Ethylhexyl)phthalate	mg/L	NS	0.022	–	–	–	–	–	–	–	–	–
Diethyl phthalate	mg/L	NS	44	–	–	–	–	–	–	–	–	–
Fluoranthene	mg/L	NS	0.14	–	–	–	–	–	–	–	–	–
Naphthalene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Phenanthrene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Phenol	mg/L	NS	1,700	–	–	–	–	–	–	–	–	–
VOAs												
Acetone	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
General Chemistry												
Alkalinity, Total (As CaCO3)	mg/L	NS	NS	–	–	–	–	–	1600	250	210	460
Ammonia	mg/L	NS	NS	–	–	–	–	–	5	ND(0.05)	1.5	3.4
Chemical Oxygen Demand (COI	mg/L	NS	NS	27	–	–	–	–	23.2	23.35	7.4	30
Chloride	mg/L	NS	NS	–	–	–	–	–	42	32	55	55
Conductivity	umhos/cm	NS	NS	3400	–	–	–	–	7500	1175	1125	1950
Dissolved Oxygen	mg/L	5.0	NS	–	–	–	–	–	1.74 *	–	**9.06[a]**	3.66
Hardness	mg/L	NS	NS	–	–	–	–	–	2000	975	220	841
Nitrate (as N)	mg/L	NS	NS	–	–	–	–	–	0.3	0.32	0.3	0.8
Oxidation reduction potential	millivolts	NS	NS	–	–	–	–	-25	-132	-73	-15	-78
pH	s.u.	NS	NS	11.40	12.69	11.61	12.5	11.71	12.53	12.09	12.13	12.31
Phenolics (Total)	mg/L	NS	NS	–	–	–	–	–	0.032	0.009	0.009	0.026
Sulfate	mg/L	NS	NS	–	–	–	–	–	16	10.8	42	26
Temperature	deg F	NS	NS	–	–	–	–	–	60	40	44	74
Total Dissolved Solids (TDS)	mg/L	500	NS	**960[a]**	–	–	–	–	**1600[a]**	400	350	**570[a]**
Total Organic Carbon (TOC)	mg/L	NS	NS	20	–	–	–	–	5.73	7.59	6	9.6
Turbidity	NTU	NS	NS	–	–	–	–	–	21.5	6.08	18.5	115

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*
Sample ID:				*Point 6A*	*Point 6A*	*Point 6A*	*Point 6A*	*Point 6A*	*Point 6A*	*Point 6A*	*Point 6A*	*Point 6A*
Sample Date:				*9/20/1994*	*3/16/1995*	*6/6/1995*	*10/27/1995*	*12/13/1995*	*1/25/1996*	*4/19/1996*	*7/11/1996*	*11/1/1996*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*									
Metals												
Aluminum	mg/L	NS	NS	–	–	–	–	ND(0.05)	–	0.18	–	–
Antimony	mg/L	NS	NS	–	–	–	–	ND(0.05)	–	ND(0.05)	–	–
Arsenic	mg/L	0.340	NS	–	–	–	–	ND(0.002)	–	ND(0.005)	–	–
Barium	mg/L	NS	NS	–	–	–	–	0.24	–	0.18	–	–
Beryllium	mg/L	NS	NS	–	–	–	–	ND(0.005)	–	ND(0.005)	–	–
Cadmium	mg/L	NCV[1]	NS	ND(0.005)	ND(0.0005)	ND(0.0002)	ND(0.0002)	ND(0.005)	ND(0.0005)	ND(0.005)	ND(0.001)	–
Calcium	mg/L	NS	NS	588	127	71	300	376	250	280	440 D	120 D
Chromium Total	mg/L	NCV[2]	NS	–	–	–	–	1.5	–	0.44	–	–
Chromium VI (Hexavalent)	mg/L	0.016	NS	–	–	–	–	**0.57[a]**	–	**0.36[a]**	–	ND(0.32)
Cobalt	mg/L	0.110	NS	–	–	–	–	–	–	–	–	–
Copper	mg/L	NCV[3]	NS	–	–	–	–	ND(0.01)	–	0.01	–	–
Cyanide (total)	mg/L	NS	NS	–	–	–	–	ND(0.010)	–	ND(0.08)	–	–
Iron	mg/L	0.300	NS	0.07	0.05	0.05	**0.42[a]**	**4.6[a]**	0.16	**1[a]**	0.15	0.09
Lead	mg/L	NCV[4]	NS	0.015	ND(0.005)	0.008	0.005	ND(0.002)	0.002	0.006	ND(0.005)	ND(0.005)
Magnesium	mg/L	NS	NS	0.08	3.7	1.9	2.9	376	1	1.6	1.1	ND(0.05)
Manganese	mg/L	NS	NS	ND(0.005)	0.01	0.009	0.03	0.1	0.01	0.04	0.012	ND(0.005)
Mercury	mg/L	0.0014	NS	–	–	–	–	ND(0.0005)	–	ND(0.001)	–	–
Nickel	mg/L	NCV[5]	NS	–	–	–	–	0.48	–	ND(0.02)	–	–
Potassium	mg/L	NS	NS	54	23	64	33	38	29	30	65	23
Selenium	mg/L	NS	NS	–	–	–	–	ND(0.002)	–	ND(0.005)	–	–
Silicon	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Silver	mg/L	NCV[6]	NS	–	–	–	–	ND(0.005)	–	ND(0.005)	–	–
Sodium	mg/L	NS	NS	72	86	74	47	72	55	64	66	33
Thallium	mg/L	0.020	NS	–	–	–	–	**0.05[a]**	–	ND(0.05)	–	–
Vanadium	mg/L	0.190	NS	–	–	–	–	–	–	–	–	–
Zinc	mg/L	NCV[7]	NS	–	–	–	–	ND(0.02)	–	ND(0.02)	–	–

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*
Sample ID:				*Point 6A*	*Point 6A*	*Point 6A*	*Point 6A*	*Point 6A*	*Point 6A*	*Point 6A*	*Point 6A*	*Point 6A*
Sample Date:				*9/20/1994*	*3/16/1995*	*6/6/1995*	*10/27/1995*	*12/13/1995*	*1/25/1996*	*4/19/1996*	*7/11/1996*	*11/1/1996*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*									
SVOAs												
1,2,4-Trichlorobenzene	mg/L	NS	0.07	–	–	–	–	–	–	–	–	–
2,4-Dinitrophenol	mg/L	0.4	NS	–	–	–	–	–	–	–	–	–
2-Methylnaphthalene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
4-Methylphenol	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
4-Nitrophenol	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Acenaphthene	mg/L	NS	0.99	–	–	–	–	–	–	–	–	–
bis(2-Ethylhexyl)phthalate	mg/L	NS	0.022	–	–	–	–	–	–	–	–	–
Diethyl phthalate	mg/L	NS	44	–	–	–	–	–	–	–	–	–
Fluoranthene	mg/L	NS	0.14	–	–	–	–	–	–	–	–	–
Naphthalene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Phenanthrene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Phenol	mg/L	NS	1,700	–	–	–	–	–	–	–	–	–
VOAs												
Acetone	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
General Chemistry												
Alkalinity, Total (As CaCO3)	mg/L	NS	NS	1700	310	1600	660	1100	590	410	1600	400
Ammonia	mg/L	NS	NS	4.6	3.9	9.4	3.5	4.2	2.6	2.5	2.9 D	2.1
Chemical Oxygen Demand (COI	mg/L	NS	NS	21	33	14	29	20	27	9.3	ND(5.0)	18
Chloride	mg/L	NS	NS	73	130	38	430	60	43	60	31 D	38
Conductivity	umhos/cm	NS	NS	7000	1180	8070	4070	4600	3530	2710	8050	2300
Dissolved Oxygen	mg/L	5.0	NS	1.26	**6.1[a]**	2.7	**5.9[a]**	**6.61[a]**	**9.17[a]**	**7.3[a]**	2.16	**7.6[a]**
Hardness	mg/L	NS	NS	1470	333	188	760	940	630	706	1100	300
Nitrate (as N)	mg/L	NS	NS	0.8	0.35	1.5	0.3	0.2	0.69	0.34	0.22	0.30 D
Oxidation reduction potential	millivolts	NS	NS	-108	-86	-101	-95	-312	-68	-57	153	-30
pH	s.u.	NS	NS	12.67	13.2	12.35	11.99 *	12.6	12.92	13.6	12.91	11.65
Phenolics (Total)	mg/L	NS	NS	0.04	0.012	0.018	0.01	0.013	0.01	0.009	0.02	ND(0.004)
Sulfate	mg/L	NS	NS	13	48	18	24	21	21	35	16	47 D
Temperature	deg F	NS	NS	66	57	85	52	23	35	58	78	47
Total Dissolved Solids (TDS)	mg/L	500	NS	**1600[a]**	**630[a]**	**1600[a]**	**1000[a]**	**1200[a]**	**830[a]**	**830[a]**	**1700[a]**	**644[a]**
Total Organic Carbon (TOC)	mg/L	NS	NS	5.6	8.6	6.5	8.3	5.6	5.9	8.2	11	8.3
Turbidity	NTU	NS	NS	14.5	8.8	16.9	31	23	11	74	4	7

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*
Sample ID:				*Point 6A*	*Point 6A*	*Point 6A*	*Point 6A*	*Location7*	*Location7*	*Location7*	*Location7*	*Location7*
Sample Date:				*1/30/1997*	*4/30/1997*	*10/23/1997*	*1/22/1998*	*3/7/1979*	*4/11/1979*	*5/14/1979*	*6/11/1979*	*12/14/1979*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*									
Metals												
Aluminum	mg/L	NS	NS	–	–	0.23	ND(0.10)	–	–	–	–	–
Antimony	mg/L	NS	NS	–	–	ND(0.24)	ND(0.24)	–	–	–	–	–
Arsenic	mg/L	0.340	NS	–	–	ND(0.002)	ND(0.002)	–	–	–	–	–
Barium	mg/L	NS	NS	–	–	0.178	0.382	0.05	0.10	0.20	0.20	0.15
Beryllium	mg/L	NS	NS	–	–	ND(0.002)	ND(0.002)	–	–	–	–	–
Cadmium	mg/L	NCV[1]	NS	ND(0.001)	ND(0.001)	ND(0.016)	ND(0.016)	–	–	–	–	–
Calcium	mg/L	NS	NS	410 D	230 D	180 D	410 D	–	–	–	–	–
Chromium Total	mg/L	NCV[2]	NS	–	–	0.530	0.55	0.48	0.59	0.95	1.1	0.17
Chromium VI (Hexavalent)	mg/L	0.016	NS	**0.42**[a]	**0.28**[a]	**0.54**[a]	**0.56**[a]	–	–	–	–	–
Cobalt	mg/L	0.110	NS	–	–	–	–	–	–	–	–	–
Copper	mg/L	NCV[3]	NS	–	–	0.013	ND(0.010)	–	–	–	–	–
Cyanide (total)	mg/L	NS	NS	–	–	ND(0.04)	ND(0.4) **	–	–	–	–	–
Iron	mg/L	0.300	NS	**0.45**[a]	0.16	0.152	ND(0.060)	0.06	0.18	0.02	0.02	0.12
Lead	mg/L	NCV[4]	NS	ND(0.005)	ND(0.005)	ND(0.002)	ND(0.002)	–	–	–	–	–
Magnesium	mg/L	NS	NS	0.4	1.9	0.65	0.50	–	–	–	–	–
Manganese	mg/L	NS	NS	0.007	0.007	ND(0.010)	ND(0.010)	0.01	0.03	0.01	ND(0.01)	ND(0.005)
Mercury	mg/L	0.0014	NS	–	–	ND(0.0004)	ND(0.0004)	–	–	–	–	–
Nickel	mg/L	NCV[5]	NS	–	–	ND(0.050)	ND(0.050)	–	–	–	–	–
Potassium	mg/L	NS	NS	87	33	26	77	–	–	–	–	–
Selenium	mg/L	NS	NS	–	–	0.009	0.015	–	–	–	–	–
Silicon	mg/L	NS	NS	–	–	–	–	3.3	5.0	2.5	0.8	–
Silver	mg/L	NCV[6]	NS	–	–	ND(0.010)	ND(0.010)	–	–	–	–	–
Sodium	mg/L	NS	NS	70	75	39	64	–	–	–	–	–
Thallium	mg/L	0.020	NS	–	–	ND(0.05)	ND(0.05)	–	–	–	–	–
Vanadium	mg/L	0.190	NS	–	–	–	–	–	–	–	–	–
Zinc	mg/L	NCV[7]	NS	–	–	ND(0.016)	ND(0.016)	0.01	0.01	0.01	ND(0.01)	0.015

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-6A*	*SW-6A*	*SW-6A*	*SW-6A*	*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*
Sample ID:				*Point 6A*	*Point 6A*	*Point 6A*	*Point 6A*	*Location7*	*Location7*	*Location7*	*Location7*	*Location7*
Sample Date:				*1/30/1997*	*4/30/1997*	*10/23/1997*	*1/22/1998*	*3/7/1979*	*4/11/1979*	*5/14/1979*	*6/11/1979*	*12/14/1979*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*									
SVOAs												
1,2,4-Trichlorobenzene	mg/L	NS	0.07	–	–	–	–	–	–	–	–	–
2,4-Dinitrophenol	mg/L	0.4	NS	–	–	–	–	–	–	–	–	–
2-Methylnaphthalene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
4-Methylphenol	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
4-Nitrophenol	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Acenaphthene	mg/L	NS	0.99	–	–	–	–	–	–	–	–	–
bis(2-Ethylhexyl)phthalate	mg/L	NS	0.022	–	–	–	–	–	–	–	–	–
Diethyl phthalate	mg/L	NS	44	–	–	–	–	–	–	–	–	–
Fluoranthene	mg/L	NS	0.14	–	–	–	–	–	–	–	–	–
Naphthalene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Phenanthrene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Phenol	mg/L	NS	1,700	–	–	–	–	–	–	–	–	–
VOAs												
Acetone	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
General Chemistry												
Alkalinity, Total (As CaCO3)	mg/L	NS	NS	1150	735	330	1140	–	–	–	–	–
Ammonia	mg/L	NS	NS	14.2	1.5	1.2	7.9	–	–	–	–	–
Chemical Oxygen Demand (COI	mg/L	NS	NS	31	23	12	16	19	10	22	28	22
Chloride	mg/L	NS	NS	0.46 D	102 D	50 D	40 D	–	–	–	–	–
Conductivity	umhos/cm	NS	NS	6250	4550	2450	4900	3500	2800	3950	7000	6000
Dissolved Oxygen	mg/L	5.0	NS	2.51	**7.99[a]**	**6.04[a]**	**6.54[a]**	–	–	–	–	–
Hardness	mg/L	NS	NS	1000	570	450	1020	–	–	–	–	–
Nitrate (as N)	mg/L	NS	NS	3.32	0.06	6.8 D	2.7 D	–	–	–	–	–
Oxidation reduction potential	millivolts	NS	NS	-25	-150	-134	-168	–	–	–	–	–
pH	s.u.	NS	NS	12.67	12.37	12.24	12.35	11.70	11.80	11.60	12.10	11.40
Phenolics (Total)	mg/L	NS	NS	0.018	0.007	0.01	0.015	–	–	–	–	–
Sulfate	mg/L	NS	NS	84 D	54 D	31	104 D	–	–	–	–	–
Temperature	deg F	NS	NS	34	58	36	40	–	–	–	–	–
Total Dissolved Solids (TDS)	mg/L	500	NS	**1310[a]**	**992[a]**	**592[a]**	**1340[a]**	–	–	–	–	–
Total Organic Carbon (TOC)	mg/L	NS	NS	6.2	7.6	6.5	4.6	10	8	12	9	8
Turbidity	NTU	NS	NS	14	12	48	8	–	–	–	–	–

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*
Sample ID:				*Location7*	*Location7*	*Location7*	*Location7*	*Location7*	*Location7*	*Location7*	*Location7*	*Location7*
Sample Date:				*1/16/1980*	*4/11/1980*	*7/8/1980*	*10/30/1980*	*4/7/1981*	*6/22/1981*	*10/29/1981*	*1/6/1982*	*4/14/1982*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*									
Metals												
Aluminum	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Antimony	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Arsenic	mg/L	0.340	NS	–	–	–	–	–	–	–	–	–
Barium	mg/L	NS	NS	ND(0.1)	0.2	0.9	0.5	0.37	0.40	ND(0.2)	ND(0.2)	0.214
Beryllium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Cadmium	mg/L	NCV[1]	NS	–	–	–	–	–	–	–	–	–
Calcium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Chromium Total	mg/L	NCV[2]	NS	0.35	1.6	2.2	0.82	1.73	0.384	1.800	0.438	1.25
Chromium VI (Hexavalent)	mg/L	0.016	NS	–	–	–	**0.03[a]**	**1.27[a]**	**0.130[a]**	**0.860[a]**	**0.114[a]**	**0.851[a]**
Cobalt	mg/L	0.110	NS	–	–	–	–	–	–	–	–	–
Copper	mg/L	NCV[3]	NS	–	–	–	–	–	–	–	–	–
Cyanide (total)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Iron	mg/L	0.300	NS	0.06	0.02	ND(0.02)	0.07	ND(0.05)	ND(0.05)	ND(0.05)	0.066	ND(0.050)
Lead	mg/L	NCV[4]	NS	–	–	–	–	–	–	–	–	–
Magnesium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Manganese	mg/L	NS	NS	ND(0.01)	ND(0.01)	ND(0.01)	0.02	ND(0.02)	ND(0.02)	0.022	ND(0.020)	ND(0.020)
Mercury	mg/L	0.0014	NS	–	–	–	–	–	–	–	–	–
Nickel	mg/L	NCV[5]	NS	–	–	–	–	–	–	–	–	–
Potassium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Selenium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Silicon	mg/L	NS	NS	0.5	0.05	ND(0.01)	0.5	0.50	6.4	0.2	3.0	1.30
Silver	mg/L	NCV[6]	NS	–	–	–	–	–	–	–	–	–
Sodium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Thallium	mg/L	0.020	NS	–	–	–	–	–	–	–	–	–
Vanadium	mg/L	0.190	NS	–	–	–	–	–	–	–	–	–
Zinc	mg/L	NCV[7]	NS	0.01	0.02	ND(0.01)	0.01	ND(0.01)	ND(0.010)	ND(0.05)	0.029	ND(0.010)

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*
Sample ID:				*Location7*	*Location7*	*Location7*	*Location7*	*Location7*	*Location7*	*Location7*	*Location7*	*Location7*
Sample Date:				*1/16/1980*	*4/11/1980*	*7/8/1980*	*10/30/1980*	*4/7/1981*	*6/22/1981*	*10/29/1981*	*1/6/1982*	*4/14/1982*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*									
SVOAs												
1,2,4-Trichlorobenzene	mg/L	NS	0.07	–	–	–	–	–	–	–	–	–
2,4-Dinitrophenol	mg/L	0.4	NS	–	–	–	–	–	–	–	–	–
2-Methylnaphthalene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
4-Methylphenol	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
4-Nitrophenol	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Acenaphthene	mg/L	NS	0.99	–	–	–	–	–	–	–	–	–
bis(2-Ethylhexyl)phthalate	mg/L	NS	0.022	–	–	–	–	–	–	–	–	–
Diethyl phthalate	mg/L	NS	44	–	–	–	–	–	–	–	–	–
Fluoranthene	mg/L	NS	0.14	–	–	–	–	–	–	–	–	–
Naphthalene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Phenanthrene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Phenol	mg/L	NS	1,700	–	–	–	–	–	–	–	–	–
VOAs												
Acetone	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
General Chemistry												
Alkalinity, Total (As CaCO3)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Ammonia	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Chemical Oxygen Demand (COI	mg/L	NS	NS	22	12	17	2	45.4	14.5	38	52.5	11.3
Chloride	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Conductivity	umhos/cm	NS	NS	7000	3800	7800	7500	6100	630	4700	2170	2400
Dissolved Oxygen	mg/L	5.0	NS	–	–	–	–	–	–	–	–	–
Hardness	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Nitrate (as N)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Oxidation reduction potential	millivolts	NS	NS	–	–	–	–	–	–	–	–	–
pH	s.u.	NS	NS	12.30	11.75	11.65	12.30	12.05	10.77	11.52	11.35	11.20
Phenolics (Total)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Sulfate	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Temperature	deg F	NS	NS	–	–	–	–	–	–	–	–	–
Total Dissolved Solids (TDS)	mg/L	500	NS	**1440[a]**	**1520[a]**	**1950[a]**	**1520[a]**	**1804[a]**	268	290	**680[a]**	**1044[a]**
Total Organic Carbon (TOC)	mg/L	NS	NS	12	14	15	8	27.4	1.0	37	24.1	36.5
Turbidity	NTU	NS	NS	–	–	–	–	–	–	–	–	–

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*
Sample ID:				*Location7*	*Location7*	*Location7*	*Location7*	*Location7*	*Location7*	*Location7*	*Location7*	*Location7*
Sample Date:				*3/1/1983*	*10/26/1983*	*2/24/1984*	*4/11/1984*	*1/8/1985*	*4/3/1985*	*7/25/1985*	*10/31/1985*	*1/23/1986*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*									
Metals												
Aluminum	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Antimony	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Arsenic	mg/L	0.340	NS	–	–	–	–	–	–	–	–	–
Barium	mg/L	NS	NS	ND(0.2)	–	4.9	0.06	0.276	–	–	–	–
Beryllium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Cadmium	mg/L	NCV[1]	NS	–	–	–	–	–	–	–	–	–
Calcium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Chromium Total	mg/L	NCV[2]	NS	2.640	–	0.88	–	0.927	–	–	–	–
Chromium VI (Hexavalent)	mg/L	0.016	NS	**0.980[a]**	–	**0.55[a]**	–	**0.561[a]**	–	–	–	–
Cobalt	mg/L	0.110	NS	–	–	–	–	–	–	–	–	–
Copper	mg/L	NCV[3]	NS	–	–	–	–	–	–	–	–	–
Cyanide (total)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Iron	mg/L	0.300	NS	ND(0.05)	–	ND(0.05)	–	ND(0.050)	–	–	–	–
Lead	mg/L	NCV[4]	NS	–	–	–	–	–	–	–	–	–
Magnesium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Manganese	mg/L	NS	NS	ND(0.05)	–	0.014	–	ND(0.050)	–	–	–	–
Mercury	mg/L	0.0014	NS	–	–	–	–	–	–	–	–	–
Nickel	mg/L	NCV[5]	NS	–	–	–	–	–	–	–	–	–
Potassium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Selenium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Silicon	mg/L	NS	NS	2.9	–	1.9	–	ND(0.4)	–	–	–	–
Silver	mg/L	NCV[6]	NS	–	–	–	–	–	–	–	–	–
Sodium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Thallium	mg/L	0.020	NS	–	–	–	–	–	–	–	–	–
Vanadium	mg/L	0.190	NS	–	–	–	–	–	–	–	–	–
Zinc	mg/L	NCV[7]	NS	ND(0.050)	–	ND(0.02)	–	0.009	–	–	–	–

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*
Sample ID:				*Location7*	*Location7*	*Location7*	*Location7*	*Location7*	*Location7*	*Location7*	*Location7*	*Location7*
Sample Date:				*3/1/1983*	*10/26/1983*	*2/24/1984*	*4/11/1984*	*1/8/1985*	*4/3/1985*	*7/25/1985*	*10/31/1985*	*1/23/1986*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*									
SVOAs												
1,2,4-Trichlorobenzene	mg/L	NS	0.07	–	–	–	–	–	–	–	–	–
2,4-Dinitrophenol	mg/L	0.4	NS	–	–	–	–	–	–	–	–	–
2-Methylnaphthalene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
4-Methylphenol	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
4-Nitrophenol	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Acenaphthene	mg/L	NS	0.99	–	–	–	–	–	–	–	–	–
bis(2-Ethylhexyl)phthalate	mg/L	NS	0.022	–	–	–	–	–	–	–	–	–
Diethyl phthalate	mg/L	NS	44	–	–	–	–	–	–	–	–	–
Fluoranthene	mg/L	NS	0.14	–	–	–	–	–	–	–	–	–
Naphthalene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Phenanthrene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Phenol	mg/L	NS	1,700	–	–	–	–	–	–	–	–	–
VOAs												
Acetone	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
General Chemistry												
Alkalinity, Total (As CaCO3)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Ammonia	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Chemical Oxygen Demand (COI	mg/L	NS	NS	25.5	18.8	15.7	32	15	4.1	54	22	26
Chloride	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Conductivity	umhos/cm	NS	NS	5300	2840	2700	900	3700	1500	6800	1800	3600
Dissolved Oxygen	mg/L	5.0	NS	–	–	–	–	–	–	–	–	–
Hardness	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Nitrate (as N)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Oxidation reduction potential	millivolts	NS	NS	–	–	–	–	–	–	–	–	–
pH	s.u.	NS	NS	11.55	12.29	12.36	11.71	7.69	11.43	12.22	11.70	12.12
Phenolics (Total)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Sulfate	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Temperature	deg F	NS	NS	–	–	–	–	–	–	–	–	–
Total Dissolved Solids (TDS)	mg/L	500	NS	**1694[a]**	**944[a]**	**1030[a]**	**900[a]**	**1500[a]**	500	**1700[a]**	**850[a]**	**1100[a]**
Total Organic Carbon (TOC)	mg/L	NS	NS	6.54	13.2	9.2	9.8	40	25	13	18	8.3
Turbidity	NTU	NS	NS	–	–	–	–	–	–	–	–	–

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*
Sample ID:				*Location7*	*Location7*	*SW-7*	*Location7*	*Location7*	*Point 7*	*Point 7*	*Point 7*	*Point 7*
Sample Date:				*4/2/1986*	*8/4/1986*	*8/4/1986*	*10/2/1986*	*4/15/1987*	*6/1/1989*	*8/1/1989*	*12/1/1992*	*12/7/1993*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*									
Metals												
Aluminum	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Antimony	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Arsenic	mg/L	0.340	NS	–	–	–	–	–	–	–	–	–
Barium	mg/L	NS	NS	0.181	–	–	–	0.148	–	–	–	–
Beryllium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Cadmium	mg/L	NCV(1)	NS	–	–	–	–	–	–	–	–	ND(0.001)
Calcium	mg/L	NS	NS	–	–	–	–	–	–	–	–	170
Chromium Total	mg/L	NCV(2)	NS	0.403	–	–	–	0.281	0.23	0.23	0.34	–
Chromium VI (Hexavalent)	mg/L	0.016	NS	**0.371[a]**	–	–	–	**0.244[a]**	**0.36[a]**	**0.36[a]**	**0.2[a]**	–
Cobalt	mg/L	0.110	NS	–	–	–	–	–	–	–	–	–
Copper	mg/L	NCV(3)	NS	–	–	–	–	–	–	–	–	–
Cyanide (total)	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Iron	mg/L	0.300	NS	0.202	–	–	–	**0.481[a]**	–	–	–	0.09
Lead	mg/L	NCV(4)	NS	–	–	–	–	–	–	–	–	ND(0.005)
Magnesium	mg/L	NS	NS	–	–	–	–	–	–	–	–	2
Manganese	mg/L	NS	NS	ND(0.03)	–	–	–	0.064	–	–	–	ND(0.005)
Mercury	mg/L	0.0014	NS	–	–	–	–	–	–	–	–	–
Nickel	mg/L	NCV(5)	NS	–	–	–	–	–	–	–	–	–
Potassium	mg/L	NS	NS	–	–	–	–	–	–	–	–	17
Selenium	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Silicon	mg/L	NS	NS	1.62	–	–	–	2.74	–	–	–	–
Silver	mg/L	NCV(6)	NS	–	–	–	–	–	–	–	–	–
Sodium	mg/L	NS	NS	–	–	–	–	–	–	–	–	41
Thallium	mg/L	0.020	NS	–	–	–	–	–	–	–	–	–
Vanadium	mg/L	0.190	NS	–	–	–	–	–	–	–	–	–
Zinc	mg/L	NCV(7)	NS	0.247	–	–	–	ND(0.01)	–	–	–	–

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*
Sample ID:				*Location7*	*Location7*	*SW-7*	*Location7*	*Location7*	*Point 7*	*Point 7*	*Point 7*	*Point 7*
Sample Date:				*4/2/1986*	*8/4/1986*	*8/4/1986*	*10/2/1986*	*4/15/1987*	*6/1/1989*	*8/1/1989*	*12/1/1992*	*12/7/1993*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*									
SVOAs												
1,2,4-Trichlorobenzene	mg/L	NS	0.07	–	–	–	–	–	–	–	–	–
2,4-Dinitrophenol	mg/L	0.4	NS	–	–	–	–	–	–	–	–	–
2-Methylnaphthalene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
4-Methylphenol	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
4-Nitrophenol	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Acenaphthene	mg/L	NS	0.99	–	–	–	–	–	–	–	–	–
bis(2-Ethylhexyl)phthalate	mg/L	NS	0.022	–	–	–	–	–	–	–	–	–
Diethyl phthalate	mg/L	NS	44	–	–	–	–	–	–	–	–	–
Fluoranthene	mg/L	NS	0.14	–	–	–	–	–	–	–	–	–
Naphthalene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Phenanthrene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Phenol	mg/L	NS	1,700	–	–	–	–	–	–	–	–	–
VOAs												
Acetone	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
General Chemistry												
Alkalinity, Total (As CaCO3)	mg/L	NS	NS	–	–	–	–	–	–	–	–	310
Ammonia	mg/L	NS	NS	–	–	–	–	–	–	–	–	3
Chemical Oxygen Demand (COI	mg/L	NS	NS	25	26	–	320	80	–	–	–	23
Chloride	mg/L	NS	NS	–	–	–	–	–	–	–	–	50
Conductivity	umhos/cm	NS	NS	2700	210	–	2600	2400	–	–	–	1940
Dissolved Oxygen	mg/L	5.0	NS	–	–	–	–	–	–	–	–	–
Hardness	mg/L	NS	NS	–	–	–	–	–	–	–	–	435
Nitrate (as N)	mg/L	NS	NS	–	–	–	–	–	–	–	–	0.43
Oxidation reduction potential	millivolts	NS	NS	–	–	–	–	–	12.04	-296	-99	-66
pH	s.u.	NS	NS	12.3	12.65	12.65	12.15	11.10	12.04	12.37	12.37	12.41
Phenolics (Total)	mg/L	NS	NS	–	–	–	–	–	–	–	–	0.013
Sulfate	mg/L	NS	NS	–	–	–	–	–	–	–	–	24
Temperature	deg F	NS	NS	–	–	–	–	–	–	–	–	42
Total Dissolved Solids (TDS)	mg/L	500	NS	**770[a]**	**1600[a]**	–	**710[a]**	**740[a]**	–	–	–	**610[a]**
Total Organic Carbon (TOC)	mg/L	NS	NS	25	5	–	63	22	–	–	–	6.98
Turbidity	NTU	NS	NS	–	–	–	–	–	–	–	–	8.28

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*
Sample ID:				*Point 7*	*Point 7*	*Point 7*	*Point 7*	*Point 7*	*Point 7*	*Point 7*	*Point 7*	*Point 7*
Sample Date:				*3/23/1994*	*6/28/1994*	*12/12/1994*	*3/16/1995*	*10/27/1995*	*1/24/1996*	*4/19/1996*	*11/1/1996*	*1/30/1997*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*									
Metals												
Aluminum	mg/L	NS	NS	–	–	ND(0.05)	–	–	–	ND(0.05)	–	–
Antimony	mg/L	NS	NS	–	–	ND(0.05)	–	–	–	ND(0.05)	–	–
Arsenic	mg/L	0.340	NS	–	–	ND(0.002)	–	–	–	ND(0.005)	–	–
Barium	mg/L	NS	NS	–	–	0.2	–	–	–	0.11	–	–
Beryllium	mg/L	NS	NS	–	–	ND(0.005)	–	–	–	ND(0.005)	–	–
Cadmium	mg/L	NCV[1]	NS	ND(0.0005)	ND(0.0005)	ND(0.005)	ND(0.0005)	ND(0.0002)	ND(0.0005)	ND(0.005)	–	ND(0.001)
Calcium	mg/L	NS	NS	184	187	201	439	480	390	190	260 D	710 D
Chromium Total	mg/L	NCV[2]	NS	–	–	ND(0.01)	–	–	–	0.25	–	–
Chromium VI (Hexavalent)	mg/L	0.016	NS	–	–	**0.32[a]**	–	–	–	**0.24[a]**	**0.38[a]**	**0.64[a]**
Cobalt	mg/L	0.110	NS	–	–	–	–	–	–	–	–	–
Copper	mg/L	NCV[3]	NS	–	–	ND(0.01)	–	–	–	ND(0.01)	–	–
Cyanide (total)	mg/L	NS	NS	–	–	ND(0.010)	–	–	–	ND(0.08)	–	–
Iron	mg/L	0.300	NS	0.3	**0.95[a]**	ND(0.05)	0.28	0.11	ND(0.05)	ND(0.05)	**0.59[a]**	**3.8[a]**
Lead	mg/L	NCV[4]	NS	ND(0.005)	0.01	ND(0.002)	ND(0.005)	0.002	0.005	0.005	0.008	0.008
Magnesium	mg/L	NS	NS	3.5	5.2	1.7	ND(0.05)	0.54	0.93	1.2	3.2	11
Manganese	mg/L	NS	NS	0.02	0.12	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)	0.02	0.2
Mercury	mg/L	0.0014	NS	–	–	ND(0.0005)	–	–	–	ND(0.001)	–	–
Nickel	mg/L	NCV[5]	NS	–	–	ND(0.02)	–	–	–	ND(0.02)	–	–
Potassium	mg/L	NS	NS	40	21	21	92	26	93	9.2	72	57
Selenium	mg/L	NS	NS	–	–	0.006	–	–	–	ND(0.005)	–	–
Silicon	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Silver	mg/L	NCV[6]	NS	–	–	ND(0.005)	–	–	–	ND(0.005)	–	–
Sodium	mg/L	NS	NS	45	54	70	84	40	78	67	65	60
Thallium	mg/L	0.020	NS	–	–	ND(0.05)	–	–	–	ND(0.05)	–	–
Vanadium	mg/L	0.190	NS	–	–	–	–	–	–	–	–	–
Zinc	mg/L	NCV[7]	NS	–	–	ND(0.02)	–	–	–	ND(0.02)	–	–

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*	*SW-7*
Sample ID:				*Point 7*	*Point 7*	*Point 7*	*Point 7*	*Point 7*	*Point 7*	*Point 7*	*Point 7*	*Point 7*
Sample Date:				*3/23/1994*	*6/28/1994*	*12/12/1994*	*3/16/1995*	*10/27/1995*	*1/24/1996*	*4/19/1996*	*11/1/1996*	*1/30/1997*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*									
SVOAs												
1,2,4-Trichlorobenzene	mg/L	NS	0.07	–	–	–	–	–	–	–	–	–
2,4-Dinitrophenol	mg/L	0.4	NS	–	–	–	–	–	–	–	–	–
2-Methylnaphthalene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
4-Methylphenol	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
4-Nitrophenol	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Acenaphthene	mg/L	NS	0.99	–	–	–	–	–	–	–	–	–
bis(2-Ethylhexyl)phthalate	mg/L	NS	0.022	–	–	–	–	–	–	–	–	–
Diethyl phthalate	mg/L	NS	44	–	–	–	–	–	–	–	–	–
Fluoranthene	mg/L	NS	0.14	–	–	–	–	–	–	–	–	–
Naphthalene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Phenanthrene	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
Phenol	mg/L	NS	1,700	–	–	–	–	–	–	–	–	–
VOAs												
Acetone	mg/L	NS	NS	–	–	–	–	–	–	–	–	–
General Chemistry												
Alkalinity, Total (As CaCO3)	mg/L	NS	NS	480	390	610	1200	680	1100	430	990	1740
Ammonia	mg/L	NS	NS	7.5	4	6.7	15	8.1	16	1	8.9 D	3.36
Chemical Oxygen Demand (COI	mg/L	NS	NS	7.4	43	26	30	32	11	9.3	21	31
Chloride	mg/L	NS	NS	43	70	110	60	48	40	93	41	37 D
Conductivity	umhos/cm	NS	NS	1950	1850	7500	1870	3670	5570	2710	5450	8410
Dissolved Oxygen	mg/L	5.0	NS	–	–	3.37	4.6	**9.95[a]**	3.45	**7[a]**	**5.65[a]**	2.45
Hardness	mg/L	NS	NS	474	488	508	1097	1200	980	480	660	1840
Nitrate (as N)	mg/L	NS	NS	0.72	0.6	0.29	1.7	0.4	2.5	0.2	0.04	0.94
Oxidation reduction potential	millivolts	NS	NS	-23	-77	-323	-110	-53	-68	-76	-64	-34
pH	s.u.	NS	NS	12.3	12.2	12.78	13.63	11.84	15.19	13.6	11.88	12.77
Phenolics (Total)	mg/L	NS	NS	0.013	0.034	0.014	0.017	0.01	0.02	0.01	0.01	0.014
Sulfate	mg/L	NS	NS	77	30	30	84	54	120	28	66 D	14
Temperature	deg F	NS	NS	51	75	43	57	52	42	58	44	41
Total Dissolved Solids (TDS)	mg/L	500	NS	**640[a]**	**550[a]**	**790[a]**	**1400[a]**	**960[a]**	**1300[a]**	**630[a]**	**1230[a]**	**1480[a]**
Total Organic Carbon (TOC)	mg/L	NS	NS	5.5	15	7	6.2	8.2	6.2	6.5	6.6	8.9
Turbidity	NTU	NS	NS	67.5	215	15	16.2	10	15	8	100	45

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-7*	*SW-7*	*SW-7*	*SW-9*	*SW-9*	*SW-9*	*SW-11*
Sample ID:				*Point 7*	*Point 7*	*Point 7*	*SW-19867-1203-009*	*SW-9*	*SW-19867-0504-009*	*SW-19867-08-03-011*
Sample Date:				*4/30/1997*	*10/23/1997*	*1/22/1998*	*12/17/2003*	*4/1/2004*	*5/12/2004*	*8/21/2003*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*							
Metals										
Aluminum	mg/L	NS	NS	–	0.23	0.23	1.55	–	0.183 J	0.887
Antimony	mg/L	NS	NS	–	ND(0.24)	ND(0.24)	ND(0.01)	–	ND(0.02)	ND(0.01)
Arsenic	mg/L	0.340	NS	–	ND(0.002)	ND(0.002)	0.023 J	–	0.0158 J	0.029
Barium	mg/L	NS	NS	–	0.333	0.344	0.103	–	0.076	0.171
Beryllium	mg/L	NS	NS	–	ND(0.002)	ND(0.002)	0.000294 J	–	ND(0.005)	ND(0.005)
Cadmium	mg/L	NCV[1]	NS	ND(0.001)	ND(0.016)	ND(0.016)	ND(0.005)	–	ND(0.005)	ND(0.005)
Calcium	mg/L	NS	NS	600 D	500 D	590 D	143	–	130	86.1
Chromium Total	mg/L	NCV[2]	NS	–	0.705	0.72	0.0531	–	0.0264	0.157
Chromium VI (Hexavalent)	mg/L	0.016	NS	**0.75[a]**	**0.68[a]**	**0.72[a]**	0.0160	–	ND(0.01)	ND(0.01)
Cobalt	mg/L	0.110	NS	–	–	–	0.00462 J	–	0.00118 J	0.000612 J
Copper	mg/L	NCV[3]	NS	–	0.018	0.010	0.097	–	0.0174 J	0.0264
Cyanide (total)	mg/L	NS	NS	–	ND(0.04)	ND(0.04)	ND(0.01)	–	ND(0.01)	0.00316 J
Iron	mg/L	0.300	NS	0.11	**0.402[a]**	**0.530[a]**	**2.52[a]**	–	**1.37[a]**	**2.51[a]**
Lead	mg/L	NCV[4]	NS	ND(0.005)	0.002	0.003	0.0591	–	0.0114	0.0203
Magnesium	mg/L	NS	NS	0.27	0.80	2.2	35.9	–	33.2	30.4
Manganese	mg/L	NS	NS	0.006	0.25	0.028	0.551	–	0.533	3.28
Mercury	mg/L	0.0014	NS	–	ND(0.0004)	ND(0.0004)	0.00032 J	–	ND(0.0002)	ND(0.0004)
Nickel	mg/L	NCV[5]	NS	–	ND(0.050)	ND(0.050)	0.0113 J	–	0.00577 J	0.0134 J
Potassium	mg/L	NS	NS	59	48	61	8.29	–	10.6	8.85
Selenium	mg/L	NS	NS	–	0.035	0.033	ND(0.02)	–	0.0251	ND(0.02)
Silicon	mg/L	NS	NS	–	–	–	–	–	–	–
Silver	mg/L	NCV[6]	NS	–	ND(0.010)	ND(0.010)	ND(0.01)	–	ND(0.01)	ND(0.01)
Sodium	mg/L	NS	NS	56	58	64	140	–	223	36.2
Thallium	mg/L	0.020	NS	–	ND(0.05)	ND(0.05)	ND(0.02)	–	ND(0.04)	**0.0664[a]**
Vanadium	mg/L	0.190	NS	–	–	–	ND(0.02)	–	0.00474 J	ND(0.02)
Zinc	mg/L	NCV[7]	NS	–	ND(0.016)	ND(0.016)	0.313	–	0.0464	0.0597 B

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-7*	*SW-7*	*SW-7*	*SW-9*	*SW-9*	*SW-9*	*SW-11*
Sample ID:				*Point 7*	*Point 7*	*Point 7*	*SW-19867-1203-009*	*SW-9*	*SW-19867-0504-009*	*SW-19867-08-03-011*
Sample Date:				*4/30/1997*	*10/23/1997*	*1/22/1998*	*12/17/2003*	*4/1/2004*	*5/12/2004*	*8/21/2003*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*							
SVOAs										
1,2,4-Trichlorobenzene	mg/L	NS	0.07	–	–	–	–	–	–	–
2,4-Dinitrophenol	mg/L	0.4	NS	–	–	–	–	–	–	–
2-Methylnaphthalene	mg/L	NS	NS	–	–	–	–	–	–	–
4-Methylphenol	mg/L	NS	NS	–	–	–	–	–	–	–
4-Nitrophenol	mg/L	NS	NS	–	–	–	–	–	–	–
Acenaphthene	mg/L	NS	0.99	–	–	–	–	–	–	–
bis(2-Ethylhexyl)phthalate	mg/L	NS	0.022	–	–	–	–	–	–	–
Diethyl phthalate	mg/L	NS	44	–	–	–	–	–	–	–
Fluoranthene	mg/L	NS	0.14	–	–	–	–	–	–	–
Naphthalene	mg/L	NS	NS	–	–	–	–	–	–	–
Phenanthrene	mg/L	NS	NS	–	–	–	–	–	–	–
Phenol	mg/L	NS	1,700	–	–	–	–	–	–	–
VOAs										
Acetone	mg/L	NS	NS	–	–	–	–	–	–	–
General Chemistry										
Alkalinity, Total (As CaCO3)	mg/L	NS	NS	1630	1370	1550	–	–	–	–
Ammonia	mg/L	NS	NS	1.3	3.3	1.4	–	–	–	–
Chemical Oxygen Demand (COI	mg/L	NS	NS	ND(5.0)	ND(5.0)	13	–	–	–	–
Chloride	mg/L	NS	NS	46 D	40 D	30 D	–	–	–	–
Conductivity	umhos/cm	NS	NS	5600	7410	6700	–	–	–	–
Dissolved Oxygen	mg/L	5.0	NS	4.31	**9.69[a]**	3.96	–	–	–	–
Hardness	mg/L	NS	NS	1500	1500	1480	–	–	505	–
Nitrate (as N)	mg/L	NS	NS	0.92	0.72 D	0.94	–	–	–	–
Oxidation reduction potential	millivolts	NS	NS	-126	-136	-168	–	–	–	–
pH	s.u.	NS	NS	12.56	12.5	12.38	–	7.07	7.74	–
Phenolics (Total)	mg/L	NS	NS	0.016	0.029	0.028	–	–	–	–
Sulfate	mg/L	NS	NS	27	14	18	–	–	–	–
Temperature	deg F	NS	NS	56	52	40	–	–	–	–
Total Dissolved Solids (TDS)	mg/L	500	NS	**1462[a]**	**1630[a]**	**1490[a]**	–	–	–	–
Total Organic Carbon (TOC)	mg/L	NS	NS	4.9	4.0	5.0	–	–	–	–
Turbidity	NTU	NS	NS	5	29	39	–	–	–	–

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-11*	*SW-11*	*SW-11*	*SW-11*	*SW-12*	*SW-12*	*SW-12*
Sample ID:				*SW-19867-10-03-PK-011*	*SW-19867-1203-011*	*SW-11*	*SW-19867-0504-011*	*SW-19867-1203-012*	*SW-12*	*SW-19867-0504-012*
Sample Date:				*10/7/2003*	*12/17/2003*	*4/1/2004*	*5/12/2004*	*12/17/2003*	*4/1/2004*	*5/12/2004*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*							
Metals										
Aluminum	mg/L	NS	NS	66.7	0.912	–	2.13	0.0879 J	–	ND(0.2)
Antimony	mg/L	NS	NS	ND(0.011)	ND(0.01)	–	ND(0.02)	ND(0.01)	–	ND(0.02)
Arsenic	mg/L	0.340	NS	0.0648	0.0203 J	–	0.0139 J	0.0191 J	–	0.00868 J
Barium	mg/L	NS	NS	2.53	0.14	–	0.193	0.0457	–	0.0393
Beryllium	mg/L	NS	NS	0.00304 J	0.000156 J	–	ND(0.005)	ND(0.005)	–	ND(0.005)
Cadmium	mg/L	NCV[1]	NS	0.00463 J	ND(0.005)	–	ND(0.005)	ND(0.005)	–	ND(0.005)
Calcium	mg/L	NS	NS	338	66.5	–	59.2	56.7	–	33.9
Chromium Total	mg/L	NCV[2]	NS	6.39	0.135	–	0.611	0.008 J	–	0.00171 J
Chromium VI (Hexavalent)	mg/L	0.016	NS	ND(0.01)	ND(0.01)	–	ND(0.01)	ND(0.01)	–	ND(0.01)
Cobalt	mg/L	0.110	NS	0.0753	0.00618 J	–	0.00244 J	0.00124 J	–	ND(0.02)
Copper	mg/L	NCV[3]	NS	1.09	0.0157 J	–	0.0471	ND(0.02)	–	ND(0.02)
Cyanide (total)	mg/L	NS	NS	ND(0.01) UJ	ND(0.01)	–	ND(0.01)	ND(0.01)	–	ND(0.01)
Iron	mg/L	0.300	NS	**151[a]**	**2.19[a]**	–	**4.04[a]**	ND(0.2)	–	0.0533 J
Lead	mg/L	NCV[4]	NS	0.865	0.0101	–	0.0473	ND(0.005)	–	ND(0.005)
Magnesium	mg/L	NS	NS	103	61.7	–	54.1	27.3	–	13.7
Manganese	mg/L	NS	NS	19.2	4.63	–	1.94	0.00807 J	–	0.119
Mercury	mg/L	0.0014	NS	0.0013	ND(0.0004)	–	ND(0.0002)	ND(0.0004)	–	ND(0.0002)
Nickel	mg/L	NCV[5]	NS	0.544	ND(0.02)	–	0.0187 J	ND(0.02)	–	0.00295 J
Potassium	mg/L	NS	NS	27.1	13.3	–	9.65	11.8	–	13.6
Selenium	mg/L	NS	NS	0.0957	0.0164 J	–	0.0434	ND(0.02)	–	0.00904 J
Silicon	mg/L	NS	NS	–	–	–	–	–	–	–
Silver	mg/L	NCV[6]	NS	0.0016 J	ND(0.01)	–	ND(0.01)	ND(0.01)	–	ND(0.01)
Sodium	mg/L	NS	NS	33.7	21	–	27.7	28.1	–	38
Thallium	mg/L	0.020	NS	0.0183 J	ND(0.02)	–	ND(0.02)	ND(0.02)	–	ND(0.03)
Vanadium	mg/L	0.190	NS	**0.231[a]**	ND(0.02)	–	0.0138 J	ND(0.02)	–	ND(0.02)
Zinc	mg/L	NCV[7]	NS	2.84	0.0316	–	0.129	0.00498 J	–	0.00519 J

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-11*	*SW-11*	*SW-11*	*SW-11*	*SW-12*	*SW-12*	*SW-12*
Sample ID:				*SW-19867-10-03-PK-011*	*SW-19867-1203-011*	*SW-11*	*SW-19867-0504-011*	*SW-19867-1203-012*	*SW-12*	*SW-19867-0504-012*
Sample Date:				*10/7/2003*	*12/17/2003*	*4/1/2004*	*5/12/2004*	*12/17/2003*	*4/1/2004*	*5/12/2004*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*							
SVOAs										
1,2,4-Trichlorobenzene	mg/L	NS	0.07	–	–	–	–	–	–	–
2,4-Dinitrophenol	mg/L	0.4	NS	–	–	–	–	–	–	–
2-Methylnaphthalene	mg/L	NS	NS	–	–	–	–	–	–	–
4-Methylphenol	mg/L	NS	NS	–	–	–	–	–	–	–
4-Nitrophenol	mg/L	NS	NS	–	–	–	–	–	–	–
Acenaphthene	mg/L	NS	0.99	–	–	–	–	–	–	–
bis(2-Ethylhexyl)phthalate	mg/L	NS	0.022	–	–	–	–	–	–	–
Diethyl phthalate	mg/L	NS	44	–	–	–	–	–	–	–
Fluoranthene	mg/L	NS	0.14	–	–	–	–	–	–	–
Naphthalene	mg/L	NS	NS	–	–	–	–	–	–	–
Phenanthrene	mg/L	NS	NS	–	–	–	–	–	–	–
Phenol	mg/L	NS	1,700	–	–	–	–	–	–	–
VOAs										
Acetone	mg/L	NS	NS	–	–	–	–	–	–	–
General Chemistry										
Alkalinity, Total (As CaCO3)	mg/L	NS	NS	–	–	–	–	–	–	–
Ammonia	mg/L	NS	NS	–	–	–	–	–	–	–
Chemical Oxygen Demand (COI	mg/L	NS	NS	–	–	–	–	–	–	–
Chloride	mg/L	NS	NS	–	–	–	–	–	–	–
Conductivity	umhos/cm	NS	NS	–	–	–	–	–	–	–
Dissolved Oxygen	mg/L	5.0	NS	–	–	–	–	–	–	–
Hardness	mg/L	NS	NS	–	–	–	416	–	–	198
Nitrate (as N)	mg/L	NS	NS	–	–	–	–	–	–	–
Oxidation reduction potential	millivolts	NS	NS	–	–	–	–	–	–	–
pH	s.u.	NS	NS	8.19	–	6.35	7.58	–	6.16	8.55
Phenolics (Total)	mg/L	NS	NS	–	–	–	–	–	–	–
Sulfate	mg/L	NS	NS	–	–	–	–	–	–	–
Temperature	deg F	NS	NS	–	–	–	–	–	–	–
Total Dissolved Solids (TDS)	mg/L	500	NS	–	–	–	–	–	–	–
Total Organic Carbon (TOC)	mg/L	NS	NS	–	–	–	–	–	–	–
Turbidity	NTU	NS	NS	–	–	–	–	–	–	–

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-13*	*SW-13*	*SW-13*	*SW-13*	*SW-13*	*SW-14*
Sample ID:				*SW-19867-08-03-013*	*SW-19867-10-03-PK-013*	*SW-19867-1203-013*	*SW-13*	*SW-19867-0504-013*	*SW-19867-08-03-014*
Sample Date:				*8/21/2003*	*10/7/2003*	*12/17/2003*	*4/1/2004*	*5/12/2004*	*8/21/2003*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*						
Metals									
Aluminum	mg/L	NS	NS	5.13	2.15	1.33	–	0.312	4.28
Antimony	mg/L	NS	NS	0.0169	0.0108	ND(0.01)	–	ND(0.02)	0.0112
Arsenic	mg/L	0.340	NS	0.0439	ND(0.025)	0.0317	–	ND(0.025)	0.0305
Barium	mg/L	NS	NS	0.404	0.217	0.0545	–	0.0301	0.769
Beryllium	mg/L	NS	NS	ND(0.005)	ND(0.005)	ND(0.005)	–	ND(0.005)	ND(0.005)
Cadmium	mg/L	NCV[1]	NS	ND(0.005)	ND(0.005)	ND(0.005)	–	ND(0.005)	ND(0.005)
Calcium	mg/L	NS	NS	675	412	180	–	31.1	378
Chromium Total	mg/L	NCV[2]	NS	0.379	0.122	0.0219	–	0.00365 J	0.514
Chromium VI (Hexavalent)	mg/L	0.016	NS	**0.102[a]**	ND(0.01)	ND(0.01)	–	ND(0.01)	**0.364[a]**
Cobalt	mg/L	0.110	NS	0.00194 J	ND(0.02)	0.00253 J	–	ND(0.02)	0.00109 J
Copper	mg/L	NCV[3]	NS	0.013 J	0.00566 J	ND(0.02)	–	ND(0.02)	0.013 J
Cyanide (total)	mg/L	NS	NS	0.00664 J	ND(0.01) UJ	ND(0.01)	–	ND(0.01)	0.00869 J
Iron	mg/L	0.300	NS	**6.44[a]**	**2.96[a]**	**8.26[a]**	–	**0.848[a]**	**3.72[a]**
Lead	mg/L	NCV[4]	NS	0.0191	0.00853	ND(0.005)	–	ND(0.005)	0.00807
Magnesium	mg/L	NS	NS	12.8	6.56	19.1	–	9.6	3.08
Manganese	mg/L	NS	NS	0.203	0.107	0.272	–	0.031	0.121
Mercury	mg/L	0.0014	NS	ND(0.0004)	ND(0.0004)	ND(0.0004)	–	ND(0.0002)	ND(0.0004)
Nickel	mg/L	NCV[5]	NS	0.0079 J	0.0112 J	ND(0.02)	–	0.00332 J	0.00483 J
Potassium	mg/L	NS	NS	27.9	72.3	13	–	10	7.63
Selenium	mg/L	NS	NS	ND(0.02)	0.0232	ND(0.02)	–	ND(0.02)	ND(0.02)
Silicon	mg/L	NS	NS	–	–	–	–	–	–
Silver	mg/L	NCV[6]	NS	ND(0.01)	ND(0.01)	ND(0.01)	–	ND(0.01)	ND(0.01)
Sodium	mg/L	NS	NS	56.8	66.2	29.4	–	29.7	48.9
Thallium	mg/L	0.020	NS	0.00866 J	ND(0.02)	ND(0.02)	–	ND(0.02)	**0.0679[a]**
Vanadium	mg/L	0.190	NS	0.00464 J	0.00865 J	ND(0.02)	–	ND(0.02)	0.0061 J
Zinc	mg/L	NCV[7]	NS	0.0567 B	0.0194 J	0.0124 J	–	0.00559 J	0.0394 B

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-13*	*SW-13*	*SW-13*	*SW-13*	*SW-13*	*SW-14*
Sample ID:				*SW-19867-08-03-013*	*SW-19867-10-03-PK-013*	*SW-19867-1203-013*	*SW-13*	*SW-19867-0504-013*	*SW-19867-08-03-014*
Sample Date:				*8/21/2003*	*10/7/2003*	*12/17/2003*	*4/1/2004*	*5/12/2004*	*8/21/2003*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*						
SVOAs									
1,2,4-Trichlorobenzene	mg/L	NS	0.07	–	–	–	–	–	–
2,4-Dinitrophenol	mg/L	0.4	NS	–	–	–	–	–	–
2-Methylnaphthalene	mg/L	NS	NS	–	–	–	–	–	–
4-Methylphenol	mg/L	NS	NS	–	–	–	–	–	–
4-Nitrophenol	mg/L	NS	NS	–	–	–	–	–	–
Acenaphthene	mg/L	NS	0.99	–	–	–	–	–	–
bis(2-Ethylhexyl)phthalate	mg/L	NS	0.022	–	–	–	–	–	–
Diethyl phthalate	mg/L	NS	44	–	–	–	–	–	–
Fluoranthene	mg/L	NS	0.14	–	–	–	–	–	–
Naphthalene	mg/L	NS	NS	–	–	–	–	–	–
Phenanthrene	mg/L	NS	NS	–	–	–	–	–	–
Phenol	mg/L	NS	1,700	–	–	–	–	–	–
VOAs									
Acetone	mg/L	NS	NS	–	–	–	–	–	–
General Chemistry									
Alkalinity, Total (As CaCO3)	mg/L	NS	NS	–	–	–	–	–	–
Ammonia	mg/L	NS	NS	–	–	–	–	–	–
Chemical Oxygen Demand (COI	mg/L	NS	NS	–	–	–	–	–	–
Chloride	mg/L	NS	NS	–	–	–	–	–	–
Conductivity	umhos/cm	NS	NS	–	–	–	–	–	–
Dissolved Oxygen	mg/L	5.0	NS	–	–	–	–	–	–
Hardness	mg/L	NS	NS	–	–	–	–	166	–
Nitrate (as N)	mg/L	NS	NS	–	–	–	–	–	–
Oxidation reduction potential	millivolts	NS	NS	–	–	–	–	–	–
pH	s.u.	NS	NS	–	12.41	–	11.87	8.41	–
Phenolics (Total)	mg/L	NS	NS	–	–	–	–	–	–
Sulfate	mg/L	NS	NS	–	–	–	–	–	–
Temperature	deg F	NS	NS	–	–	–	–	–	–
Total Dissolved Solids (TDS)	mg/L	500	NS	–	–	–	–	–	–
Total Organic Carbon (TOC)	mg/L	NS	NS	–	–	–	–	–	–
Turbidity	NTU	NS	NS	–	–	–	–	–	–

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-14*	*SW-14*	*SW-14*	*SW-14*	*SW-15*	*SW-15*
Sample ID:				*SW-19867-10-03-PK-014*	*SW-19867-1203-014*	*SW-14*	*SW-19867-0504-014*	*SW-19867-08-03-015*	*SW-19867-10-03-PK-015*
Sample Date:				*10/7/2003*	*12/17/2003*	*4/1/2004*	*5/12/2004*	*8/21/2003*	*10/7/2003*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*						
Metals									
Aluminum	mg/L	NS	NS	2.34	0.0426 J	–	0.0493 J	6.98	2.02
Antimony	mg/L	NS	NS	0.00744 J	ND(0.01)	–	ND(0.02)	ND(0.01)	ND(0.01)
Arsenic	mg/L	0.340	NS	ND(0.025)	0.0211 J	–	0.0108 J	0.0345	0.0249 J
Barium	mg/L	NS	NS	1.24	0.0609	–	0.0868	0.141	0.321
Beryllium	mg/L	NS	NS	ND(0.005)	ND(0.005)	–	ND(0.005)	ND(0.005)	ND(0.005)
Cadmium	mg/L	NCV[1]	NS	ND(0.005)	ND(0.005)	–	ND(0.005)	ND(0.005)	ND(0.005)
Calcium	mg/L	NS	NS	615	137	–	166	144	343
Chromium Total	mg/L	NCV[2]	NS	0.617	0.0812	–	0.114	0.1	0.586
Chromium VI (Hexavalent)	mg/L	0.016	NS	**0.571[a]**	**0.0650[a]**	–	**0.107[a]**	ND(0.01)	**0.289[a]**
Cobalt	mg/L	0.110	NS	ND(0.02)	0.00662 J	–	ND(0.02)	0.0043 J	ND(0.02)
Copper	mg/L	NCV[3]	NS	0.00803 J	ND(0.02)	–	ND(0.02)	0.0383	0.0343
Cyanide (total)	mg/L	NS	NS	ND(0.01) UJ	ND(0.01)	–	0.00464 J	0.00342 J	0.00364 J
Iron	mg/L	0.300	NS	**2.11[a]**	ND(0.2)	–	ND(0.2)	**8.27[a]**	**0.691[a]**
Lead	mg/L	NCV[4]	NS	0.00516	ND(0.005)	–	ND(0.005)	0.0256	0.00982
Magnesium	mg/L	NS	NS	1.86	0.429 J	–	0.194 J	15.2	2.69
Manganese	mg/L	NS	NS	0.0695	0.00247 J	–	ND(0.01)	1.55	0.0562
Mercury	mg/L	0.0014	NS	ND(0.0004)	ND(0.0004)	–	ND(0.0002)	ND(0.0004)	ND(0.0004)
Nickel	mg/L	NCV[5]	NS	0.00532 J	ND(0.02)	–	0.00181 J	0.0156 J	0.00719 J
Potassium	mg/L	NS	NS	9.16	2.75	–	3.6	7.34	7.47
Selenium	mg/L	NS	NS	0.03	ND(0.02)	–	ND(0.02)	ND(0.02)	0.0194 J
Silicon	mg/L	NS	NS	–	–	–	–	–	–
Silver	mg/L	NCV[6]	NS	ND(0.01)	ND(0.01)	–	ND(0.01)	ND(0.01)	ND(0.01)
Sodium	mg/L	NS	NS	45.8	43.7	–	67.6	52.3	43.7
Thallium	mg/L	0.020	NS	0.0107 J	ND(0.02)	–	ND(0.03)	**0.0826[a]**	0.00776 J
Vanadium	mg/L	0.190	NS	0.00682 J	ND(0.02)	–	ND(0.02)	0.0162 J	0.0136 J
Zinc	mg/L	NCV[7]	NS	0.0139 J	0.00657 J	–	0.0059 J	0.0554 B	0.00972 J

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-14*	*SW-14*	*SW-14*	*SW-14*	*SW-15*	*SW-15*
Sample ID:				*SW-19867-10-03-PK-014*	*SW-19867-1203-014*	*SW-14*	*SW-19867-0504-014*	*SW-19867-08-03-015*	*SW-19867-10-03-PK-015*
Sample Date:				*10/7/2003*	*12/17/2003*	*4/1/2004*	*5/12/2004*	*8/21/2003*	*10/7/2003*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*						
SVOAs									
1,2,4-Trichlorobenzene	mg/L	NS	0.07	–	–	–	–	–	–
2,4-Dinitrophenol	mg/L	0.4	NS	–	–	–	–	–	–
2-Methylnaphthalene	mg/L	NS	NS	–	–	–	–	–	–
4-Methylphenol	mg/L	NS	NS	–	–	–	–	–	–
4-Nitrophenol	mg/L	NS	NS	–	–	–	–	–	–
Acenaphthene	mg/L	NS	0.99	–	–	–	–	–	–
bis(2-Ethylhexyl)phthalate	mg/L	NS	0.022	–	–	–	–	–	–
Diethyl phthalate	mg/L	NS	44	–	–	–	–	–	–
Fluoranthene	mg/L	NS	0.14	–	–	–	–	–	–
Naphthalene	mg/L	NS	NS	–	–	–	–	–	–
Phenanthrene	mg/L	NS	NS	–	–	–	–	–	–
Phenol	mg/L	NS	1,700	–	–	–	–	–	–
VOAs									
Acetone	mg/L	NS	NS	–	–	–	–	–	–
General Chemistry									
Alkalinity, Total (As CaCO3)	mg/L	NS	NS	–	–	–	–	–	–
Ammonia	mg/L	NS	NS	–	–	–	–	–	–
Chemical Oxygen Demand (COI	mg/L	NS	NS	–	–	–	–	–	–
Chloride	mg/L	NS	NS	–	–	–	–	–	–
Conductivity	umhos/cm	NS	NS	–	–	–	–	–	–
Dissolved Oxygen	mg/L	5.0	NS	–	–	–	–	–	–
Hardness	mg/L	NS	NS	–	–	–	436	–	–
Nitrate (as N)	mg/L	NS	NS	–	–	–	–	–	–
Oxidation reduction potential	millivolts	NS	NS	–	–	–	–	–	–
pH	s.u.	NS	NS	12.11	–	11.91	11.22	–	12.02
Phenolics (Total)	mg/L	NS	NS	–	–	–	–	–	–
Sulfate	mg/L	NS	NS	–	–	–	–	–	–
Temperature	deg F	NS	NS	–	–	–	–	–	–
Total Dissolved Solids (TDS)	mg/L	500	NS	–	–	–	–	–	–
Total Organic Carbon (TOC)	mg/L	NS	NS	–	–	–	–	–	–
Turbidity	NTU	NS	NS	–	–	–	–	–	–

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-15*	*SW-15*	*SW-15*	*SW-16*	*SW-16*	*SW-16*	*SW-17*
Sample ID:				*SW-19867-1203-015*	*SW-15*	*SW-19867-0504-015*	*SW-19867-1203-016*	*SW-16*	*SW-19867-0504-016*	*SW-19867-1203-017*
Sample Date:				*12/17/2003*	*4/1/2004*	*5/12/2004*	*12/17/2003*	*4/1/2004*	*5/12/2004*	*12/17/2003*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*							
Metals										
Aluminum	mg/L	NS	NS	2.07	–	2.01	0.618	–	0.656	21.9
Antimony	mg/L	NS	NS	ND(0.025)	–	ND(0.02)	ND(0.05)	–	ND(0.02)	ND(0.01)
Arsenic	mg/L	0.340	NS	0.0285	–	ND(0.025)	0.0191 J	–	ND(0.025)	0.0155 J
Barium	mg/L	NS	NS	0.0763	–	0.048	0.266	–	0.299	0.173
Beryllium	mg/L	NS	NS	ND(0.005)	–	ND(0.005)	ND(0.005)	–	ND(0.005)	0.000916 J
Cadmium	mg/L	NCV[1]	NS	ND(0.005)	–	ND(0.005)	ND(0.005)	–	ND(0.005)	ND(0.005)
Calcium	mg/L	NS	NS	187	–	294	600	–	662	28.5
Chromium Total	mg/L	NCV[2]	NS	0.372	–	0.347	0.0887	–	0.0727	0.0432
Chromium VI (Hexavalent)	mg/L	0.016	NS	**0.204**[a]	–	**0.292**[a]	**0.0350**[a]	–	**0.058**[a]	0.0120
Cobalt	mg/L	0.110	NS	0.00139 J	–	ND(0.02)	0.00198 J	–	ND(0.02)	0.00821 J
Copper	mg/L	NCV[3]	NS	0.0395	–	0.0368	0.0061 J	–	0.0118 J	0.0313
Cyanide (total)	mg/L	NS	NS	ND(0.01)	–	ND(0.01)	ND(0.01)	–	ND(0.01)	ND(0.01)
Iron	mg/L	0.300	NS	**1.03**[a]	–	ND(0.2)	ND(0.2)	–	0.148 J	**23.4**[a]
Lead	mg/L	NCV[4]	NS	0.00523	–	ND(0.005)	ND(0.005)	–	ND(0.005)	0.0451
Magnesium	mg/L	NS	NS	1.14 J	–	ND(1.5)	0.324 J	–	0.227 J	13.3
Manganese	mg/L	NS	NS	0.193	–	0.00165 J	0.0229	–	0.00608 J	0.564
Mercury	mg/L	0.0014	NS	ND(0.0004)	–	ND(0.0002)	ND(0.0004)	–	ND(0.0002)	ND(0.0004)
Nickel	mg/L	NCV[5]	NS	0.00255 J	–	0.00645 J	ND(0.02)	–	0.00329 J	0.0186 J
Potassium	mg/L	NS	NS	5.58	–	6.27	12.1	–	14.8	10.7
Selenium	mg/L	NS	NS	ND(0.02)	–	ND(0.02)	0.0254 J	–	ND(0.02)	0.0123 J
Silicon	mg/L	NS	NS	–	–	–	–	–	–	–
Silver	mg/L	NCV[6]	NS	ND(0.01)	–	ND(0.01)	ND(0.01)	–	ND(0.01)	ND(0.01)
Sodium	mg/L	NS	NS	34.3	–	39.5	22.3	–	23.3	1.47 J
Thallium	mg/L	0.020	NS	ND(0.02)	–	ND(0.02)	ND(0.02)	–	ND(0.02)	ND(0.02)
Vanadium	mg/L	0.190	NS	0.0122 J	–	0.00391 J	ND(0.02)	–	ND(0.02)	0.037
Zinc	mg/L	NCV[7]	NS	0.0148 J	–	0.00697 J	0.0192 J	–	0.0169 J	0.333

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-15*	*SW-15*	*SW-15*	*SW-16*	*SW-16*	*SW-16*	*SW-17*
Sample ID:				*SW-19867-1203-015*	*SW-15*	*SW-19867-0504-015*	*SW-19867-1203-016*	*SW-16*	*SW-19867-0504-016*	*SW-19867-1203-017*
Sample Date:				*12/17/2003*	*4/1/2004*	*5/12/2004*	*12/17/2003*	*4/1/2004*	*5/12/2004*	*12/17/2003*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*							
SVOAs										
1,2,4-Trichlorobenzene	mg/L	NS	0.07	–	–	–	–	–	–	–
2,4-Dinitrophenol	mg/L	0.4	NS	–	–	–	–	–	–	–
2-Methylnaphthalene	mg/L	NS	NS	–	–	–	–	–	–	–
4-Methylphenol	mg/L	NS	NS	–	–	–	–	–	–	–
4-Nitrophenol	mg/L	NS	NS	–	–	–	–	–	–	–
Acenaphthene	mg/L	NS	0.99	–	–	–	–	–	–	–
bis(2-Ethylhexyl)phthalate	mg/L	NS	0.022	–	–	–	–	–	–	–
Diethyl phthalate	mg/L	NS	44	–	–	–	–	–	–	–
Fluoranthene	mg/L	NS	0.14	–	–	–	–	–	–	–
Naphthalene	mg/L	NS	NS	–	–	–	–	–	–	–
Phenanthrene	mg/L	NS	NS	–	–	–	–	–	–	–
Phenol	mg/L	NS	1,700	–	–	–	–	–	–	–
VOAs										
Acetone	mg/L	NS	NS	–	–	–	–	–	–	–
General Chemistry										
Alkalinity, Total (As CaCO3)	mg/L	NS	NS	–	–	–	–	–	–	–
Ammonia	mg/L	NS	NS	–	–	–	–	–	–	–
Chemical Oxygen Demand (COI	mg/L	NS	NS	–	–	–	–	–	–	–
Chloride	mg/L	NS	NS	–	–	–	–	–	–	–
Conductivity	umhos/cm	NS	NS	–	–	–	–	–	–	–
Dissolved Oxygen	mg/L	5.0	NS	–	–	–	–	–	–	–
Hardness	mg/L	NS	NS	–	–	776	–	–	1600	–
Nitrate (as N)	mg/L	NS	NS	–	–	–	–	–	–	–
Oxidation reduction potential	millivolts	NS	NS	–	–	–	–	–	–	–
pH	s.u.	NS	NS	–	12.05	11.98	–	11.28	12.03	–
Phenolics (Total)	mg/L	NS	NS	–	–	–	–	–	–	–
Sulfate	mg/L	NS	NS	–	–	–	–	–	–	–
Temperature	deg F	NS	NS	–	–	–	–	–	–	–
Total Dissolved Solids (TDS)	mg/L	500	NS	–	–	–	–	–	–	–
Total Organic Carbon (TOC)	mg/L	NS	NS	–	–	–	–	–	–	–
Turbidity	NTU	NS	NS	–	–	–	–	–	–	–

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-17*	*SW-17*	*SW-18*	*SW-18*	*SW-18*	*SW-19*	*SW-19*
Sample ID:				*SW-17*	*SW-19867-0504-017*	*SW-19867-1203-018*	*SW-18*	*SW-19867-0504-018*	*SW-19867-08-03-019*	*SW-19867-10-03-PK-019*
Sample Date:				*4/1/2004*	*5/12/2004*	*12/17/2003*	*4/1/2004*	*5/12/2004*	*8/21/2003*	*10/7/2003*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*							
Metals										
Aluminum	mg/L	NS	NS	–	0.541	0.0415 J	–	0.125 J	0.181 J	1.75
Antimony	mg/L	NS	NS	–	ND(0.02)	ND(0.02)	–	ND(0.02)	ND(0.01)	ND(0.01)
Arsenic	mg/L	0.340	NS	–	0.0151 J	0.0254	–	0.0095 J	0.0258	0.0213 J
Barium	mg/L	NS	NS	–	0.0238	0.0569	–	0.055	0.0415	0.129
Beryllium	mg/L	NS	NS	–	ND(0.005)	ND(0.005)	–	ND(0.005)	ND(0.005)	ND(0.005)
Cadmium	mg/L	NCV[1]	NS	–	ND(0.005)	ND(0.005)	–	ND(0.005)	ND(0.005)	ND(0.005)
Calcium	mg/L	NS	NS	–	63.1	140	–	116	58.9	176
Chromium Total	mg/L	NCV[2]	NS	–	0.000768 J	0.0783	–	0.0803	0.0213	0.0648
Chromium VI (Hexavalent)	mg/L	0.016	NS	–	ND(0.01)	**0.0290[a]**	–	**0.065[a]**	**0.018[a]**	0.0120
Cobalt	mg/L	0.110	NS	–	ND(0.02)	ND(0.02)	–	ND(0.02)	ND(0.02)	ND(0.02)
Copper	mg/L	NCV[3]	NS	–	ND(0.02)	ND(0.02)	–	ND(0.02)	0.00638 J	0.014 J
Cyanide (total)	mg/L	NS	NS	–	ND(0.01)	ND(0.01)	–	ND(0.01)	ND(0.01)	ND(0.01) UJ
Iron	mg/L	0.300	NS	–	**3.06[a]**	ND(0.2)	–	0.146 J	**0.309[a]**	**2.64[a]**
Lead	mg/L	NCV[4]	NS	–	0.00531	ND(0.005)	–	0.00535	ND(0.005)	0.018
Magnesium	mg/L	NS	NS	–	22.4	0.56 J	–	1.79	35.3	74.3
Manganese	mg/L	NS	NS	–	0.267	0.00347 J	–	0.0143	0.078	0.317
Mercury	mg/L	0.0014	NS	–	ND(0.0002)	ND(0.0004)	–	ND(0.0002)	ND(0.0004)	ND(0.0004)
Nickel	mg/L	NCV[5]	NS	–	0.00291 J	ND(0.02)	–	ND(0.02)	0.00589 J	ND(0.02)
Potassium	mg/L	NS	NS	–	6.95	2.88	–	3.36	8.28	4.08
Selenium	mg/L	NS	NS	–	0.024	ND(0.04)	–	ND(0.02)	ND(0.02)	0.0371
Silicon	mg/L	NS	NS	–	–	–	–	–	–	–
Silver	mg/L	NCV[6]	NS	–	ND(0.01)	ND(0.01)	–	ND(0.01)	ND(0.01)	ND(0.01)
Sodium	mg/L	NS	NS	–	2.36	43.7	–	66.4	75.1	81.5
Thallium	mg/L	0.020	NS	–	ND(0.02)	ND(0.02)	–	ND(0.03)	**0.0601[a]**	ND(0.02)
Vanadium	mg/L	0.190	NS	–	ND(0.02)	ND(0.02)	–	ND(0.02)	ND(0.02)	0.0124 J
Zinc	mg/L	NCV[7]	NS	–	0.0171 J	0.00773 J	–	0.013 J	0.0206 B	0.102

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-17*	*SW-17*	*SW-18*	*SW-18*	*SW-18*	*SW-19*	*SW-19*
Sample ID:				*SW-17*	*SW-19867-0504-017*	*SW-19867-1203-018*	*SW-18*	*SW-19867-0504-018*	*SW-19867-08-03-019*	*SW-19867-10-03-PK-019*
Sample Date:				*4/1/2004*	*5/12/2004*	*12/17/2003*	*4/1/2004*	*5/12/2004*	*8/21/2003*	*10/7/2003*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*							
SVOAs										
1,2,4-Trichlorobenzene	mg/L	NS	0.07	–	–	–	–	–	–	–
2,4-Dinitrophenol	mg/L	0.4	NS	–	–	–	–	–	–	–
2-Methylnaphthalene	mg/L	NS	NS	–	–	–	–	–	–	–
4-Methylphenol	mg/L	NS	NS	–	–	–	–	–	–	–
4-Nitrophenol	mg/L	NS	NS	–	–	–	–	–	–	–
Acenaphthene	mg/L	NS	0.99	–	–	–	–	–	–	–
bis(2-Ethylhexyl)phthalate	mg/L	NS	0.022	–	–	–	–	–	–	–
Diethyl phthalate	mg/L	NS	44	–	–	–	–	–	–	–
Fluoranthene	mg/L	NS	0.14	–	–	–	–	–	–	–
Naphthalene	mg/L	NS	NS	–	–	–	–	–	–	–
Phenanthrene	mg/L	NS	NS	–	–	–	–	–	–	–
Phenol	mg/L	NS	1,700	–	–	–	–	–	–	–
VOAs										
Acetone	mg/L	NS	NS	–	–	–	–	–	–	–
General Chemistry										
Alkalinity, Total (As CaCO3)	mg/L	NS	NS	–	–	–	–	–	–	–
Ammonia	mg/L	NS	NS	–	–	–	–	–	–	–
Chemical Oxygen Demand (COI	mg/L	NS	NS	–	–	–	–	–	–	–
Chloride	mg/L	NS	NS	–	–	–	–	–	–	–
Conductivity	umhos/cm	NS	NS	–	–	–	–	–	–	–
Dissolved Oxygen	mg/L	5.0	NS	–	–	–	–	–	–	–
Hardness	mg/L	NS	NS	–	319	–	–	356	–	–
Nitrate (as N)	mg/L	NS	NS	–	–	–	–	–	–	–
Oxidation reduction potential	millivolts	NS	NS	–	–	–	–	–	–	–
pH	s.u.	NS	NS	9.4	7.83	–	11.94	11.38	–	9.06
Phenolics (Total)	mg/L	NS	NS	–	–	–	–	–	–	–
Sulfate	mg/L	NS	NS	–	–	–	–	–	–	–
Temperature	deg F	NS	NS	–	–	–	–	–	–	–
Total Dissolved Solids (TDS)	mg/L	500	NS	–	–	–	–	–	–	–
Total Organic Carbon (TOC)	mg/L	NS	NS	–	–	–	–	–	–	–
Turbidity	NTU	NS	NS	–	–	–	–	–	–	–

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-19*	*SW-19*	*SW-19*	*SW-20*	*SW-20*	*SW-20*	*SW-20*
Sample ID:				*SW-19867-1203-019*	*SW-19*	*SW-19867-0504-019*	*SW-19867-08-03-020*	*SW-19867-10-03-PK-020*	*SW-19867-1203-020*	*SW-20*
Sample Date:				*12/17/2003*	*4/1/2004*	*5/12/2004*	*8/21/2003*	*10/7/2003*	*12/17/2003*	*4/1/2004*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*							
Metals										
Aluminum	mg/L	NS	NS	0.0277 J	–	ND(0.2)	0.62	0.516	0.218	–
Antimony	mg/L	NS	NS	ND(0.02)	–	ND(0.02)	ND(0.01)	ND(0.01)	ND(0.02)	–
Arsenic	mg/L	0.340	NS	0.0219 J	–	0.00985 J	0.0296	0.0143 J	0.0239 J	–
Barium	mg/L	NS	NS	0.0413	–	0.0433	0.0815	0.0611	0.0455	–
Beryllium	mg/L	NS	NS	ND(0.005)	–	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)	–
Cadmium	mg/L	NCV[1]	NS	ND(0.005)	–	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)	–
Calcium	mg/L	NS	NS	109	–	101	189	128	131	–
Chromium Total	mg/L	NCV[2]	NS	0.0396	–	0.048	0.0265	0.0543	0.0292	–
Chromium VI (Hexavalent)	mg/L	0.016	NS	**0.0240[a]**	–	**0.03[a]**	ND(0.01)	**0.0350[a]**	0.00800 J	–
Cobalt	mg/L	0.110	NS	ND(0.02)	–	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	–
Copper	mg/L	NCV[3]	NS	ND(0.02)	–	ND(0.02)	0.00609 J	0.0143 J	ND(0.02)	–
Cyanide (total)	mg/L	NS	NS	ND(0.01)	–	ND(0.01)	0.00349 J	ND(0.01)	ND(0.01)	–
Iron	mg/L	0.300	NS	ND(0.2)	–	ND(0.2)	0.22	ND(0.2)	0.0727 J	–
Lead	mg/L	NCV[4]	NS	ND(0.005)	–	0.0051	ND(0.005)	ND(0.005)	ND(0.005)	–
Magnesium	mg/L	NS	NS	1.58	–	0.833 J	0.477 J	0.167 J	1.45 J	–
Manganese	mg/L	NS	NS	0.00847 J	–	0.00467 J	0.0182	0.00465 J	0.0136	–
Mercury	mg/L	0.0014	NS	ND(0.0004)	–	ND(0.0002)	ND(0.0004)	ND(0.0004)	ND(0.0004)	–
Nickel	mg/L	NCV[5]	NS	ND(0.02)	–	ND(0.02)	0.00178 J	0.00241 J	ND(0.02)	–
Potassium	mg/L	NS	NS	2.56	–	3.14	4.37	5.67	2.12	–
Selenium	mg/L	NS	NS	ND(0.02)	–	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.04)	–
Silicon	mg/L	NS	NS	–	–	–	–	–	–	–
Silver	mg/L	NCV[6]	NS	ND(0.01)	–	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	–
Sodium	mg/L	NS	NS	41.4	–	68.6	75.7	63.8	36.9	–
Thallium	mg/L	0.020	NS	ND(0.02)	–	ND(0.03)	**0.0936[a]**	ND(0.02)	ND(0.02)	–
Vanadium	mg/L	0.190	NS	ND(0.02)	–	ND(0.02)	ND(0.02)	0.0145 J	ND(0.02)	–
Zinc	mg/L	NCV[7]	NS	0.00887 J	–	0.00691 J	0.0151 B	0.00529 J	0.0301	–

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-19*	*SW-19*	*SW-19*	*SW-20*	*SW-20*	*SW-20*	*SW-20*
Sample ID:				*SW-19867-1203-019*	*SW-19*	*SW-19867-0504-019*	*SW-19867-08-03-020*	*SW-19867-10-03-PK-020*	*SW-19867-1203-020*	*SW-20*
Sample Date:				*12/17/2003*	*4/1/2004*	*5/12/2004*	*8/21/2003*	*10/7/2003*	*12/17/2003*	*4/1/2004*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*							
SVOAs										
1,2,4-Trichlorobenzene	mg/L	NS	0.07	–	–	–	–	–	–	–
2,4-Dinitrophenol	mg/L	0.4	NS	–	–	–	–	–	–	–
2-Methylnaphthalene	mg/L	NS	NS	–	–	–	–	–	–	–
4-Methylphenol	mg/L	NS	NS	–	–	–	–	–	–	–
4-Nitrophenol	mg/L	NS	NS	–	–	–	–	–	–	–
Acenaphthene	mg/L	NS	0.99	–	–	–	–	–	–	–
bis(2-Ethylhexyl)phthalate	mg/L	NS	0.022	–	–	–	–	–	–	–
Diethyl phthalate	mg/L	NS	44	–	–	–	–	–	–	–
Fluoranthene	mg/L	NS	0.14	–	–	–	–	–	–	–
Naphthalene	mg/L	NS	NS	–	–	–	–	–	–	–
Phenanthrene	mg/L	NS	NS	–	–	–	–	–	–	–
Phenol	mg/L	NS	1,700	–	–	–	–	–	–	–
VOAs										
Acetone	mg/L	NS	NS	–	–	–	–	–	–	–
General Chemistry										
Alkalinity, Total (As CaCO3)	mg/L	NS	NS	–	–	–	–	–	–	–
Ammonia	mg/L	NS	NS	–	–	–	–	–	–	–
Chemical Oxygen Demand (COI	mg/L	NS	NS	–	–	–	–	–	–	–
Chloride	mg/L	NS	NS	–	–	–	–	–	–	–
Conductivity	umhos/cm	NS	NS	–	–	–	–	–	–	–
Dissolved Oxygen	mg/L	5.0	NS	–	–	–	–	–	–	–
Hardness	mg/L	NS	NS	–	–	283	–	–	–	–
Nitrate (as N)	mg/L	NS	NS	–	–	–	–	–	–	–
Oxidation reduction potential	millivolts	NS	NS	–	–	–	–	–	–	–
pH	s.u.	NS	NS	–	11.74	11.62	–	12.31	–	11.79
Phenolics (Total)	mg/L	NS	NS	–	–	–	–	–	–	–
Sulfate	mg/L	NS	NS	–	–	–	–	–	–	–
Temperature	deg F	NS	NS	–	–	–	–	–	–	–
Total Dissolved Solids (TDS)	mg/L	500	NS	–	–	–	–	–	–	–
Total Organic Carbon (TOC)	mg/L	NS	NS	–	–	–	–	–	–	–
Turbidity	NTU	NS	NS	–	–	–	–	–	–	–

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-20*	*SW-21*	*SW-21*	*SW-21*	*SW-21*	*SW-21*
Sample ID:				*SW-19867-0504-020*	*SW-19867-08-03-021*	*SW-19867-10-03-PK-021*	*SW-19867-1203-021*	*SW-21*	*SW-19867-0504-021*
Sample Date:				*5/12/2004*	*8/21/2003*	*10/7/2003*	*12/17/2003*	*4/1/2004*	*5/12/2004*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*						
Metals									
Aluminum	mg/L	NS	NS	0.0258 J	0.125 J	ND(0.2)	0.221	–	ND(0.2)
Antimony	mg/L	NS	NS	ND(0.02)	ND(0.01)	ND(0.01)	ND(0.01)	–	ND(0.02)
Arsenic	mg/L	0.340	NS	0.009 J	0.0313	0.012 J	0.019 J	–	0.0077 J
Barium	mg/L	NS	NS	0.0584	0.0549	0.0391	0.0941	–	0.0525
Beryllium	mg/L	NS	NS	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)	–	ND(0.005)
Cadmium	mg/L	NCV[1]	NS	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)	–	ND(0.005)
Calcium	mg/L	NS	NS	117	146	94.5	63.1	–	113
Chromium Total	mg/L	NCV[2]	NS	0.0554	0.0385	0.0368	0.00603 J	–	0.0547
Chromium VI (Hexavalent)	mg/L	0.016	NS	**0.037**[a]	0.008 J	0.00400 J	ND(0.01)	–	**0.036**[a]
Cobalt	mg/L	0.110	NS	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	–	ND(0.02)
Copper	mg/L	NCV[3]	NS	0.00343 J	ND(0.02)	0.0105 J	ND(0.02)	–	ND(0.02)
Cyanide (total)	mg/L	NS	NS	ND(0.01)	0.00284 J	ND(0.01)	ND(0.01)	–	ND(0.01)
Iron	mg/L	0.300	NS	ND(0.2)	0.0781 J	ND(0.2)	**0.409**[a]	–	0.226
Lead	mg/L	NCV[4]	NS	0.00601	ND(0.005)	ND(0.005)	0.0159	–	0.00594
Magnesium	mg/L	NS	NS	0.0581 J	0.936 J	0.218 J	6.92	–	1.6
Manganese	mg/L	NS	NS	ND(0.01)	0.01	0.00227 J	0.0758	–	0.0121
Mercury	mg/L	0.0014	NS	ND(0.0002)	ND(0.0004)	ND(0.0004)	ND(0.0004)	–	ND(0.0002)
Nickel	mg/L	NCV[5]	NS	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	–	ND(0.02)
Potassium	mg/L	NS	NS	3.69	3.93	5.4	3.03	–	3.13
Selenium	mg/L	NS	NS	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	–	ND(0.02)
Silicon	mg/L	NS	NS	–	–	–	–	–	–
Silver	mg/L	NCV[6]	NS	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	–	ND(0.01)
Sodium	mg/L	NS	NS	60.4	83.6	77.7	59.1	–	63.8
Thallium	mg/L	0.020	NS	ND(0.03)	**0.0865**[a]	ND(0.02)	ND(0.02)	–	ND(0.02)
Vanadium	mg/L	0.190	NS	ND(0.02)	ND(0.02)	0.00334 J	ND(0.02)	–	ND(0.02)
Zinc	mg/L	NCV[7]	NS	0.0129 J	ND(0.01)	0.00218 J	0.0181 J	–	0.00536 J

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-20*	*SW-21*	*SW-21*	*SW-21*	*SW-21*	*SW-21*
Sample ID:				*SW-19867-0504-020*	*SW-19867-08-03-021*	*SW-19867-10-03-PK-021*	*SW-19867-1203-021*	*SW-21*	*SW-19867-0504-021*
Sample Date:				*5/12/2004*	*8/21/2003*	*10/7/2003*	*12/17/2003*	*4/1/2004*	*5/12/2004*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*						
SVOAs									
1,2,4-Trichlorobenzene	mg/L	NS	0.07	–	–	–	–	–	–
2,4-Dinitrophenol	mg/L	0.4	NS	–	–	–	–	–	–
2-Methylnaphthalene	mg/L	NS	NS	–	–	–	–	–	–
4-Methylphenol	mg/L	NS	NS	–	–	–	–	–	–
4-Nitrophenol	mg/L	NS	NS	–	–	–	–	–	–
Acenaphthene	mg/L	NS	0.99	–	–	–	–	–	–
bis(2-Ethylhexyl)phthalate	mg/L	NS	0.022	–	–	–	–	–	–
Diethyl phthalate	mg/L	NS	44	–	–	–	–	–	–
Fluoranthene	mg/L	NS	0.14	–	–	–	–	–	–
Naphthalene	mg/L	NS	NS	–	–	–	–	–	–
Phenanthrene	mg/L	NS	NS	–	–	–	–	–	–
Phenol	mg/L	NS	1,700	–	–	–	–	–	–
VOAs									
Acetone	mg/L	NS	NS	–	–	–	–	–	–
General Chemistry									
Alkalinity, Total (As CaCO3)	mg/L	NS	NS	–	–	–	–	–	–
Ammonia	mg/L	NS	NS	–	–	–	–	–	–
Chemical Oxygen Demand (COI	mg/L	NS	NS	–	–	–	–	–	–
Chloride	mg/L	NS	NS	–	–	–	–	–	–
Conductivity	umhos/cm	NS	NS	–	–	–	–	–	–
Dissolved Oxygen	mg/L	5.0	NS	–	–	–	–	–	–
Hardness	mg/L	NS	NS	319	–	–	–	–	311
Nitrate (as N)	mg/L	NS	NS	–	–	–	–	–	–
Oxidation reduction potential	millivolts	NS	NS	–	–	–	–	–	–
pH	s.u.	NS	NS	11.55	–	12.24	–	10.00	11.47
Phenolics (Total)	mg/L	NS	NS	–	–	–	–	–	–
Sulfate	mg/L	NS	NS	–	–	–	–	–	–
Temperature	deg F	NS	NS	–	–	–	–	–	–
Total Dissolved Solids (TDS)	mg/L	500	NS	–	–	–	–	–	–
Total Organic Carbon (TOC)	mg/L	NS	NS	–	–	–	–	–	–
Turbidity	NTU	NS	NS	–	–	–	–	–	–

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-22*	*SW-22*	*SW-23*	*SW-23*	*SW-23*	*SW-23*
Sample ID:				*SW-19867-1203-022*	*SW-19867-0504-022*	*SW-19867-08-03-023*	*SW-19867-08-03-025*	*SW-19867-10-03-PK-023*	*SW-19867-10-03-PK-025*
Sample Date:				*12/17/2003*	*5/12/2004*	*8/21/2003*	*8/21/2003*	*10/7/2003*	*10/7/2003*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water Duplicate*	*Surface water*	*Surface water Duplicate*
	Units	*NYSDEC Ambient Water Quality Criteria*[a]	*USEPA Recom. Water Quality Criteria*						
Metals									
Aluminum	mg/L	NS	NS	8.28	0.043 J	0.196 J	0.2	0.125 J	0.0969 J
Antimony	mg/L	NS	NS	ND(0.02)	ND(0.02)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)
Arsenic	mg/L	0.340	NS	0.0278	0.00825 J	0.0122 J	0.0166 J	0.00722 J	ND(0.025)
Barium	mg/L	NS	NS	0.204	0.0412	0.0533	0.0579	0.0236	0.0241
Beryllium	mg/L	NS	NS	0.000469 J	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)
Cadmium	mg/L	NCV[1]	NS	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)
Calcium	mg/L	NS	NS	103	32.6	31.4	35	22.3	22.2
Chromium Total	mg/L	NCV[2]	NS	0.285	0.00208 J	0.0101	0.00953 J	0.13	–
Chromium VI (Hexavalent)	mg/L	0.016	NS	0.00500 J	ND(0.01)	ND(0.01)	ND(0.01)	**0.110**[a]	**0.100**[a]
Cobalt	mg/L	0.110	NS	0.00238 J	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)
Copper	mg/L	NCV[3]	NS	0.0418	0.00389 J	ND(0.02)	0.00372 J	0.00645 J	0.00555 J
Cyanide (total)	mg/L	NS	NS	ND(0.01)	ND(0.01)	0.00216 J	0.00727 J	ND(0.01)	ND(0.01)
Iron	mg/L	0.300	NS	**11.1**[a]	0.146 J	**1.21**[a]	**1.29**[a]	0.076 J	ND(0.2)
Lead	mg/L	NCV[4]	NS	0.0976	0.00557	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)
Magnesium	mg/L	NS	NS	24.1	3.57	3.93	3.97	3.82	3.59
Manganese	mg/L	NS	NS	0.38	0.208	0.101	0.125	0.00907 J	0.00401 J
Mercury	mg/L	0.0014	NS	ND(0.0004)	ND(0.0002)	ND(0.0004)	ND(0.0004)	ND(0.0004)	ND(0.0004)
Nickel	mg/L	NCV[5]	NS	0.0231	0.00271 J	0.00204 J	0.00177 J	ND(0.02)	ND(0.02)
Potassium	mg/L	NS	NS	2.87	1.5	1.83	1.81	2.74	2.28
Selenium	mg/L	NS	NS	ND(0.02)	ND(0.02)	ND(0.02)	0.00775 J	ND(0.02)	ND(0.02)
Silicon	mg/L	NS	NS	–	–	–	–	–	–
Silver	mg/L	NCV[6]	NS	ND(0.01)	ND(0.01)	ND(0.01)	0.00203 J	ND(0.01)	ND(0.01)
Sodium	mg/L	NS	NS	25.7	50.1	72.3	75.4	38.8	36.7
Thallium	mg/L	0.020	NS	ND(0.02)	ND(0.02)	**0.0403**[a]	**0.0419**[a]	ND(0.02)	ND(0.02)
Vanadium	mg/L	0.190	NS	0.0229	ND(0.02)	ND(0.02)	ND(0.02)	0.00578 J	0.00542 J
Zinc	mg/L	NCV[7]	NS	0.247	0.0351	0.0121 B	0.0124 B	0.0214	0.017 J

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-22*	*SW-22*	*SW-23*	*SW-23*	*SW-23*	*SW-23*
Sample ID:				*SW-19867-1203-022*	*SW-19867-0504-022*	*SW-19867-08-03-023*	*SW-19867-08-03-025*	*SW-19867-10-03-PK-023*	*SW-19867-10-03-PK-025*
Sample Date:				*12/17/2003*	*5/12/2004*	*8/21/2003*	*8/21/2003*	*10/7/2003*	*10/7/2003*
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*
							Duplicate		*Duplicate*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*						
SVOAs									
1,2,4-Trichlorobenzene	mg/L	NS	0.07	–	–	–	–	–	–
2,4-Dinitrophenol	mg/L	0.4	NS	–	–	–	–	–	–
2-Methylnaphthalene	mg/L	NS	NS	–	–	–	–	–	–
4-Methylphenol	mg/L	NS	NS	–	–	–	–	–	–
4-Nitrophenol	mg/L	NS	NS	–	–	–	–	–	–
Acenaphthene	mg/L	NS	0.99	–	–	–	–	–	–
bis(2-Ethylhexyl)phthalate	mg/L	NS	0.022	–	–	–	–	–	–
Diethyl phthalate	mg/L	NS	44	–	–	–	–	–	–
Fluoranthene	mg/L	NS	0.14	–	–	–	–	–	–
Naphthalene	mg/L	NS	NS	–	–	–	–	–	–
Phenanthrene	mg/L	NS	NS	–	–	–	–	–	–
Phenol	mg/L	NS	1,700	–	–	–	–	–	–
VOAs									
Acetone	mg/L	NS	NS	–	–	–	–	–	–
General Chemistry									
Alkalinity, Total (As CaCO3)	mg/L	NS	NS	–	–	–	–	–	–
Ammonia	mg/L	NS	NS	–	–	–	–	–	–
Chemical Oxygen Demand (COI	mg/L	NS	NS	–	–	–	–	–	–
Chloride	mg/L	NS	NS	–	–	–	–	–	–
Conductivity	umhos/cm	NS	NS	–	–	–	–	–	–
Dissolved Oxygen	mg/L	5.0	NS	–	–	–	–	–	–
Hardness	mg/L	NS	NS	–	166	–	–	–	–
Nitrate (as N)	mg/L	NS	NS	–	–	–	–	–	–
Oxidation reduction potential	millivolts	NS	NS	–	–	–	–	–	–
pH	s.u.	NS	NS	–	8.18	–	–	9.60	9.60
Phenolics (Total)	mg/L	NS	NS	–	–	–	–	–	–
Sulfate	mg/L	NS	NS	–	–	–	–	–	–
Temperature	deg F	NS	NS	–	–	–	–	–	–
Total Dissolved Solids (TDS)	mg/L	500	NS	–	–	–	–	–	–
Total Organic Carbon (TOC)	mg/L	NS	NS	–	–	–	–	–	–
Turbidity	NTU	NS	NS	–	–	–	–	–	–

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-23*	*SW-23*	*SW-23*	*SW-23*	*SW-23*	*SW-24*
Sample ID:				*SW-19867-1203-023*	*SW-19867-1203-025*	*SW-23*	*SW-19867-0504-023*	*SW-19867-0504-025*	*SW-19867-08-03-024*
Sample Date:				*12/17/2003*	*12/17/2003*	*4/1/2004*	*5/12/2004*	*5/12/2004*	*8/21/2003*
Sample Matrix:				*Surface water*	*Surface water Duplicate*	*Surface water*	*Surface water*	*Surface water Duplicate*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*						
Metals									
Aluminum	mg/L	NS	NS	0.264 J	0.512 J	–	0.407	0.459	1.23
Antimony	mg/L	NS	NS	ND(0.01)	ND(0.01)	–	ND(0.02)	ND(0.02)	ND(0.01)
Arsenic	mg/L	0.340	NS	0.0147 J	0.014 J	–	0.00793 J	0.00974 J	0.024 J
Barium	mg/L	NS	NS	0.0298	0.0307	–	0.0603	0.0611	0.0809
Beryllium	mg/L	NS	NS	ND(0.005)	ND(0.005)	–	ND(0.005)	ND(0.005)	ND(0.005)
Cadmium	mg/L	NCV[1]	NS	ND(0.005)	ND(0.005)	–	ND(0.005)	ND(0.005)	ND(0.005)
Calcium	mg/L	NS	NS	30.5	32.4	–	83.8	86.9	66.1
Chromium Total	mg/L	NCV[2]	NS	0.104	0.0958	–	0.158	0.167	0.0117
Chromium VI (Hexavalent)	mg/L	0.016	NS	**0.0560[a]**	**0.0720[a]**	–	**0.124[a]**	**0.156[a]**	ND(0.01)
Cobalt	mg/L	0.110	NS	ND(0.02)	ND(0.02)	–	ND(0.02)	ND(0.02)	0.000834 J
Copper	mg/L	NCV[3]	NS	ND(0.02)	ND(0.02)	–	0.00729 J	0.0073 J	0.0142 J
Cyanide (total)	mg/L	NS	NS	ND(0.01)	ND(0.01)	–	ND(0.01)	ND(0.01)	0.0066 J
Iron	mg/L	0.300	NS	0.2 J	**0.513 J[a]**	–	0.233	0.252	**6.05[a]**
Lead	mg/L	NCV[4]	NS	ND(0.005)	ND(0.005)	–	0.00676	0.00941	0.0389
Magnesium	mg/L	NS	NS	6.57	6.64	–	2.23	2.21	18.9
Manganese	mg/L	NS	NS	0.0201	0.0295	–	0.0284	0.0278	0.499
Mercury	mg/L	0.0014	NS	ND(0.0004)	ND(0.0004)	–	ND(0.0002)	ND(0.0002)	ND(0.0004)
Nickel	mg/L	NCV[5]	NS	ND(0.02)	ND(0.02)	–	0.00261 J	0.0025 J	0.0053 J
Potassium	mg/L	NS	NS	1.72	1.83	–	3.28	3.39	0.327 J
Selenium	mg/L	NS	NS	ND(0.02)	ND(0.02)	–	ND(0.02)	ND(0.02)	ND(0.02)
Silicon	mg/L	NS	NS	–	–	–	–	–	–
Silver	mg/L	NCV[6]	NS	ND(0.01)	ND(0.01)	–	ND(0.01)	ND(0.01)	ND(0.01)
Sodium	mg/L	NS	NS	35.5	35	–	110	112	27.9
Thallium	mg/L	0.020	NS	ND(0.02)	ND(0.02)	–	ND(0.03)	ND(0.025)	**0.0628[a]**
Vanadium	mg/L	0.190	NS	ND(0.02)	ND(0.02)	–	0.00363 J	ND(0.02)	ND(0.02)
Zinc	mg/L	NCV[7]	NS	0.0277	0.0356	–	0.0288	0.0289	0.148 B

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-23*	*SW-23*	*SW-23*	*SW-23*	*SW-23*	*SW-24*
Sample ID:				*SW-19867-1203-023*	*SW-19867-1203-025*	*SW-23*	*SW-19867-0504-023*	*SW-19867-0504-025*	*SW-19867-08-03-024*
Sample Date:				*12/17/2003*	*12/17/2003*	*4/1/2004*	*5/12/2004*	*5/12/2004*	*8/21/2003*
Sample Matrix:				*Surface water*	*Surface water Duplicate*	*Surface water*	*Surface water*	*Surface water Duplicate*	*Surface water*
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*						
SVOAs									
1,2,4-Trichlorobenzene	mg/L	NS	0.07	–	–	–	–	–	–
2,4-Dinitrophenol	mg/L	0.4	NS	–	–	–	–	–	–
2-Methylnaphthalene	mg/L	NS	NS	–	–	–	–	–	–
4-Methylphenol	mg/L	NS	NS	–	–	–	–	–	–
4-Nitrophenol	mg/L	NS	NS	–	–	–	–	–	–
Acenaphthene	mg/L	NS	0.99	–	–	–	–	–	–
bis(2-Ethylhexyl)phthalate	mg/L	NS	0.022	–	–	–	–	–	–
Diethyl phthalate	mg/L	NS	44	–	–	–	–	–	–
Fluoranthene	mg/L	NS	0.14	–	–	–	–	–	–
Naphthalene	mg/L	NS	NS	–	–	–	–	–	–
Phenanthrene	mg/L	NS	NS	–	–	–	–	–	–
Phenol	mg/L	NS	1,700	–	–	–	–	–	–
VOAs									
Acetone	mg/L	NS	NS	–	–	–	–	–	–
General Chemistry									
Alkalinity, Total (As CaCO3)	mg/L	NS	NS	–	–	–	–	–	–
Ammonia	mg/L	NS	NS	–	–	–	–	–	–
Chemical Oxygen Demand (COI	mg/L	NS	NS	–	–	–	–	–	–
Chloride	mg/L	NS	NS	–	–	–	–	–	–
Conductivity	umhos/cm	NS	NS	–	–	–	–	–	–
Dissolved Oxygen	mg/L	5.0	NS	–	–	–	–	–	–
Hardness	mg/L	NS	NS	–	–	–	259	287	–
Nitrate (as N)	mg/L	NS	NS	–	–	–	–	–	–
Oxidation reduction potential	millivolts	NS	NS	–	–	–	–	–	–
pH	s.u.	NS	NS	–	–	9.25	10.69	8.01	–
Phenolics (Total)	mg/L	NS	NS	–	–	–	–	–	–
Sulfate	mg/L	NS	NS	–	–	–	–	–	–
Temperature	deg F	NS	NS	–	–	–	–	–	–
Total Dissolved Solids (TDS)	mg/L	500	NS	–	–	–	–	–	–
Total Organic Carbon (TOC)	mg/L	NS	NS	–	–	–	–	–	–
Turbidity	NTU	NS	NS	–	–	–	–	–	–

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-24*	*SW-24*	*SW-24*	*SW-24*	*SW-103*	*SW-105*			
Sample ID:				*SW-19867-10-03-PK-024*	*SW-19867-1203-024*	*SW-24*	*SW-19867-0504-024*	*SW-103*	*SW-105*			
Sample Date:				*10/7/2003*	*12/17/2003*	*4/1/2004*	*5/12/2004*	*1/1/1989*	*1/1/1989*			
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*			
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*							# Smp	# Dtcts	Min
Metals												
Aluminum	mg/L	NS	NS	0.215	0.164 J	--	0.339	0.051	0.188	62	54	0.0258 J
Antimony	mg/L	NS	NS	ND(0.01)	ND(0.01)	--	ND(0.02)	--	--	60	5	0.00744 J
Arsenic	mg/L	0.340	NS	0.0207 J	0.0115 J	--	0.00964 J	--	--	60	44	0.00722 J
Barium	mg/L	NS	NS	0.0483	0.0369	--	0.0698	0.0356	0.0494	115	103	0.0236
Beryllium	mg/L	NS	NS	ND(0.005)	ND(0.005)	--	ND(0.005)	--	--	60	5	0.000156 J
Cadmium	mg/L	NCV[1]	NS	ND(0.005)	ND(0.005)	--	ND(0.005)	ND(0.005)	ND(0.005)	81	1	0.00463 J
Calcium	mg/L	NS	NS	39.1	42.3	--	60	39.1	33.7	82	82	22.2
Chromium Total	mg/L	NCV[2]	NS	0.00241 J	0.00783 J	--	0.00199 J	ND(0.01)	ND(0.01)	117	114	0.000768 J
Chromium VI (Hexavalent)	mg/L	0.016	NS	ND(0.01)	ND(0.01)	--	ND(0.01)	ND(0.01)	ND(0.01)	106	80	0.00400 J
Cobalt	mg/L	0.110	NS	ND(0.02)	ND(0.02)	--	0.00133 J	--	--	51	16	0.000612 J
Copper	mg/L	NCV[3]	NS	0.0456	ND(0.02)	--	0.0038 J	ND(0.025)	ND(0.025)	62	36	0.00343 J
Cyanide (total)	mg/L	NS	NS	ND(0.01)	ND(0.01)	--	ND(0.01)	--	--	59	11	0.00216 J
Iron	mg/L	0.300	NS	**1[a]**	0.113 J	--	**3.37[a]**	0.0786	**0.951[a]**	134	98	0.02
Lead	mg/L	NCV[4]	NS	0.0085	ND(0.005)	--	0.0127	ND(0.003)	0.0092 J	83	41	0.002
Magnesium	mg/L	NS	NS	12.6	13.6	--	18.3	17.2	11	83	80	0.0581 J
Manganese	mg/L	NS	NS	0.286	0.0154	--	0.559	0.155	0.151	134	91	0.00165 J
Mercury	mg/L	0.0014	NS	ND(0.0004)	ND(0.0004)	--	ND(0.0002)	--	--	60	1	0.0013
Nickel	mg/L	NCV[5]	NS	ND(0.02)	ND(0.02)	--	0.00257 J	--	--	60	29	0.00177 J
Potassium	mg/L	NS	NS	8.4	0.341 J	--	1.35 J	6.91	5.29	83	83	0.327 J
Selenium	mg/L	NS	NS	0.00994 J	ND(0.02)	--	0.0148 J	ND(0.005) R	ND(0.005) R	60	21	0.0059
Silicon	mg/L	NS	NS	--	--	--	--	--	--	49	45	0.05
Silver	mg/L	NCV[6]	NS	ND(0.01)	ND(0.01)	--	ND(0.01)	--	--	60	2	0.0016 J
Sodium	mg/L	NS	NS	8.6	41.9	--	70.3	13.4	8.54	83	83	1.47 J
Thallium	mg/L	0.020	NS	ND(0.02)	ND(0.02)	--	ND(0.03)	ND(0.01) R	ND(0.01) R	60	14	0.00776 J
Vanadium	mg/L	0.190	NS	0.00369 J	ND(0.02)	--	0.00539 J	ND(0.05)	ND(0.05)	53	21	0.00334 J
Zinc	mg/L	NCV[7]	NS	0.0583	0.0569	--	0.062	ND(0.02)	0.0404	113	79	0.00218 J

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*SW-24*	*SW-24*	*SW-24*	*SW-24*	*SW-103*	*SW-105*			
Sample ID:				*SW-19867-10-03-PK-024*	*SW-19867-1203-024*	*SW-24*	*SW-19867-0504-024*	*SW-103*	*SW-105*			
Sample Date:				*10/7/2003*	*12/17/2003*	*4/1/2004*	*5/12/2004*	*1/1/1989*	*1/1/1989*			
Sample Matrix:				*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*	*Surface water*			
	Units	*NYSDEC Ambient Water Quality Criteria**	*USEPA Recom. Water Quality Criteria*									
SVOAs												
1,2,4-Trichlorobenzene	mg/L	NS	0.07	–	–	–	–	ND(0.01)	ND(0.01)	2	0	N/A
2,4-Dinitrophenol	mg/L	0.4	NS	–	–	–	–	ND(0.025)	ND(0.025)	2	0	N/A
2-Methylnaphthalene	mg/L	NS	NS	–	–	–	–	ND(0.01)	ND(0.01)	2	0	N/A
4-Methylphenol	mg/L	NS	NS	–	–	–	–	ND(0.01)	ND(0.01)	2	0	N/A
4-Nitrophenol	mg/L	NS	NS	–	–	–	–	ND(0.025)	ND(0.025)	2	0	N/A
Acenaphthene	mg/L	NS	0.99	–	–	–	–	ND(0.01)	ND(0.01)	2	0	N/A
bis(2-Ethylhexyl)phthalate	mg/L	NS	0.022	–	–	–	–	ND(0.01)	0.001 JJ	2	1	0.001 JJ
Diethyl phthalate	mg/L	NS	44	–	–	–	–	0.001 JJ	ND(0.01)	2	1	0.001 JJ
Fluoranthene	mg/L	NS	0.14	–	–	–	–	ND(0.01)	ND(0.01)	2	0	N/A
Naphthalene	mg/L	NS	NS	–	–	–	–	ND(0.01)	ND(0.01)	2	0	N/A
Phenanthrene	mg/L	NS	NS	–	–	–	–	ND(0.01)	ND(0.01)	2	0	N/A
Phenol	mg/L	NS	1,700	–	–	–	–	ND(0.01)	ND(0.01)	2	0	N/A
VOAs												
Acetone	mg/L	NS	NS	–	–	–	–	–	–	1	1	0.012
General Chemistry												
Alkalinity, Total (As CaCO3)	mg/L	NS	NS	–	–	–	–	–	–	30	30	210
Ammonia	mg/L	NS	NS	–	–	–	–	–	–	30	29	1
Chemical Oxygen Demand (COI	mg/L	NS	NS	–	–	–	–	–	–	102	99	2
Chloride	mg/L	NS	NS	–	–	–	–	–	–	30	30	0.46 D
Conductivity	umhos/cm	NS	NS	–	–	–	–	–	–	102	102	135
Dissolved Oxygen	mg/L	5.0	NS	–	–	–	–	–	–	26	26	1.26
Hardness	mg/L	NS	NS	–	–	–	275	–	–	45	45	166
Nitrate (as N)	mg/L	NS	NS	–	–	–	–	–	–	30	30	0.04
Oxidation reduction potential	millivolts	NS	NS	–	–	–	–	–	–	34	34	-323
pH	s.u.	NS	NS	8.20	–	8.89	8.01	7.5	7.2	185	185	6.16
Phenolics (Total)	mg/L	NS	NS	–	–	–	–	–	–	30	29	0.007
Sulfate	mg/L	NS	NS	–	–	–	–	–	–	30	30	10.8
Temperature	deg F	NS	NS	–	–	–	–	–	–	30	30	23
Total Dissolved Solids (TDS)	mg/L	500	NS	–	–	–	–	–	–	93	93	62
Total Organic Carbon (TOC)	mg/L	NS	NS	–	–	–	–	–	–	102	100	1
Turbidity	NTU	NS	NS	–	–	–	–	–	–	30	30	4

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:								
Sample ID:								
Sample Date:								
Sample Matrix:								
	Units	***NYSDEC Ambient Water Quality Criteria****	***USEPA Recom. Water Quality Criteria***					
Metals								
				Max	Loc (Date)	Exceed a	Exceed b	Exceed Total
Aluminum	mg/L	NS	NS	66.7	SW-11 (10/7/2003)	N/A	N/A	0
Antimony	mg/L	NS	NS	0.0357 B	SW-6A (10/23/1997)	N/A	N/A	0
Arsenic	mg/L	0.340	NS	0.0648	SW-11 (10/7/2003)	0	N/A	0
Barium	mg/L	NS	NS	6.3	SW-6A (2/24/1984)	N/A	N/A	0
Beryllium	mg/L	NS	NS	0.00304 J	SW-11 (10/7/2003)	N/A	N/A	0
Cadmium	mg/L	NCV[1]	NS	0.00463 J	SW-6A (10/23/1997)	N/A	N/A	0
Calcium	mg/L	NS	NS	810	SW-6A (6/30/1993)	N/A	N/A	0
Chromium Total	mg/L	NCV[2]	NS	6.39	SW-11 (10/7/2003)	N/A	N/A	0
Chromium VI (Hexavalent)	mg/L	0.016	NS	1.27	SW-7 (4/7/1981)	73	N/A	73
Cobalt	mg/L	0.110	NS	0.0753	SW-11 (10/7/2003)	0	N/A	0
Copper	mg/L	NCV[3]	NS	1.09	SW-11 (10/7/2003)	N/A	N/A	0
Cyanide (total)	mg/L	NS	NS	0.00869 J	SW-6A (1/22/1998)	N/A	N/A	0
Iron	mg/L	0.300	NS	151	SW-11 (10/7/2003)	40	N/A	40
Lead	mg/L	NCV[4]	NS	0.865	SW-11 (10/7/2003)	N/A	N/A	0
Magnesium	mg/L	NS	NS	376	SW-6A (12/13/1995)	N/A	N/A	0
Manganese	mg/L	NS	NS	19.2	SW-11 (10/7/2003)	N/A	N/A	0
Mercury	mg/L	0.0014	NS	0.0013	SW-11 (10/7/2003)	0	N/A	0
Nickel	mg/L	NCV[5]	NS	0.544	SW-11 (10/7/2003)	N/A	N/A	0
Potassium	mg/L	NS	NS	93	SW-7 (1/24/1996)	N/A	N/A	0
Selenium	mg/L	NS	NS	0.0957	SW-11 (10/7/2003)	N/A	N/A	0
Silicon	mg/L	NS	NS	6.4	SW-7 (6/22/1981)	N/A	N/A	0
Silver	mg/L	NCV[6]	NS	0.00203 J	SW-6A (10/23/1997)	N/A	N/A	0
Sodium	mg/L	NS	NS	112	SW-23 (5/12/2004)	N/A	N/A	0
Thallium	mg/L	0.020	NS	0.0936	SW-20 (8/21/2003)	10	N/A	10
Vanadium	mg/L	0.190	NS	0.231	SW-11 (10/7/2003)	1	N/A	1
Zinc	mg/L	NCV[7]	NS	2.84	SW-11 (10/7/2003)	N/A	N/A	0
						N/A	N/A	0

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

		NYSDEC	*USEPA*					
	Units	*Ambient Water Quality Criteria**	*Recom. Water Quality Criteria*					
SVOAs						N/A	N/A	0
						N/A	N/A	0
1,2,4-Trichlorobenzene	mg/L	NS	0.07	N/A	SW-103 (1/1/1989)	N/A	N/A	0
2,4-Dinitrophenol	mg/L	0.4	NS	N/A	SW-103 (1/1/1989)	N/A	N/A	0
2-Methylnaphthalene	mg/L	NS	NS	N/A	SW-103 (1/1/1989)	N/A	N/A	0
4-Methylphenol	mg/L	NS	NS	N/A	SW-103 (1/1/1989)	N/A	N/A	0
4-Nitrophenol	mg/L	NS	NS	N/A	SW-103 (1/1/1989)	N/A	N/A	0
Acenaphthene	mg/L	NS	0.99	N/A	SW-103 (1/1/1989)	N/A	N/A	0
bis(2-Ethylhexyl)phthalate	mg/L	NS	0.022	0.001 JJ	SW-103 (1/1/1989)	N/A	0	0
Diethyl phthalate	mg/L	NS	44	0.001 JJ	SW-105 (1/1/1989)	N/A	0	0
Fluoranthene	mg/L	NS	0.14	N/A	SW-103 (1/1/1989)	N/A	N/A	0
Naphthalene	mg/L	NS	NS	N/A	SW-103 (1/1/1989)	N/A	N/A	0
Phenanthrene	mg/L	NS	NS	N/A	SW-103 (1/1/1989)	N/A	N/A	0
Phenol	mg/L	NS	1,700	N/A	SW-103 (1/1/1989)	N/A	N/A	0
VOAs								
Acetone	mg/L	NS	NS	0.012	SB-2 Pond (11/7/1996)	N/A	N/A	0
General Chemistry								
Alkalinity, Total (As CaCO3)	mg/L	NS	NS	1740	SW-7 (1/30/1997)	N/A	N/A	0
Ammonia	mg/L	NS	NS	16	SW-7 (1/24/1996)	N/A	N/A	0
Chemical Oxygen Demand (COI	mg/L	NS	NS	320	SW-7 (10/2/1986)	N/A	N/A	0
Chloride	mg/L	NS	NS	430	SW-6A (10/27/1995)	N/A	N/A	0
Conductivity	umhos/cm	NS	NS	8410	SW-7 (1/30/1997)	N/A	N/A	0
Dissolved Oxygen	mg/L	5.0	NS	9.95	SW-7 (10/27/1995)	14	N/A	14
Hardness	mg/L	NS	NS	2000	SW-6A (6/30/1993)	N/A	N/A	0
Nitrate (as N)	mg/L	NS	NS	6.8 D	SW-6A (10/23/1997)	N/A	N/A	0
Oxidation reduction potential	millivolts	NS	NS	153	SW-6A (7/11/1996)	N/A	N/A	0
pH	s.u.	NS	NS	15.19	SW-7 (1/24/1996)	N/A	N/A	0
Phenolics (Total)	mg/L	NS	NS	0.04	SW-6A (9/20/1994)	N/A	N/A	0
Sulfate	mg/L	NS	NS	120	SW-7 (1/24/1996)	N/A	N/A	0
Temperature	deg F	NS	NS	85	SW-6A (6/6/1995)	N/A	N/A	0
Total Dissolved Solids (TDS)	mg/L	500	NS	1950	SW-7 (7/8/1980)	82	N/A	82
Total Organic Carbon (TOC)	mg/L	NS	NS	63	SW-7 (10/2/1986)	N/A	N/A	0
Turbidity	NTU	NS	NS	215	SW-7 (6/28/1994)	N/A	N/A	0

TABLE B.6

SURFACE WATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Notes:

a	-	Indicates an exceedance of NYSDEC Ambient Water Quality Criteria
b	-	Indicates an exceedance of USEPA National Recommended Water Quality Criteria (Updated 2002)
NS	-	No Standard
ND ()		Non detect at associated value
--	-	No Data
J	-	Estimated Value
NCV	-	No calculated value. Criteria depends on hardness values.
(1)	-	AWQC for cadmium = (0.85) exp (1.128 [ln (ppm hardness)] - 3.6876)
(2)	-	AWQC for chromium (tota = (0.316) exp (0.819 [ln (ppm hardness)] + 3.7256)
(3)	-	AWQC for copper = (0.96) exp (0.9422 [ln (ppm hardness)] - 1.7)
(4)	-	AWQC for lead = {1.46203 - [ln (hardness) (0.145712)]} exp (1.273 [ln (ppm hardness)] - 1.052)
(5)	-	AWQC for nickel = (0.998) exp (0.846 [ln (hardness)] +2.255)
(6)	-	AWQC for silver = exp (1.72 [ln (ppm hardness)] - 6.52)
(7)	-	AWQC for zinc = (0.978) exp (0.8473 [ln (ppm hardness)] +0.884)
*	-	The value for Human Consumption of Fish in fresh waters (H(FC)) was used first. If no value exists, then Fish Survival in fresh waters (A(A)) was used

TABLE B.7

SHALLOW GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-15*	*MW-15*	*MW-15*	*MW-16*	*MW-16*
Sample ID:				*GW-19867-08-03-PK-004*	*GW-19867-08-03-PK-005*	*GW-19867-10-03-PK-024*	*GW-19867-08-03-PK-019*	*GW-19867-10-03-PK-025*
Sample Date:				*8/15/2003*	*8/15/2003*	*10/22/2003*	*8/25/2003*	*10/22/2003*
Sample Matrix:				*Shallow*	*Shallow*	*Shallow*	*Shallow*	*Shallow*
	Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]					
Metals								
Aluminum	mg/L	NS	NS	5.14	--	1.18	0.124	ND(0.2)
Aluminum (Dissolved)	mg/L	NS	NS	--	ND(0.2)	--	--	--
Antimony	mg/L	0.003	NS	ND(0.01)	--	ND(0.01)	ND(0.01)	ND(0.01)
Antimony (Dissolved)	mg/L	0.003	NS	--	ND(0.01)	--	--	--
Arsenic	mg/L	0.025	NS	**0.0276**[a]	--	ND(0.025)	0.0139	ND(0.025)
Arsenic (Dissolved)	mg/L	0.025	NS	--	0.0217 J	--	--	--
Barium	mg/L	1	NS	0.0901	--	0.0698	0.0444	0.0396
Barium (Dissolved)	mg/L	1	NS	--	0.06	--	--	--
Beryllium	mg/L	NS	0.003	ND(0.005)	--	ND(0.005)	ND(0.005)	ND(0.005)
Beryllium (Dissolved)	mg/L	NS	0.003	--	ND(0.005)	--	--	--
Cadmium	mg/L	0.005	NS	ND(0.005)	--	ND(0.005)	ND(0.005)	ND(0.005)
Cadmium (Dissolved)	mg/L	0.005	NS	--	ND(0.005)	--	--	--
Calcium	mg/L	NS	NS	155	--	98.8	145	142
Calcium (Dissolved)	mg/L	NS	NS	--	97.3	--	--	--
Chromium Total	mg/L	0.05	NS	0.00689 J	--	0.00106 J	0.00134	ND(0.01)
Chromium Total (Dissolved)	mg/L	0.05	NS	--	0.000859 J	--	--	--
Chromium VI (Hexavalent)	mg/L	0.05	NS	ND(0.01)	--	0.0410	ND(0.01)	ND(0.01)
Chromium VI (Hexavalent) (Dissolvec	mg/L	0.05	NS	--	ND(0.01)	--	--	--
Cobalt	mg/L	NS	NS	0.00264 J	--	ND(0.02)	ND(0.02)	ND(0.02)
Cobalt (Dissolved)	mg/L	NS	NS	--	0.00135 J	--	--	--
Copper	mg/L	0.2	NS	0.0793	--	ND(0.02)	0.00628	ND(0.02)
Copper (Dissolved)	mg/L	0.2	NS	--	0.0102 J	--	--	--
Cyanide (Dissolved)	mg/L	0.2	NS	--	ND(0.01)	--	--	--
Cyanide (total)	mg/L	0.2	NS	ND(0.01)	--	ND(0.01)	ND(0.01)	ND(0.01)
Iron	mg/L	0.3	NS	**6.53**[a]	--	**3.93**[a]	ND(0.2)	**0.979**[a]
Iron (Dissolved)	mg/L	0.3	NS	--	**2.01**[a]	--	--	--
Lead	mg/L	0.025	NS	**0.123**[a]	--	**0.0251**[a]	ND(0.005)	ND(0.005)
Lead (Dissolved)	mg/L	0.025	NS	--	0.00751	--	--	--

TABLE B.7

SHALLOW GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-15*	*MW-15*	*MW-15*	*MW-16*	*MW-16*
Sample ID:				*GW-19867-08-03-PK-004*	*GW-19867-08-03-PK-005*	*GW-19867-10-03-PK-024*	*GW-19867-08-03-PK-019*	*GW-19867-10-03-PK-025*
Sample Date:				*8/15/2003*	*8/15/2003*	*10/22/2003*	*8/25/2003*	*10/22/2003*
Sample Matrix:				*Shallow*	*Shallow*	*Shallow*	*Shallow*	*Shallow*
	Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]					
Magnesium	mg/L	NS	35	**71.9**[b]	–	**37.2**[b]	**69.1**[b]	**74.7**[b]
Magnesium (Dissolved)	mg/L	NS	35	–	**39.1**[b]	–	–	–
Manganese	mg/L	0.3	NS	**0.606**[a]	–	**0.362**[a]	0.0217	0.188
Manganese (Dissolved)	mg/L	0.3	NS	–	**0.421**[a]	–	–	–
Mercury	mg/L	0.0007	NS	ND(0.0004)	–	ND(0.0004)	ND(0.0004)	ND(0.0004)
Mercury (Dissolved)	mg/L	0.0007	NS	–	ND(0.0004)	–	–	–
Nickel	mg/L	0.1	NS	0.00178 J	–	ND(0.02)	ND(0.02)	ND(0.02)
Nickel (Dissolved)	mg/L	0.1	NS	–	ND(0.02)	–	–	–
Potassium	mg/L	NS	NS	3.13	–	2.78	3.15	3.59
Potassium (Dissolved)	mg/L	NS	NS	–	1.93	–	–	–
Selenium	mg/L	0.010	NS	**0.0302**[a]	–	**0.035**[a]	ND(0.02)	**0.052**[a]
Selenium (Dissolved)	mg/L	0.010	NS	–	**0.0173 J**[a]	–	–	–
Silver	mg/L	0.050	NS	ND(0.01)	–	ND(0.01)	ND(0.01)	ND(0.01)
Silver (Dissolved)	mg/L	0.050	NS	–	ND(0.01)	–	–	–
Sodium	mg/L	20	NS	**32.2**[a]	–	**29.8**[a]	**40.3**[a]	**34.9**[a]
Sodium (Dissolved)	mg/L	20	NS	–	**30.1**[a]	–	–	–
Thallium	mg/L	NS	0.0005	ND(0.02)	–	ND(0.02)	ND(0.02)	ND(0.02)
Thallium (Dissolved)	mg/L	NS	0.0005	–	ND(0.02)	–	–	–
Vanadium	mg/L	NS	NS	0.00528 J	–	0.014 J	ND(0.02)	0.0157 J
Vanadium (Dissolved)	mg/L	NS	NS	–	ND(0.02)	–	–	–
Zinc	mg/L	NS	2	0.144	–	0.0393	0.0176	0.00752 J
Zinc (Dissolved)	mg/L	NS	2	–	0.00948 J	–	–	–
Wet								
pH (water)	s.u.	6.5-8.5	NS	6.93	6.93	7.17	6.80	7.21

TABLE B.7

SHALLOW GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-17*	*MW-17*	*MW-18*	*MW-18*	*MW-19*
Sample ID:				*GW-19867-08-03-PK-024*	*GW-19867-10-03-PK-015*	*GW-19867-08-03-PK-023*	*GW-19867-10-03-PK-018*	*GW-19867-08-03-PK-003*
Sample Date:				*8/28/2003*	*10/6/2003*	*8/28/2003*	*10/6/2003*	*8/15/2003*
Sample Matrix:				*Shallow*	*Shallow*	*Shallow*	*Shallow*	*Shallow*
	Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]					
Metals								
Aluminum	mg/L	NS	NS	38.9	38	4.83	3.18	64.3
Aluminum (Dissolved)	mg/L	NS	NS	--	--	--	--	--
Antimony	mg/L	0.003	NS	ND(0.01)	ND(0.01)	ND(0.01)	**0.01**[a]	ND(0.01)
Antimony (Dissolved)	mg/L	0.003	NS	--	--	--	--	--
Arsenic	mg/L	0.025	NS	0.0224 J	**0.0288**[a]	0.0203 J	0.0136 J	**0.0437**[a]
Arsenic (Dissolved)	mg/L	0.025	NS	--	--	--	--	--
Barium	mg/L	1	NS	0.316	0.349	0.049	0.0226	0.388
Barium (Dissolved)	mg/L	1	NS	--	--	--	--	--
Beryllium	mg/L	NS	0.003	0.00219 J	0.00177 J	ND(0.005)	ND(0.005)	0.00208 J
Beryllium (Dissolved)	mg/L	NS	0.003	--	--	--	--	--
Cadmium	mg/L	0.005	NS	0.00211 J	0.00395 J	ND(0.005)	ND(0.005)	ND(0.005)
Cadmium (Dissolved)	mg/L	0.005	NS	--	--	--	--	--
Calcium	mg/L	NS	NS	317	305	134	73.4	298
Calcium (Dissolved)	mg/L	NS	NS	--	--	--	--	--
Chromium Total	mg/L	0.05	NS	0.0486	0.0461	**0.358**[a]	**0.332**[a]	**0.655**[a]
Chromium Total (Dissolved)	mg/L	0.05	NS	--	--	--	--	--
Chromium VI (Hexavalent)	mg/L	0.05	NS	ND(0.01)	ND(0.01)	**0.181**[a]	ND(0.01)	ND(0.01)
Chromium VI (Hexavalent) (Dissolvec	mg/L	0.05	NS	--	--	--	--	--
Cobalt	mg/L	NS	NS	0.0303	0.0285	0.00442 J	0.00167 J	0.0282
Cobalt (Dissolved)	mg/L	NS	NS	--	--	--	--	--
Copper	mg/L	0.2	NS	0.0955	0.0822	0.0794	0.0318	0.105
Copper (Dissolved)	mg/L	0.2	NS	--	--	--	--	--
Cyanide (Dissolved)	mg/L	0.2	NS	--	--	--	--	--
Cyanide (total)	mg/L	0.2	NS	0.00331	ND(0.01) UJ	ND(0.01)	ND(0.01) UJ	ND(0.01)
Iron	mg/L	0.3	NS	**55.3**[a]	**62.8**[a]	**2.03**[a]	**2.18**[a]	**85.5**[a]
Iron (Dissolved)	mg/L	0.3	NS	--	--	--	--	--
Lead	mg/L	0.025	NS	**0.283**[a]	**0.379**[a]	ND(0.005)	ND(0.005)	**0.0443**[a]
Lead (Dissolved)	mg/L	0.025	NS	--	--	--	--	--

TABLE B.7

SHALLOW GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-17*	*MW-17*	*MW-18*	*MW-18*	*MW-19*
Sample ID:				*GW-19867-08-03-PK-024*	*GW-19867-10-03-PK-015*	*GW-19867-08-03-PK-023*	*GW-19867-10-03-PK-018*	*GW-19867-08-03-PK-003*
Sample Date:				*8/28/2003*	*10/6/2003*	*8/28/2003*	*10/6/2003*	*8/15/2003*
Sample Matrix:				*Shallow*	*Shallow*	*Shallow*	*Shallow*	*Shallow*
	Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]					
Magnesium	mg/L	NS	35	**120**[b]	**120**[b]	1.32 J	5.87	**43.9**[b]
Magnesium (Dissolved)	mg/L	NS	35	–	–	–	–	–
Manganese	mg/L	0.3	NS	**2.29**[a]	**2.47**[a]	0.0369	0.0269	**2.43**[a]
Manganese (Dissolved)	mg/L	0.3	NS	–	–	–	–	–
Mercury	mg/L	0.0007	NS	0.000291 J	0.000072 J	0.0000911 J	ND(0.0004)	0.0000718 J
Mercury (Dissolved)	mg/L	0.0007	NS	–	–	–	–	–
Nickel	mg/L	0.1	NS	0.0512	0.0555	0.0135 J	ND(0.02)	0.0769
Nickel (Dissolved)	mg/L	0.1	NS	–	–	–	–	–
Potassium	mg/L	NS	NS	9.09	8.57	3.35	2.17	21.4
Potassium (Dissolved)	mg/L	NS	NS	–	–	–	–	–
Selenium	mg/L	0.010	NS	**0.0501**[a]	**0.0739**[a]	**0.0105 J**[a]	**0.0198 J**[a]	**0.054**[a]
Selenium (Dissolved)	mg/L	0.010	NS	–	–	–	–	–
Silver	mg/L	0.050	NS	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)
Silver (Dissolved)	mg/L	0.050	NS	–	–	–	–	–
Sodium	mg/L	20	NS	**40.8**[a]	**39.7**[a]	**55.8**[a]	**33.6**[a]	**71.8**[a]
Sodium (Dissolved)	mg/L	20	NS	–	–	–	–	–
Thallium	mg/L	NS	0.0005	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)
Thallium (Dissolved)	mg/L	NS	0.0005	–	–	–	–	–
Vanadium	mg/L	NS	NS	0.063	0.0772	0.0268	0.0345	0.161
Vanadium (Dissolved)	mg/L	NS	NS	–	–	–	–	–
Zinc	mg/L	NS	2	1.44	1.79	0.0548	0.171	0.213
Zinc (Dissolved)	mg/L	NS	2	–	–	–	–	–
Wet								
pH (water)	s.u.	6.5-8.5	NS	7.49	7.34	**11.64**[a]	–	**11.29**[a]

TABLE B.7

SHALLOW GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-19*	*MW-20*	*MW-20*	*MW-20*	*MW-20*
Sample ID:				*GW-19867-10-03-PK-001*	*GW-19867-08-03-PK-009*	*GW-19867-08-03-PK-010*	*GW-19867-10-03-PK-005*	*GW-19867-10-03-PK-006*
Sample Date:				*10/1/2003*	*8/18/2003*	*8/18/2003*	*10/1/2003*	*10/1/2003*
Sample Matrix:				*Shallow*	*Shallow*	*Shallow*	*Shallow*	*Shallow*
	Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]					
Metals								
Aluminum	mg/L	NS	NS	12.8	1.82	–	2.21	–
Aluminum (Dissolved)	mg/L	NS	NS	–	–	1.66	–	1.82
Antimony	mg/L	0.003	NS	ND(0.01)	ND(0.01)	–	ND(0.01)	–
Antimony (Dissolved)	mg/L	0.003	NS	–	–	ND(0.01)	–	ND(0.01)
Arsenic	mg/L	0.025	NS	**0.0267**[a]	0.022 J	–	0.0191 J	–
Arsenic (Dissolved)	mg/L	0.025	NS	–	–	0.0232 J	–	0.0217 J
Barium	mg/L	1	NS	0.0858	0.186	–	0.071	–
Barium (Dissolved)	mg/L	1	NS	–	–	0.194	–	0.0718
Beryllium	mg/L	NS	0.003	0.000467 J	ND(0.005)	–	ND(0.005)	–
Beryllium (Dissolved)	mg/L	NS	0.003	–	–	ND(0.005)	–	ND(0.005)
Cadmium	mg/L	0.005	NS	ND(0.005)	ND(0.005)	–	ND(0.005)	–
Cadmium (Dissolved)	mg/L	0.005	NS	–	–	ND(0.005)	–	ND(0.005)
Calcium	mg/L	NS	NS	112	219	–	126	–
Calcium (Dissolved)	mg/L	NS	NS	–	–	228	–	125
Chromium Total	mg/L	0.05	NS	**0.0869**[a]	0.00165 J	–	0.0104	–
Chromium Total (Dissolved)	mg/L	0.05	NS	–	–	0.00163 J	–	ND(0.01)
Chromium VI (Hexavalent)	mg/L	0.05	NS	ND(0.01) UJ	ND(0.01)	–	0.0180 J	–
Chromium VI (Hexavalent) (Dissolvec	mg/L	0.05	NS	–	–	ND(0.01)	–	ND(0.01) UJ
Cobalt	mg/L	NS	NS	0.00423 J	ND(0.02)	–	ND(0.02)	–
Cobalt (Dissolved)	mg/L	NS	NS	–	–	ND(0.02)	–	ND(0.02)
Copper	mg/L	0.2	NS	0.0191 J	ND(0.02)	–	ND(0.02)	–
Copper (Dissolved)	mg/L	0.2	NS	–	–	ND(0.02)	–	ND(0.02)
Cyanide (Dissolved)	mg/L	0.2	NS	–	–	–	–	ND(0.01)
Cyanide (total)	mg/L	0.2	NS	ND(0.01)	ND(0.01)	–	ND(0.01)	–
Iron	mg/L	0.3	NS	**16**[a]	ND(0.2)	–	**0.487**[a]	–
Iron (Dissolved)	mg/L	0.3	NS	–	–	ND(0.2)	–	ND(0.2)
Lead	mg/L	0.025	NS	0.00926	ND(0.005)	–	ND(0.005)	–
Lead (Dissolved)	mg/L	0.025	NS	–	–	ND(0.005)	–	ND(0.005)

TABLE B.7

SHALLOW GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-19*	*MW-20*	*MW-20*	*MW-20*	*MW-20*
Sample ID:				*GW-19867-10-03-PK-001*	*GW-19867-08-03-PK-009*	*GW-19867-08-03-PK-010*	*GW-19867-10-03-PK-005*	*GW-19867-10-03-PK-006*
Sample Date:				*10/1/2003*	*8/18/2003*	*8/18/2003*	*10/1/2003*	*10/1/2003*
Sample Matrix:				*Shallow*	*Shallow*	*Shallow*	*Shallow*	*Shallow*
	Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]					
Magnesium	mg/L	NS	35	8.65	0.0388 J	–	0.613 J	–
Magnesium (Dissolved)	mg/L	NS	35	–	–	ND(1.5)	–	ND(1.5)
Manganese	mg/L	0.3	NS	**0.447**[a]	ND(0.01)	–	0.0402	–
Manganese (Dissolved)	mg/L	0.3	NS	–	–	ND(0.01)	–	ND(0.01)
Mercury	mg/L	0.0007	NS	ND(0.0004)	ND(0.0004)	–	ND(0.0004)	–
Mercury (Dissolved)	mg/L	0.0007	NS	–	–	ND(0.0004)	–	ND(0.0004)
Nickel	mg/L	0.1	NS	0.0221	0.00459 J	–	0.00806 J	–
Nickel (Dissolved)	mg/L	0.1	NS	–	–	0.00516 J	–	0.00714 J
Potassium	mg/L	NS	NS	11.5	7.56	–	5.48	–
Potassium (Dissolved)	mg/L	NS	NS	–	–	7.57	–	5.9
Selenium	mg/L	0.010	NS	**0.0169 J**[a]	0.00669 J	–	ND(0.02)	–
Selenium (Dissolved)	mg/L	0.010	NS	–	–	ND(0.02)	–	ND(0.02)
Silver	mg/L	0.050	NS	ND(0.01)	ND(0.01)	–	ND(0.01)	–
Silver (Dissolved)	mg/L	0.050	NS	–	–	ND(0.01)	–	ND(0.01)
Sodium	mg/L	20	NS	**67.3**[a]	**66.3**[a]	–	**58.2**[a]	–
Sodium (Dissolved)	mg/L	20	NS	–	–	**65.8**[a]	–	**59**[a]
Thallium	mg/L	NS	0.0005	ND(0.02)	ND(0.02)	–	ND(0.02)	–
Thallium (Dissolved)	mg/L	NS	0.0005	–	–	ND(0.02)	–	ND(0.02)
Vanadium	mg/L	NS	NS	0.0558	0.00721 J	–	0.0085 J	–
Vanadium (Dissolved)	mg/L	NS	NS	–	–	0.00591 J	–	0.00511 J
Zinc	mg/L	NS	2	0.0409	ND(0.01)	–	0.0127	–
Zinc (Dissolved)	mg/L	NS	2	–	–	ND(0.01)	–	0.00494 J
Wet								
pH (water)	s.u.	6.5-8.5	NS	**11.78**[a]	**11.5**[a]	**11.5**[a]	**11.97**[a]	**11.97**[a]

TABLE B.7

SHALLOW GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-21*	*MW-21*	*MW-22*	*MW-22*	*MW-22*
Sample ID:				*GW-19867-08-03-PK-022*	*GW-19867-10-03-PK-017*	*GW-19867-08-03-PK-001*	*GW-19867-08-03-PK-002*	*GW-19867-10-03-PK-003*
Sample Date:				*8/28/2003*	*10/6/2003*	*8/15/2003*	*8/15/2003*	*10/1/2003*
Sample Matrix:				*Shallow*	*Shallow*	*Shallow*	*Shallow*	*Shallow*
	Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]					
Metals								
Aluminum	mg/L	NS	NS	3.89	2.19	2.9	–	1
Aluminum (Dissolved)	mg/L	NS	NS	–	–	–	0.681	–
Antimony	mg/L	0.003	NS	**0.0109**[a]	**0.0119**[a]	ND(0.01)	–	ND(0.01)
Antimony (Dissolved)	mg/L	0.003	NS	–	–	–	ND(0.01)	–
Arsenic	mg/L	0.025	NS	ND(0.025)	0.0154 J	0.0132 J	–	ND(0.025)
Arsenic (Dissolved)	mg/L	0.025	NS	–	–	–	0.0112 J	–
Barium	mg/L	1	NS	0.222	0.146	0.135	–	0.085
Barium (Dissolved)	mg/L	1	NS	–	–	–	0.123	–
Beryllium	mg/L	NS	0.003	ND(0.005)	ND(0.005)	ND(0.005)	–	ND(0.005)
Beryllium (Dissolved)	mg/L	NS	0.003	–	–	–	ND(0.005)	–
Cadmium	mg/L	0.005	NS	ND(0.005)	ND(0.005)	ND(0.005)	–	ND(0.005)
Cadmium (Dissolved)	mg/L	0.005	NS	–	–	–	ND(0.005)	–
Calcium	mg/L	NS	NS	378	267	388	–	395
Calcium (Dissolved)	mg/L	NS	NS	–	–	–	391	–
Chromium Total	mg/L	0.05	NS	**0.0961**[a]	0.0357	**0.0839**[a]	–	0.00758 J
Chromium Total (Dissolved)	mg/L	0.05	NS	–	–	–	0.0372	–
Chromium VI (Hexavalent)	mg/L	0.05	NS	0.0430	0.0350	ND(0.01)	–	ND(0.01) UJ
Chromium VI (Hexavalent) (Dissolvec	mg/L	0.05	NS	–	–	–	0.0120	–
Cobalt	mg/L	NS	NS	0.00161	ND(0.02)	0.00124 J	–	ND(0.02)
Cobalt (Dissolved)	mg/L	NS	NS	–	–	–	0.000932 J	–
Copper	mg/L	0.2	NS	0.0538	0.0198 J	ND(0.02)	–	ND(0.02)
Copper (Dissolved)	mg/L	0.2	NS	–	–	–	ND(0.02)	–
Cyanide (Dissolved)	mg/L	0.2	NS	–	–	–	ND(0.01)	–
Cyanide (total)	mg/L	0.2	NS	ND(0.01)	ND(0.01) UJ	ND(0.01)	–	ND(0.01)
Iron	mg/L	0.3	NS	**1.98**[a]	ND(0.2)	**1.63**[a]	–	ND(0.2)
Iron (Dissolved)	mg/L	0.3	NS	–	–	–	ND(0.2)	–
Lead	mg/L	0.025	NS	ND(0.005)	ND(0.005)	0.00592	–	ND(0.005)
Lead (Dissolved)	mg/L	0.025	NS	–	–	–	ND(0.005)	–

TABLE B.7

SHALLOW GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-21*	*MW-21*	*MW-22*	*MW-22*	*MW-22*
Sample ID:				*GW-19867-08-03-PK-022*	*GW-19867-10-03-PK-017*	*GW-19867-08-03-PK-001*	*GW-19867-08-03-PK-002*	*GW-19867-10-03-PK-003*
Sample Date:				*8/28/2003*	*10/6/2003*	*8/15/2003*	*8/15/2003*	*10/1/2003*
Sample Matrix:				*Shallow*	*Shallow*	*Shallow*	*Shallow*	*Shallow*
	Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]					
Magnesium	mg/L	NS	35	1.56	ND(1.5)	1.2 J	–	ND(1.5)
Magnesium (Dissolved)	mg/L	NS	35	–	–	–	ND(1.5)	–
Manganese	mg/L	0.3	NS	0.0284	0.00256 J	0.0294	–	0.00272 J
Manganese (Dissolved)	mg/L	0.3	NS	–	–	–	0.00414 J	–
Mercury	mg/L	0.0007	NS	ND(0.0004) UJ	ND(0.0004)	ND(0.0004)	–	ND(0.0004)
Mercury (Dissolved)	mg/L	0.0007	NS	–	–	–	ND(0.0004)	–
Nickel	mg/L	0.1	NS	0.0109 J	0.0136 J	0.00172 J	–	0.002 J
Nickel (Dissolved)	mg/L	0.1	NS	–	–	–	ND(0.02)	–
Potassium	mg/L	NS	NS	22.8	20.6	6.54	–	5.5
Potassium (Dissolved)	mg/L	NS	NS	–	–	–	6.18	–
Selenium	mg/L	0.010	NS	**0.0186 J**[a]	**0.0131 J**[a]	**0.0203**[a]	–	0.00918 J
Selenium (Dissolved)	mg/L	0.010	NS	–	–	–	**0.0144 J**[a]	–
Silver	mg/L	0.050	NS	ND(0.01)	ND(0.01)	ND(0.01)	–	ND(0.01)
Silver (Dissolved)	mg/L	0.050	NS	–	–	–	ND(0.01)	–
Sodium	mg/L	20	NS	**90.3**[a]	**91.5**[a]	**90.5**[a]	–	**83**[a]
Sodium (Dissolved)	mg/L	20	NS	–	–	–	**93**[a]	–
Thallium	mg/L	NS	0.0005	ND(0.02)	ND(0.02)	ND(0.02)	–	ND(0.02)
Thallium (Dissolved)	mg/L	NS	0.0005	–	–	–	ND(0.02)	–
Vanadium	mg/L	NS	NS	0.00691 J	0.012 J	0.00563 J	–	ND(0.02)
Vanadium (Dissolved)	mg/L	NS	NS	–	–	–	ND(0.02)	–
Zinc	mg/L	NS	2	0.0187	0.0343	0.00977 J	–	ND(0.01)
Zinc (Dissolved)	mg/L	NS	2	–	–	–	ND(0.01)	–
Wet								
pH (water)	s.u.	6.5-8.5	NS	–	**12.76**[a]	**12.07**[a]	**12.07**[a]	**12.44**[a]

TABLE B.7

SHALLOW GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-22*	*MW-23*	*MW-23*	*MW-23*	*MW-24*
Sample ID:				*GW-19867-10-03-PK-004*	*GW-19867-08-03-PK-014*	*GW-19867-08-03-PK-015*	*GW-19867-10-03-PK-021*	*GW-19867-08-03-PK-016*
Sample Date:				*10/1/2003*	*8/20/2003*	*8/20/2003*	*10/22/2003*	*8/20/2003*
Sample Matrix:				*Shallow*	*Shallow*	*Shallow*	*Shallow*	*Shallow*
	Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]					
Metals								
Aluminum	mg/L	NS	NS	–	0.384	–	0.792	2.95
Aluminum (Dissolved)	mg/L	NS	NS	0.79	–	0.184 J	–	–
Antimony	mg/L	0.003	NS	–	**0.00767 J**[a]	–	**0.0194**[a]	ND(0.01)
Antimony (Dissolved)	mg/L	0.003	NS	ND(0.01)	–	ND(0.01)	–	–
Arsenic	mg/L	0.025	NS	–	ND(0.025)	–	ND(0.025)	0.0173 J
Arsenic (Dissolved)	mg/L	0.025	NS	ND(0.025)	–	ND(0.025)	–	–
Barium	mg/L	1	NS	–	0.209	–	0.237	0.836
Barium (Dissolved)	mg/L	1	NS	0.0929	–	0.208	–	–
Beryllium	mg/L	NS	0.003	–	ND(0.005)	–	ND(0.005)	ND(0.005)
Beryllium (Dissolved)	mg/L	NS	0.003	ND(0.005)	–	ND(0.005)	–	–
Cadmium	mg/L	0.005	NS	–	ND(0.005)	–	ND(0.005)	ND(0.005)
Cadmium (Dissolved)	mg/L	0.005	NS	ND(0.005)	–	ND(0.005)	–	–
Calcium	mg/L	NS	NS	–	751	–	742	322
Calcium (Dissolved)	mg/L	NS	NS	390	–	732	–	–
Chromium Total	mg/L	0.05	NS	–	**0.116**[a]	–	**0.154**[a]	0.0285
Chromium Total (Dissolved)	mg/L	0.05	NS	0.0121	–	**0.106**[a]	–	–
Chromium VI (Hexavalent)	mg/L	0.05	NS	–	**0.110**[a]	–	**0.134**[a]	0.0120
Chromium VI (Hexavalent) (Dissolvec	mg/L	0.05	NS	ND(0.01) UJ	–	**0.0900**[a]	–	–
Cobalt	mg/L	NS	NS	–	ND(0.02)	–	ND(0.02)	ND(0.02)
Cobalt (Dissolved)	mg/L	NS	NS	ND(0.02)	–	ND(0.02)	–	–
Copper	mg/L	0.2	NS	–	ND(0.02)	–	ND(0.02)	0.0165 J
Copper (Dissolved)	mg/L	0.2	NS	ND(0.02)	–	ND(0.02)	–	–
Cyanide (Dissolved)	mg/L	0.2	NS	ND(0.01)	–	ND(0.01)	–	–
Cyanide (total)	mg/L	0.2	NS	–	ND(0.01)	–	ND(0.01)	ND(0.01)
Iron	mg/L	0.3	NS	–	0.133 J	–	ND(0.2)	ND(0.2)
Iron (Dissolved)	mg/L	0.3	NS	ND(0.2)	–	ND(0.2)	–	–
Lead	mg/L	0.025	NS	–	0.00631	–	ND(0.005)	0.00539
Lead (Dissolved)	mg/L	0.025	NS	ND(0.005)	–	0.00581	–	–

TABLE B.7

SHALLOW GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-22*	*MW-23*	*MW-23*	*MW-23*	*MW-24*
Sample ID:				*GW-19867-10-03-PK-004*	*GW-19867-08-03-PK-014*	*GW-19867-08-03-PK-015*	*GW-19867-10-03-PK-021*	*GW-19867-08-03-PK-016*
Sample Date:				*10/1/2003*	*8/20/2003*	*8/20/2003*	*10/22/2003*	*8/20/2003*
Sample Matrix:				*Shallow*	*Shallow*	*Shallow*	*Shallow*	*Shallow*
	Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]					
Magnesium	mg/L	NS	35	--	0.44 J	--	1.83	0.115 J
Magnesium (Dissolved)	mg/L	NS	35	ND(1.5)	--	ND(1.5)	--	--
Manganese	mg/L	0.3	NS	--	0.00529 J	--	0.0183	0.00203 J
Manganese (Dissolved)	mg/L	0.3	NS	ND(0.01)	--	ND(0.01)	--	--
Mercury	mg/L	0.0007	NS	--	ND(0.0004)	--	ND(0.0004)	ND(0.0004)
Mercury (Dissolved)	mg/L	0.0007	NS	ND(0.0004)	--	ND(0.0004)	--	--
Nickel	mg/L	0.1	NS	--	ND(0.02)	--	ND(0.02)	0.00518 J
Nickel (Dissolved)	mg/L	0.1	NS	0.00176 J	--	ND(0.02)	--	--
Potassium	mg/L	NS	NS	--	3.26	--	3.3	12.5
Potassium (Dissolved)	mg/L	NS	NS	5.6	--	3.18	--	--
Selenium	mg/L	0.010	NS	--	**0.0255**[a]	--	0.00915 J	0.00956 J
Selenium (Dissolved)	mg/L	0.010	NS	ND(0.02)	--	**0.0195 J**[a]	--	--
Silver	mg/L	0.050	NS	--	ND(0.01)	--	ND(0.01)	ND(0.01)
Silver (Dissolved)	mg/L	0.050	NS	ND(0.01)	--	ND(0.01)	--	--
Sodium	mg/L	20	NS	--	**89.4**[a]	--	**76**[a]	**87**[a]
Sodium (Dissolved)	mg/L	20	NS	**83.8**[a]	--	**88.9**[a]	--	--
Thallium	mg/L	NS	0.0005	--	ND(0.04)	--	**0.0158 J**[b]	ND(0.02)
Thallium (Dissolved)	mg/L	NS	0.0005	ND(0.02)	--	ND(0.04)	--	--
Vanadium	mg/L	NS	NS	--	ND(0.02)	--	0.00687 J	0.00318 J
Vanadium (Dissolved)	mg/L	NS	NS	ND(0.02)	--	ND(0.02)	--	--
Zinc	mg/L	NS	2	--	ND(0.01)	--	ND(0.02)	ND(0.01)
Zinc (Dissolved)	mg/L	NS	2	ND(0.01)	--	ND(0.01)	--	--
Wet								
pH (water)	s.u.	6.5-8.5	NS	**12.44**[a]	**12.23**[a]	**12.23**[a]	**12.7**[a]	**12.00**[a]

TABLE B.7

SHALLOW GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-24*	*MW-25*	*MW-25*	*MW-25*	*MW-25*
Sample ID:				*GW-19867-10-03-PK-022*	*GW-19867-08-03-PK-006*	*GW-19867-08-03-PK-007*	*GW-19867-08-03-PK-008*	*GW-19867-10-03-PK-002*
Sample Date:				*10/22/2003*	*8/18/2003*	*8/18/2003*	*8/18/2003*	*10/3/2003*
Sample Matrix:				*Shallow*	*Shallow*	*Shallow*	*Shallow Duplicate*	*Shallow*
	Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]					
Metals								
Aluminum	mg/L	NS	NS	2.18	0.557	–	ND(0.2)	0.544
Aluminum (Dissolved)	mg/L	NS	NS	–	–	ND(0.2)	–	–
Antimony	mg/L	0.003	NS	**0.00706 J**[a]	ND(0.01)	–	ND(0.01)	ND(0.01)
Antimony (Dissolved)	mg/L	0.003	NS	–	–	ND(0.01)	–	–
Arsenic	mg/L	0.025	NS	ND(0.025)	0.0215 J	–	**0.0273**[a]	ND(0.025)
Arsenic (Dissolved)	mg/L	0.025	NS	–	–	0.0186 J	–	–
Barium	mg/L	1	NS	**1.12**[a]	0.173	–	0.167	0.153
Barium (Dissolved)	mg/L	1	NS	–	–	0.164	–	–
Beryllium	mg/L	NS	0.003	ND(0.005)	ND(0.005)	–	ND(0.005)	ND(0.005)
Beryllium (Dissolved)	mg/L	NS	0.003	–	–	ND(0.005)	–	–
Cadmium	mg/L	0.005	NS	ND(0.005)	ND(0.005)	–	ND(0.005)	ND(0.005)
Cadmium (Dissolved)	mg/L	0.005	NS	–	–	ND(0.005)	–	–
Calcium	mg/L	NS	NS	352	80.2	–	80.9	69.4
Calcium (Dissolved)	mg/L	NS	NS	–	–	78.7	–	–
Chromium Total	mg/L	0.05	NS	0.00413 J	0.00431 J	–	0.00356 J	0.00582 J
Chromium Total (Dissolved)	mg/L	0.05	NS	–	–	0.00249 J	–	–
Chromium VI (Hexavalent)	mg/L	0.05	NS	0.0150	0.0110	–	0.0120	ND(0.01)
Chromium VI (Hexavalent) (Dissolvec	mg/L	0.05	NS	–	–	ND(0.01)	–	–
Cobalt	mg/L	NS	NS	ND(0.02)	ND(0.02)	–	ND(0.02)	ND(0.02)
Cobalt (Dissolved)	mg/L	NS	NS	–	–	ND(0.02)	–	–
Copper	mg/L	0.2	NS	ND(0.02)	ND(0.02)	–	ND(0.02)	ND(0.02)
Copper (Dissolved)	mg/L	0.2	NS	–	–	ND(0.02)	–	–
Cyanide (Dissolved)	mg/L	0.2	NS	–	–	–	–	–
Cyanide (total)	mg/L	0.2	NS	ND(0.01)	ND(0.01)	–	ND(0.01)	ND(0.01)
Iron	mg/L	0.3	NS	ND(0.2)	**1.54**[a]	–	**1.54**[a]	**1.26**[a]
Iron (Dissolved)	mg/L	0.3	NS	–	–	**1.04**[a]	–	–
Lead	mg/L	0.025	NS	ND(0.005)	0.015	–	0.0121	0.0166
Lead (Dissolved)	mg/L	0.025	NS	–	–	ND(0.005)	–	–

TABLE B.7

SHALLOW GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-24*	*MW-25*	*MW-25*	*MW-25*	*MW-25*
Sample ID:				*GW-19867-10-03-PK-022*	*GW-19867-08-03-PK-006*	*GW-19867-08-03-PK-007*	*GW-19867-08-03-PK-008*	*GW-19867-10-03-PK-002*
Sample Date:				*10/22/2003*	*8/18/2003*	*8/18/2003*	*8/18/2003*	*10/3/2003*
Sample Matrix:				*Shallow*	*Shallow*	*Shallow*	*Shallow Duplicate*	*Shallow*
	Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]					
Magnesium	mg/L	NS	35	0.0382 J	18.6	--	18.7	13.4
Magnesium (Dissolved)	mg/L	NS	35	--	--	18	--	--
Manganese	mg/L	0.3	NS	0.00239 J	**0.36**[a]	--	**0.366**[a]	0.283
Manganese (Dissolved)	mg/L	0.3	NS	--	--	**0.347**[a]	--	--
Mercury	mg/L	0.0007	NS	ND(0.0004)	ND(0.0004)	--	ND(0.0004)	ND(0.0004)
Mercury (Dissolved)	mg/L	0.0007	NS	--	--	ND(0.0004)	--	--
Nickel	mg/L	0.1	NS	0.00606 J	ND(0.02)	--	ND(0.02)	ND(0.02)
Nickel (Dissolved)	mg/L	0.1	NS	--	--	ND(0.02)	--	--
Potassium	mg/L	NS	NS	12.9	4.26	--	4.19	3.85
Potassium (Dissolved)	mg/L	NS	NS	--	--	4.28	--	--
Selenium	mg/L	0.010	NS	ND(0.02)	0.00777 J	--	**0.0173 J**[a]	0.00942 J
Selenium (Dissolved)	mg/L	0.010	NS	--	--	0.00995 J	--	--
Silver	mg/L	0.050	NS	ND(0.01)	ND(0.01)	--	ND(0.01)	ND(0.01)
Silver (Dissolved)	mg/L	0.050	NS	--	--	ND(0.01)	--	--
Sodium	mg/L	20	NS	**71.5**[a]	**71.3**[a]	--	**71.5**[a]	**60.6**[a]
Sodium (Dissolved)	mg/L	20	NS	--	--	**71.2**[a]	--	--
Thallium	mg/L	NS	0.0005	**0.00941 J**[b]	ND(0.02)	--	ND(0.02)	ND(0.02)
Thallium (Dissolved)	mg/L	NS	0.0005	--	--	ND(0.02)	--	--
Vanadium	mg/L	NS	NS	0.00606 J	ND(0.02)	--	ND(0.02)	0.00332 J
Vanadium (Dissolved)	mg/L	NS	NS	--	--	ND(0.02)	--	--
Zinc	mg/L	NS	2	0.00315 J	0.0123	--	0.0311	0.0332
Zinc (Dissolved)	mg/L	NS	2	--	--	ND(0.01)	--	--
Wet								
pH (water)	s.u.	6.5-8.5	NS	**12.56**[a]	6.76	6.76	6.76	7.37

TABLE B.7

SHALLOW GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-25*	*MW-26*	*MW-26*	*MW-27*	*MW-27*
Sample ID:				*GW-19867-10-03-PK-007*	*GW-19867-08-03-PK-013*	*GW-19867-10-03-PK-019*	*GW-19867-08-03-PK-011*	*GW-19867-08-03-PK-012*
Sample Date:				*10/3/2003*	*8/20/2003*	*10/22/2003*	*8/18/2003*	*8/18/2003*
Sample Matrix:				*Shallow*	*Shallow*	*Shallow*	*Shallow*	*Shallow*
	Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]					
Metals								
Aluminum	mg/L	NS	NS	--	ND(0.2)	ND(0.2)	1.53	--
Aluminum (Dissolved)	mg/L	NS	NS	ND(0.2)	--	--	--	0.982
Antimony	mg/L	0.003	NS	--	ND(0.01)	ND(0.01)	**0.00683 J**[a]	--
Antimony (Dissolved)	mg/L	0.003	NS	ND(0.01)	--	--	--	ND(0.01)
Arsenic	mg/L	0.025	NS	--	0.022 J	ND(0.025)	ND(0.025)	--
Arsenic (Dissolved)	mg/L	0.025	NS	ND(0.025)	--	--	--	ND(0.025)
Barium	mg/L	1	NS	--	0.068	0.08	0.167	--
Barium (Dissolved)	mg/L	1	NS	0.133	--	--	--	0.169
Beryllium	mg/L	NS	0.003	--	ND(0.005)	ND(0.005)	ND(0.005)	--
Beryllium (Dissolved)	mg/L	NS	0.003	ND(0.005)	--	--	--	ND(0.005)
Cadmium	mg/L	0.005	NS	--	ND(0.005)	ND(0.005)	ND(0.005)	--
Cadmium (Dissolved)	mg/L	0.005	NS	ND(0.005)	--	--	--	ND(0.005)
Calcium	mg/L	NS	NS	--	132	126	570	--
Calcium (Dissolved)	mg/L	NS	NS	66.8	--	--	--	589
Chromium Total	mg/L	0.05	NS	--	ND(0.01)	ND(0.01)	0.0297	--
Chromium Total (Dissolved)	mg/L	0.05	NS	0.00174 J	--	--	--	0.0264
Chromium VI (Hexavalent)	mg/L	0.05	NS	--	ND(0.01)	0.00800 J	0.0120	--
Chromium VI (Hexavalent) (Dissolvec	mg/L	0.05	NS	ND(0.01)	--	--	--	0.00800 J
Cobalt	mg/L	NS	NS	--	ND(0.02)	ND(0.02)	0.00122 J	--
Cobalt (Dissolved)	mg/L	NS	NS	ND(0.02)	--	--	--	0.000855 J
Copper	mg/L	0.2	NS	--	ND(0.02)	ND(0.02)	ND(0.02)	--
Copper (Dissolved)	mg/L	0.2	NS	ND(0.02)	--	--	--	ND(0.02)
Cyanide (Dissolved)	mg/L	0.2	NS	0.00397 J	--	--	--	--
Cyanide (total)	mg/L	0.2	NS	--	ND(0.01)	ND(0.01)	ND(0.01)	--
Iron	mg/L	0.3	NS	--	0.128 J	**2.57**[a]	**0.392**[a]	--
Iron (Dissolved)	mg/L	0.3	NS	**0.827**[a]	--	--	--	ND(0.2)
Lead	mg/L	0.025	NS	--	ND(0.005)	ND(0.005)	0.00672	--
Lead (Dissolved)	mg/L	0.025	NS	ND(0.005)	--	--	--	0.00467 J

TABLE B.7

SHALLOW GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-25*	*MW-26*	*MW-26*	*MW-27*	*MW-27*
Sample ID:				*GW-19867-10-03-PK-007*	*GW-19867-08-03-PK-013*	*GW-19867-10-03-PK-019*	*GW-19867-08-03-PK-011*	*GW-19867-08-03-PK-012*
Sample Date:				*10/3/2003*	*8/20/2003*	*10/22/2003*	*8/18/2003*	*8/18/2003*
Sample Matrix:				*Shallow*	*Shallow*	*Shallow*	*Shallow*	*Shallow*
	Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]					
Magnesium	mg/L	NS	35	–	**70.1**[b]	**73**[b]	0.297 J	–
Magnesium (Dissolved)	mg/L	NS	35	13	–	–	–	ND(1.5)
Manganese	mg/L	0.3	NS	–	0.298	**1.22**[a]	0.0127	–
Manganese (Dissolved)	mg/L	0.3	NS	0.275	–	–	–	ND(0.01)
Mercury	mg/L	0.0007	NS	–	ND(0.0004)	ND(0.0004)	ND(0.0004)	–
Mercury (Dissolved)	mg/L	0.0007	NS	ND(0.0004)	–	–	–	ND(0.0004)
Nickel	mg/L	0.1	NS	–	ND(0.02)	ND(0.02)	0.00534 J	–
Nickel (Dissolved)	mg/L	0.1	NS	ND(0.02)	–	–	–	0.00468 J
Potassium	mg/L	NS	NS	–	3.46	3.4	8.32	–
Potassium (Dissolved)	mg/L	NS	NS	3.78	–	–	–	8.38
Selenium	mg/L	0.010	NS	–	**0.0379**[a]	**0.0419**[a]	ND(0.02)	–
Selenium (Dissolved)	mg/L	0.010	NS	0.00725 J	–	–	–	**0.0175 J**[a]
Silver	mg/L	0.050	NS	–	ND(0.01)	ND(0.01)	ND(0.01)	–
Silver (Dissolved)	mg/L	0.050	NS	ND(0.01)	–	–	–	ND(0.01)
Sodium	mg/L	20	NS	–	**48.4**[a]	**52.2**[a]	**191**[a]	–
Sodium (Dissolved)	mg/L	20	NS	**59.7**[a]	–	–	–	**192**[a]
Thallium	mg/L	NS	0.0005	–	ND(0.02)	ND(0.02)	ND(0.02)	–
Thallium (Dissolved)	mg/L	NS	0.0005	ND(0.02)	–	–	–	ND(0.02)
Vanadium	mg/L	NS	NS	–	ND(0.02)	0.0149 J	ND(0.02)	–
Vanadium (Dissolved)	mg/L	NS	NS	ND(0.02)	–	–	–	ND(0.02)
Zinc	mg/L	NS	2	–	ND(0.01)	0.00518 J	0.0114	–
Zinc (Dissolved)	mg/L	NS	2	ND(0.01)	–	–	–	ND(0.01)
Wet								
pH (water)	s.u.	6.5-8.5	NS	7.37	6.82	7.13	**12.04**[a]	**12.04**[a]

TABLE B.7

SHALLOW GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-27*	*MW-27*	*MW-28*	*MW-28*
Sample ID:				*GW-19867-10-03-PK-008*	*GW-19867-10-03-PK-009*	*GW-19867-08-03-PK-021*	*GW-19867-10-03-PK-016*
Sample Date:				*10/3/2003*	*10/3/2003*	*8/28/2003*	*10/6/2003*
Sample Matrix:				*Shallow*	*Shallow*	*Shallow*	*Shallow*
	Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]				
Metals							
Aluminum	mg/L	NS	NS	4.36	–	0.816	1.25
Aluminum (Dissolved)	mg/L	NS	NS	–	0.983	–	–
Antimony	mg/L	0.003	NS	**0.00718 J**[a]	–	ND(0.01)	**0.0158**[a]
Antimony (Dissolved)	mg/L	0.003	NS	–	**0.00915 J**[a]	–	–
Arsenic	mg/L	0.025	NS	ND(0.025)	–	0.0162 J	0.0187 J
Arsenic (Dissolved)	mg/L	0.025	NS	–	ND(0.025)	–	–
Barium	mg/L	1	NS	0.168	–	0.0825	0.0986
Barium (Dissolved)	mg/L	1	NS	–	0.162	–	–
Beryllium	mg/L	NS	0.003	ND(0.005)	–	ND(0.005)	ND(0.005)
Beryllium (Dissolved)	mg/L	NS	0.003	–	ND(0.005)	–	–
Cadmium	mg/L	0.005	NS	ND(0.005)	–	ND(0.005)	ND(0.005)
Cadmium (Dissolved)	mg/L	0.005	NS	–	ND(0.005)	–	–
Calcium	mg/L	NS	NS	551	–	57.2	66.3
Calcium (Dissolved)	mg/L	NS	NS	–	557	–	–
Chromium Total	mg/L	0.05	NS	0.0254	–	0.00401 J	ND(0.01)
Chromium Total (Dissolved)	mg/L	0.05	NS	–	0.0361	–	–
Chromium VI (Hexavalent)	mg/L	0.05	NS	ND(0.01)	–	ND(0.01)	ND(0.01)
Chromium VI (Hexavalent) (Dissolvec	mg/L	0.05	NS	–	ND(0.01)	–	–
Cobalt	mg/L	NS	NS	ND(0.02)	–	0.00168	ND(0.02)
Cobalt (Dissolved)	mg/L	NS	NS	–	ND(0.02)	–	–
Copper	mg/L	0.2	NS	ND(0.02)	–	0.00934	0.00677 J
Copper (Dissolved)	mg/L	0.2	NS	–	ND(0.02)	–	–
Cyanide (Dissolved)	mg/L	0.2	NS	–	0.00436 J	–	–
Cyanide (total)	mg/L	0.2	NS	0.00385 J	–	ND(0.01)	ND(0.01) UJ
Iron	mg/L	0.3	NS	**2.49**[a]	–	**1.29**[a]	**6.2**[a]
Iron (Dissolved)	mg/L	0.3	NS	–	**0.495**[a]	–	–
Lead	mg/L	0.025	NS	ND(0.005)	–	ND(0.005)	ND(0.005)
Lead (Dissolved)	mg/L	0.025	NS	–	ND(0.005)	–	–

TABLE B.7

SHALLOW GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:				*MW-27*	*MW-27*	*MW-28*	*MW-28*
Sample ID:				*GW-19867-10-03-PK-008*	*GW-19867-10-03-PK-009*	*GW-19867-08-03-PK-021*	*GW-19867-10-03-PK-016*
Sample Date:				*10/3/2003*	*10/3/2003*	*8/28/2003*	*10/6/2003*
Sample Matrix:				*Shallow*	*Shallow*	*Shallow*	*Shallow*
	Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]				
Magnesium	mg/L	NS	35	2.62	–	18.8	23.3
Magnesium (Dissolved)	mg/L	NS	35	–	ND(1.5)	–	–
Manganese	mg/L	0.3	NS	0.0695	–	**0.312**[a]	**0.549**[a]
Manganese (Dissolved)	mg/L	0.3	NS	–	0.00316 J	–	–
Mercury	mg/L	0.0007	NS	ND(0.0004)	–	0.000144 J	ND(0.0004)
Mercury (Dissolved)	mg/L	0.0007	NS	–	ND(0.0004)	–	–
Nickel	mg/L	0.1	NS	0.00682 J	–	0.00276	ND(0.02)
Nickel (Dissolved)	mg/L	0.1	NS	–	0.00695 J	–	–
Potassium	mg/L	NS	NS	8.56	–	2.77	2.23
Potassium (Dissolved)	mg/L	NS	NS	–	8.22	–	–
Selenium	mg/L	0.010	NS	ND(0.02)	–	**0.0162 J**[a]	**0.0367**[a]
Selenium (Dissolved)	mg/L	0.010	NS	–	ND(0.02)	–	–
Silver	mg/L	0.050	NS	ND(0.01)	–	ND(0.01)	ND(0.01)
Silver (Dissolved)	mg/L	0.050	NS	–	ND(0.01)	–	–
Sodium	mg/L	20	NS	**184**[a]	–	**119**[a]	**148**[a]
Sodium (Dissolved)	mg/L	20	NS	–	**185**[a]	–	–
Thallium	mg/L	NS	0.0005	ND(0.02)	–	ND(0.02)	ND(0.02)
Thallium (Dissolved)	mg/L	NS	0.0005	–	ND(0.02)	–	–
Vanadium	mg/L	NS	NS	0.00494 J	–	0.00312 J	0.0145 J
Vanadium (Dissolved)	mg/L	NS	NS	–	ND(0.02)	–	–
Zinc	mg/L	NS	2	0.0296	–	0.0199	0.0235
Zinc (Dissolved)	mg/L	NS	2	–	ND(0.01)	–	–
Wet							
pH (water)	s.u.	6.5-8.5	NS	**12.57**[a]	**12.57**[a]	6.97	–

TABLE B.7

SHALLOW GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Notes:

a - Indicates and exceedance of NYSDEC Ambient Water Quality Standard
b - Indicates an exceedance of NYSDEC Ambient Water Quality Guidance Value (TOGS 1.1.1)
c - NYSDEC Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, Source of Drinking Water (Groundwater), June 1998 (Lat amended June 2004).
NS - No Standard
ND () - Non detect at associated value
J - Estimated Value
U - Not Detected
-- - No Data

TABLE B.8

DEEP OVERBURDEN GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:					*MW-103A*	*MW-103A*	*MW-103A*	*MW-103A*	*MW-103A*
Sample ID:					*MW-103A*	*MW-103A*	*MW-103A*	*GW-19867-08-03-PK-025*	*GW-19867-08-03-PK-026*
Sample Date:					*11/7/1996*	*3/1/2000*	*8/21/2001*	*8/28/2003*	*8/28/2003*
Sample Matrix:					*Deep*	*Deep*	*Deep*	*Deep*	*Deep*
	Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]	*NYSDEC MCL*[e]					
Metals									
Aluminum	mg/L	-	-	-	5.06	0.832	ND(0.075)	17.4	–
Aluminum (Dissolved)	mg/L	-	-	-	–	–	0.093	–	0.088
Antimony	mg/L	0.003	-	-	ND(0.0048)	ND(0.008)	ND(0.050)	ND(0.01)	–
Antimony (Dissolved)	mg/L	0.003	-	-	–	–	ND(0.050)	–	ND(0.01)
Arsenic	mg/L	0.025	-	-	ND(0.0025)	ND(0.0055)	ND(0.002)	**0.0262**[a]	–
Arsenic (Dissolved)	mg/L	0.025	-	-	–	–	ND(0.002)	–	0.0182 J
Barium	mg/L	1	-	-	0.218	0.106 B	0.096	0.199	–
Barium (Dissolved)	mg/L	1	-	-	–	–	0.1	–	0.0776
Beryllium	mg/L	-	0.003	-	ND(0.0001)	ND(0.001)	ND(0.002)	0.000719 J	–
Beryllium (Dissolved)	mg/L	-	0.003	-	–	–	ND(0.002)	–	ND(0.005)
Cadmium	mg/L	0.005	-	-	0.0011 B	ND(0.001)	ND(0.005)	0.000891 J	–
Cadmium (Dissolved)	mg/L	0.005	-	-	–	–	ND(0.005)	–	ND(0.005)
Calcium	mg/L	-	-	-	194.0	111 E	78.8	168	–
Calcium (Dissolved)	mg/L	-	-	-	–	–	80.3	–	88.7
Chromium Total	mg/L	0.05	-	-	0.0075 B	ND(0.0015)	ND(0.010)	0.0268	–
Chromium Total (Dissolved)	mg/L	0.05	-	-	–	–	ND(0.010)	–	ND(0.01)
Chromium VI (Hexavalent)	mg/L	0.05	-	-	0.0236	ND(0.01)	ND(0.010)	ND(0.01)	–
Chromium VI (Hexavalent) (Dissolved)	mg/L	0.05	-	-	–	–	–	–	ND(0.01)
Cobalt	mg/L	-	-	-	0.0018 B	ND(0.0015)	ND(0.010)	0.00906 J	–
Cobalt (Dissolved)	mg/L	-	-	-	–	–	ND(0.010)	–	0.00134
Copper	mg/L	0.2	-	-	0.0064 B	0.0035 B	ND(0.017)	0.029	–
Copper (Dissolved)	mg/L	0.2	-	-	–	–	ND(0.017)	–	ND(0.02)
Cyanide (Dissolved)	mg/L	0.2	-	-	–	–	–	–	0.00219
Cyanide (total)	mg/L	0.2	-	-	–	–	–	0.00211	–
Iron	mg/L	0.3	-	-	**7.91**[a]	**0.968**[a]	**0.86**[a]	**24.8**[a]	–
Iron (Dissolved)	mg/L	0.3	-	-	–	–	**0.368**[a]	–	**0.656**[a]
Lead	mg/L	0.025	-	-	**0.0317**[a]	ND(0.003)	ND(0.001)	**0.143**[a]	–
Lead (Dissolved)	mg/L	0.025	-	-	–	–	0.001	–	ND(0.005)
Magnesium	mg/L	-	35	-	**142**[b]	**99 E**[b]	**65.3**[b]	**119**[b]	–
Magnesium (Dissolved)	mg/L	-	35	-	–	–	**65.2**[b]	–	**78.9**[b]
Manganese	mg/L	0.3	-	-	**0.386**[a]	0.251	0.095	**0.798**[a]	–
Manganese (Dissolved)	mg/L	0.3	-	-	–	–	0.105	–	0.107
Mercury	mg/L	0.0007	-	-	ND(0.0001)	ND(0.0002)	ND(0.0002)	ND(0.0004) UJ	–
Mercury (Dissolved)	mg/L	0.0007	-	-	–	–	ND(0.0002)	–	ND(0.0004) UJ
Nickel	mg/L	0.1	-	-	0.0056 B	0.0042 B	ND(0.012)	0.0167 J	–
Nickel (Dissolved)	mg/L	0.1	-	-	–	–	0.014	–	ND(0.02)
Potassium	mg/L	-	-	-	1.53 B	1.29 B	0.996	4.95	–

TABLE B.8

DEEP OVERBURDEN GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:					*MW-103A*	*MW-103A*	*MW-103A*	*MW-103A*	*MW-103A*
Sample ID:					*MW-103A*	*MW-103A*	*MW-103A*	*GW-19867-08-03-PK-025*	*GW-19867-08-03-PK-026*
Sample Date:					*11/7/1996*	*3/1/2000*	*8/21/2001*	*8/28/2003*	*8/28/2003*
Sample Matrix:					*Deep*	*Deep*	*Deep*	*Deep*	*Deep*
	Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]	*NYSDEC MCL*[e]					
Potassium (Dissolved)	mg/L	-	-	-	–	–	1.12	–	0.852 J
Selenium	mg/L	0.010	-	-	ND(0.0045)	ND(0.005)	ND(0.002)	**0.0425**[a]	–
Selenium (Dissolved)	mg/L	0.010	-	-	–	–	ND(0.002)	–	**0.0281**[a]
Silver	mg/L	0.050	-	-	0.0015 B	ND(0.002)	ND(0.010)	ND(0.01)	–
Silver (Dissolved)	mg/L	0.050	-	-	–	–	ND(0.010)	–	ND(0.01)
Sodium	mg/L	20	-	-	**58.5 E**[a]	**43**[a]	**45.6**[a]	**47.9**[a]	–
Sodium (Dissolved)	mg/L	20	-	-	–	–	**47.5**[a]	–	**48**[a]
Thallium	mg/L	-	0.0005	-	ND(0.003)	ND(0.01)	ND(0.001)	ND(0.02)	–
Thallium (Dissolved)	mg/L	-	0.0005	-	–	–	ND(0.001)	–	ND(0.02)
Vanadium	mg/L	-	-	-	0.0053 B	ND(0.002)	ND(0.010)	0.0341	–
Vanadium (Dissolved)	mg/L	-	-	-	–	–	ND(0.010)	–	ND(0.02)
Zinc	mg/L	-	2	-	0.287	0.0636	0.032	1.15	–
Zinc (Dissolved)	mg/L	-	2	-	–	–	0.025	–	0.0113
SVOAs									
1,2-Dichlorobenzene	mg/L	0.003	-	-	–	ND(0.009)	–	–	–
1,3-Dichlorobenzene	mg/L	0.003	-	-	–	ND(0.009)	–	–	–
1,4-Dichlorobenzene	mg/L	0.003	-	-	–	ND(0.009)	–	–	–
2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) eth	mg/L	-	-	0.05	–	ND(0.009)	–	–	–
2,4,5-Trichlorophenol	mg/L	-	-	0.05	–	ND(0.023)	–	–	–
2,4,6-Trichlorophenol	mg/L	-	-	0.05	–	ND(0.009)	–	–	–
2,4-Dichlorophenol	mg/L	-	-	0.05	–	ND(0.009)	–	–	–
2,4-Dimethylphenol	mg/L	-	0.05	-	–	ND(0.009)	–	–	–
2,4-Dinitrophenol	mg/L	-	0.01	-	–	ND(0.023)	–	–	–
2,4-Dinitrotoluene	mg/L	0.005	-	-	–	ND(0.009)	–	–	–
2,6-Dinitrotoluene	mg/L	0.005	-	-	–	ND(0.009)	–	–	–
2-Chloronaphthalene	mg/L	-	-	0.05	–	ND(0.009)	–	–	–
2-Chlorophenol	mg/L	-	-	0.05	–	ND(0.009)	–	–	–
2-Methylnaphthalene	mg/L	-	-	0.05	–	ND(0.009)	–	–	–
2-Methylphenol	mg/L	-	-	0.05	–	ND(0.009)	–	–	–
2-Nitroaniline	mg/L	0.005	-	-	–	ND(0.023)	–	–	–
2-Nitrophenol	mg/L	-	-	0.05	–	ND(0.009)	–	–	–
3,3'-Dichlorobenzidine	mg/L	0.005	-	-	–	ND(0.009)	–	–	–
3-Nitroaniline	mg/L	0.005	-	-	–	ND(0.023)	–	–	–
4,6-Dinitro-2-methylphenol	mg/L	-	-	0.05	–	ND(0.023)	–	–	–
4-Bromophenyl phenyl ether	mg/L	-	-	0.05	–	ND(0.009)	–	–	–
4-Chloro-3-methylphenol	mg/L	-	-	0.05	–	ND(0.009)	–	–	–
4-Chloroaniline	mg/L	0.005	-	-	–	ND(0.009)	–	–	–
4-Chlorophenyl phenyl ether	mg/L	-	-	0.05	–	ND(0.009)	–	–	–
4-Methylphenol	mg/L	-	-	0.05	–	ND(0.009)	–	–	–

TABLE B.8

DEEP OVERBURDEN GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:					*MW-103A*	*MW-103A*	*MW-103A*	*MW-103A*	*MW-103A*
Sample ID:					*MW-103A*	*MW-103A*	*MW-103A*	*GW-19867-08-03-PK-025*	*GW-19867-08-03-PK-026*
Sample Date:					*11/7/1996*	*3/1/2000*	*8/21/2001*	*8/28/2003*	*8/28/2003*
Sample Matrix:					*Deep*	*Deep*	*Deep*	*Deep*	*Deep*
	Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]	*NYSDEC MCL*[e]					
4-Nitroaniline	mg/L	0.005	-	-	--	ND(0.023)	--	--	--
4-Nitrophenol	mg/L	-	-	0.05	--	ND(0.023)	--	--	--
Acenaphthene	mg/L	-	0.02	-	--	ND(0.009)	--	--	--
Acenaphthylene	mg/L	-	-	0.05	--	ND(0.009)	--	--	--
Anthracene	mg/L	-	0.05	-	--	ND(0.009)	--	--	--
Benzo(a)anthracene	mg/L	-	-	0.05	--	ND(0.009)	--	--	--
Benzo(a)pyrene	mg/L	-	-	0.05	--	ND(0.009)	--	--	--
Benzo(b)fluoranthene	mg/L	-	0.000002	-	--	ND(0.009)	--	--	--
Benzo(g,h,i)perylene	mg/L	-	-	0.05	--	ND(0.009)	--	--	--
Benzo(k)fluoranthene	mg/L	-	0.000002	-	--	ND(0.009)	--	--	--
bis(2-Chloroethoxy)methane	mg/L	0.005	-	-	--	ND(0.009)	--	--	--
bis(2-Chloroethyl)ether	mg/L	0.001	-	-	--	ND(0.009)	--	--	--
bis(2-Ethylhexyl)phthalate	mg/L	0.005	-	-	0.001 BJ	ND(0.009)	--	--	--
Butyl benzylphthalate	mg/L	-	0.05	-	--	ND(0.009)	--	--	--
Carbazole	mg/L	-	-	0.05	--	ND(0.009)	--	--	--
Chrysene	mg/L	-	0.000002	-	--	ND(0.009)	--	--	--
Dibenz(a,h)anthracene	mg/L	-	-	0.05	--	ND(0.009)	--	--	--
Dibenzofuran	mg/L	-	-	0.05	--	ND(0.009)	--	--	--
Diethyl phthalate	mg/L	-	0.05	-	--	ND(0.009)	--	--	--
Dimethyl phthalate	mg/L	-	0.05	-	--	ND(0.009)	--	--	--
Di-n-butylphthalate	mg/L	0.05	-	-	--	ND(0.009)	--	--	--
Di-n-octyl phthalate	mg/L	-	0.05	-	--	ND(0.009)	--	--	--
Fluoranthene	mg/L	-	0.05	-	--	ND(0.009)	--	--	--
Fluorene	mg/L	-	0.05	-	--	ND(0.009)	--	--	--
Hexachlorobenzene	mg/L	0.00004	-	-	--	ND(0.009)	--	--	--
Hexachlorobutadiene	mg/L	0.0005	-	-	--	ND(0.009)	--	--	--
Hexachlorocyclopentadiene	mg/L	0.005	-	-	--	ND(0.009)	--	--	--
Hexachloroethane	mg/L	0.005	-	-	--	ND(0.009)	--	--	--
Indeno(1,2,3-cd)pyrene	mg/L	-	0.000002	-	--	ND(0.009)	--	--	--
Isophorone	mg/L	-	0.05	-	--	ND(0.009)	--	--	--
Naphthalene	mg/L	-	0.05	0.05	--	ND(0.009)	--	--	--
Nitrobenzene	mg/L	0.0004	-	-	--	ND(0.009)	--	--	--
N-Nitrosodi-n-propylamine	mg/L	-	-	0.05	--	ND(0.009)	--	--	--
N-Nitrosodiphenylamine	mg/L	-	0.05	-	--	ND(0.009)	--	--	--
Pentachlorophenol	mg/L	-	-	0.05	--	ND(0.023)	--	--	--
Phenanthrene	mg/L	-	0.05	-	--	ND(0.009)	--	--	--
Phenol	mg/L	-	-	0.05	--	ND(0.009)	--	--	--
Pyrene	mg/L	-	0.05	-	--	ND(0.009)	--	--	--
VOAs									
1,1,1-Trichloroethane	mg/L	0.005	-	-	--	ND(0.01)	--	--	--

TABLE B.8

DEEP OVERBURDEN GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:					*MW-103A*	*MW-103A*	*MW-103A*	*MW-103A*	*MW-103A*
Sample ID:					*MW-103A*	*MW-103A*	*MW-103A*	*GW-19867-08-03-PK-025*	*GW-19867-08-03-PK-026*
Sample Date:					*11/7/1996*	*3/1/2000*	*8/21/2001*	*8/28/2003*	*8/28/2003*
Sample Matrix:					*Deep*	*Deep*	*Deep*	*Deep*	*Deep*
	Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]	*NYSDEC MCL*[e]					
1,1,2,2-Tetrachloroethane	mg/L	0.005	-	-	--	ND(0.01)	--	--	--
1,1,2-Trichloroethane	mg/L	0.001	-	-	--	ND(0.01)	--	--	--
1,1-Dichloroethane	mg/L	0.005	-	-	--	ND(0.01)	--	--	--
1,1-Dichloroethene	mg/L	0.005	-	-	--	ND(0.01)	--	--	--
1,2-Dichloroethane	mg/L	0.006	-	-	--	ND(0.01)	--	--	--
1,2-Dichloroethene (total)	mg/L	0.005	-	-	--	ND(0.01)	--	--	--
1,2-Dichloropropane	mg/L	0.001	-	-	--	ND(0.01)	--	--	--
2-Butanone (Methyl Ethyl Ketone)	mg/L	-	0.05	-	--	ND(0.01)	--	--	--
2-Hexanone	mg/L	-	0.05	-	--	ND(0.01)	--	--	--
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	mg/L	-	-	0.05	--	ND(0.01)	--	--	--
Acetone	mg/L	-	0.05	-	--	ND(0.01)	--	--	--
Benzene	mg/L	0.001	-	-	--	ND(0.01)	--	--	--
Bromodichloromethane	mg/L	-	0.05	-	--	ND(0.01)	--	--	--
Bromoform	mg/L	-	0.05	-	--	ND(0.01)	--	--	--
Bromomethane (Methyl Bromide)	mg/L	0.005	-	-	--	ND(0.01)	--	--	--
Carbon disulfide	mg/L	-	0.06	-	--	ND(0.01)	--	--	--
Carbon tetrachloride	mg/L	0.005	-	-	--	ND(0.01)	--	--	--
Chlorobenzene	mg/L	0.005	-	-	--	ND(0.01)	--	--	--
Chloroethane	mg/L	0.005	-	-	--	ND(0.01)	--	--	--
Chloroform (Trichloromethane)	mg/L	0.007	-	-	--	ND(0.01)	--	--	--
Chloromethane (Methyl Chloride)	mg/L	0.005	-	-	--	ND(0.01)	--	--	--
cis-1,3-Dichloropropene	mg/L	0.004	-	-	--	ND(0.01)	--	--	--
Dibromochloromethane	mg/L	-	0.05	-	--	ND(0.01)	--	--	--
Ethylbenzene	mg/L	0.005	-	-	--	ND(0.01)	--	--	--
Methylene chloride	mg/L	0.005	-	-	--	ND(0.01)	--	--	--
Styrene	mg/L	0.005	-	-	--	ND(0.01)	--	--	--
Tetrachloroethene	mg/L	0.005	-	-	--	ND(0.01)	--	--	--
Toluene	mg/L	0.005	-	-	--	ND(0.01)	--	--	--
trans-1,3-Dichloropropene	mg/L	0.005	-	-	--	ND(0.01)	--	--	--
Trichloroethene	mg/L	0.005	-	-	--	ND(0.01)	--	--	--
Vinyl chloride	mg/L	0.002	-	-	--	ND(0.01)	--	--	--
Xylene (total)	mg/L	0.005	-	-	--	ND(0.01)	--	--	--
Wet									
Alkalinity, Total (As CaCO3)	mg/L	-	-	-	560.0	--	--	--	--
Bicarbonate (as CaCO3)	mg/L	-	-	-	682.8	--	--	--	--
Chloride	mg/L	250	-	-	20.0	--	--	--	--
Conductivity	umhos/cm	-	-	-	1252	--	--	--	--
Hardness	mg/L	-	-	-	1000.0	--	--	--	--
Hardness Calculation	mg/L	-	-	-	1067.2	--	--	--	--

TABLE B.8

DEEP OVERBURDEN GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:					*MW-103A*	*MW-103A*	*MW-103A*	*MW-103A*	*MW-103A*
Sample ID:					*MW-103A*	*MW-103A*	*MW-103A*	*GW-19867-08-03-PK-025*	*GW-19867-08-03-PK-026*
Sample Date:					*11/7/1996*	*3/1/2000*	*8/21/2001*	*8/28/2003*	*8/28/2003*
Sample Matrix:					*Deep*	*Deep*	*Deep*	*Deep*	*Deep*
	Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]	*NYSDEC MCL*[e]					
pH (water)	s.u.	6.5-8.5	-	-	7.40	--	--	6.80	6.80
Sulfate	mg/L	250	-	-	**350.0**[a]	--	--	--	--
Temperature	deg F	-	-	-	57	--	--	--	--
Turbidity	NTU	5	-	-	**314.0**[a]	--	4.51	--	--

TABLE B.8

DEEP OVERBURDEN GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:					*MW-103A*	*MW-103A*	*MW-103A*	*MW-104A*	*MW-104A*
Sample ID:					*GW-19867-10-03-PK-012*	*GW-19867-10-03-PK-013*	*GW-19867-10-03-PK-014*	*MW-104A*	*MW-104A*
Sample Date:					*10/6/2003*	*10/6/2003*	*10/6/2003*	*11/7/1996*	*8/21/2001*
Sample Matrix:					*Deep Duplicate*	*Deep*	*Deep*	*Deep*	*Deep*
	Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]	*NYSDEC MCL*[e]					
Metals									
Aluminum	mg/L	-	-	-	ND(0.2)	ND(0.2)	–	4.95	ND(0.075)
Aluminum (Dissolved)	mg/L	-	-	-	–	–	ND(0.2)	–	ND(0.075)
Antimony	mg/L	0.003	-	-	ND(0.01)	**0.00865 J**[a]	–	ND(0.0048)	ND(0.050)
Antimony (Dissolved)	mg/L	0.003	-	-	–	–	**0.00817 J**[a]	–	ND(0.050)
Arsenic	mg/L	0.025	-	-	0.0104 J	0.0136 J	–	ND(0.0046)	ND(0.002)
Arsenic (Dissolved)	mg/L	0.025	-	-	–	–	0.0136 J	–	ND(0.002)
Barium	mg/L	1	-	-	0.0732	0.0708	–	ND(0.146) B	0.121
Barium (Dissolved)	mg/L	1	-	-	–	–	0.0789	–	0.127
Beryllium	mg/L	-	0.003	-	ND(0.005)	ND(0.005)	–	ND(0.0001)	ND(0.002)
Beryllium (Dissolved)	mg/L	-	0.003	-	–	–	ND(0.005)	–	ND(0.002)
Cadmium	mg/L	0.005	-	-	ND(0.005)	ND(0.005)	–	ND(0.0002)	ND(0.005)
Cadmium (Dissolved)	mg/L	0.005	-	-	–	–	ND(0.005)	–	ND(0.005)
Calcium	mg/L	-	-	-	83.9	82.2	–	128.0	83.6
Calcium (Dissolved)	mg/L	-	-	-	–	–	91.3	–	99.6
Chromium Total	mg/L	0.05	-	-	ND(0.01)	ND(0.01)	–	0.0059 B	ND(0.010)
Chromium Total (Dissolved)	mg/L	0.05	-	-	–	–	ND(0.01)	–	ND(0.010)
Chromium VI (Hexavalent)	mg/L	0.05	-	-	0.00500 J	ND(0.01)	–	0.0188	0.014
Chromium VI (Hexavalent) (Dissolved)	mg/L	0.05	-	-	–	–	ND(0.01)	–	–
Cobalt	mg/L	-	-	-	ND(0.02)	ND(0.02)	–	0.004 B	ND(0.010)
Cobalt (Dissolved)	mg/L	-	-	-	–	–	ND(0.02)	–	ND(0.010)
Copper	mg/L	0.2	-	-	ND(0.02)	ND(0.02)	–	0.0046 B	ND(0.017)
Copper (Dissolved)	mg/L	0.2	-	-	–	–	ND(0.02)	–	ND(0.017)
Cyanide (Dissolved)	mg/L	0.2	-	-	–	–	ND(0.01) UJ	–	–
Cyanide (total)	mg/L	0.2	-	-	ND(0.01) UJ	ND(0.01) UJ	–	–	–
Iron	mg/L	0.3	-	-	**0.762 J**[a]	**0.807**[a]	–	**10.9**[a]	**3.27**[a]
Iron (Dissolved)	mg/L	0.3	-	-	–	–	**0.544 J**[a]	–	**3.08**[a]
Lead	mg/L	0.025	-	-	ND(0.005)	ND(0.005)	–	**0.0903**[a]	0.001
Lead (Dissolved)	mg/L	0.025	-	-	–	–	ND(0.005)	–	0.002
Magnesium	mg/L	-	35	-	**71.5**[b]	**71.3**[b]	–	**69.3**[b]	**48.5**[b]
Magnesium (Dissolved)	mg/L	-	35	-	–	–	**81.7**[b]	–	**51.4**[b]
Manganese	mg/L	0.3	-	-	0.102	0.108	–	**0.455**[a]	**0.39**[a]
Manganese (Dissolved)	mg/L	0.3	-	-	–	–	0.0889	–	**0.41**[a]
Mercury	mg/L	0.0007	-	-	ND(0.0004)	ND(0.0004)	–	ND(0.0001)	ND(0.0002)
Mercury (Dissolved)	mg/L	0.0007	-	-	–	–	ND(0.0004)	–	ND(0.0002)
Nickel	mg/L	0.1	-	-	ND(0.02)	ND(0.02)	–	0.0116 B	ND(0.012)
Nickel (Dissolved)	mg/L	0.1	-	-	–	–	ND(0.02)	–	ND(0.012)
Potassium	mg/L	-	-	-	0.946 J	0.896 J	–	1.85 B	1.34

TABLE B.8

DEEP OVERBURDEN GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:					*MW-103A*	*MW-103A*	*MW-103A*	*MW-104A*	*MW-104A*
Sample ID:					*GW-19867-10-03-PK-012*	*GW-19867-10-03-PK-013*	*GW-19867-10-03-PK-014*	*MW-104A*	*MW-104A*
Sample Date:					*10/6/2003*	*10/6/2003*	*10/6/2003*	*11/7/1996*	*8/21/2001*
Sample Matrix:					*Deep Duplicate*	*Deep*	*Deep*	*Deep*	*Deep*
	Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]	*NYSDEC MCL*[e]					
Potassium (Dissolved)	mg/L	-	-	-	–	–	0.98 J	–	1.41
Selenium	mg/L	0.010	-	-	**0.047**[a]	**0.0468**[a]	–	ND(0.0045)	ND(0.002)
Selenium (Dissolved)	mg/L	0.010	-	-	–	–	**0.0547**[a]	–	ND(0.002)
Silver	mg/L	0.050	-	-	ND(0.01)	ND(0.01)	–	ND(0.001)	ND(0.010)
Silver (Dissolved)	mg/L	0.050	-	-	–	–	ND(0.01)	–	ND(0.010)
Sodium	mg/L	20	-	-	**50.4**[a]	**49.3**[a]	–	**134.0 E**[a]	**110**[a]
Sodium (Dissolved)	mg/L	20	-	-	–	–	**49.5**[a]	–	**118**[a]
Thallium	mg/L	-	0.0005	-	ND(0.02)	ND(0.02)	–	ND(0.003)	ND(0.001)
Thallium (Dissolved)	mg/L	-	0.0005	-	–	–	ND(0.02)	–	ND(0.001)
Vanadium	mg/L	-	-	-	0.00804 J	0.012 J	–	0.0056 B	ND(0.010)
Vanadium (Dissolved)	mg/L	-	-	-	–	–	0.0131 J	–	ND(0.010)
Zinc	mg/L	-	2	-	ND(0.01)	ND(0.01)	–	0.585	0.021
Zinc (Dissolved)	mg/L	-	2	-	–	–	ND(0.01)	–	ND(0.020)
SVOAs									
1,2-Dichlorobenzene	mg/L	0.003	-	-	–	–	–	–	–
1,3-Dichlorobenzene	mg/L	0.003	-	-	–	–	–	–	–
1,4-Dichlorobenzene	mg/L	0.003	-	-	–	–	–	–	–
2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) eth	mg/L	-	-	0.05	–	–	–	–	–
2,4,5-Trichlorophenol	mg/L	-	-	0.05	–	–	–	–	–
2,4,6-Trichlorophenol	mg/L	-	-	0.05	–	–	–	–	–
2,4-Dichlorophenol	mg/L	-	-	0.05	–	–	–	–	–
2,4-Dimethylphenol	mg/L	-	0.05	-	–	–	–	–	–
2,4-Dinitrophenol	mg/L	-	0.01	-	–	–	–	–	–
2,4-Dinitrotoluene	mg/L	0.005	-	-	–	–	–	–	–
2,6-Dinitrotoluene	mg/L	0.005	-	-	–	–	–	–	–
2-Chloronaphthalene	mg/L	-	-	0.05	–	–	–	–	–
2-Chlorophenol	mg/L	-	-	0.05	–	–	–	–	–
2-Methylnaphthalene	mg/L	-	-	0.05	–	–	–	–	–
2-Methylphenol	mg/L	-	-	0.05	–	–	–	–	–
2-Nitroaniline	mg/L	0.005	-	-	–	–	–	–	–
2-Nitrophenol	mg/L	-	-	0.05	–	–	–	–	–
3,3'-Dichlorobenzidine	mg/L	0.005	-	-	–	–	–	–	–
3-Nitroaniline	mg/L	0.005	-	-	–	–	–	–	–
4,6-Dinitro-2-methylphenol	mg/L	-	-	0.05	–	–	–	–	–
4-Bromophenyl phenyl ether	mg/L	-	-	0.05	–	–	–	–	–
4-Chloro-3-methylphenol	mg/L	-	-	0.05	–	–	–	–	–
4-Chloroaniline	mg/L	0.005	-	-	–	–	–	–	–
4-Chlorophenyl phenyl ether	mg/L	-	-	0.05	–	–	–	–	–
4-Methylphenol	mg/L	-	-	0.05	–	–	–	–	–

TABLE B.8

DEEP OVERBURDEN GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:					*MW-103A*	*MW-103A*	*MW-103A*	*MW-104A*	*MW-104A*
Sample ID:					*GW-19867-10-03-PK-012*	*GW-19867-10-03-PK-013*	*GW-19867-10-03-PK-014*	*MW-104A*	*MW-104A*
Sample Date:					*10/6/2003*	*10/6/2003*	*10/6/2003*	*11/7/1996*	*8/21/2001*
Sample Matrix:					*Deep Duplicate*	*Deep*	*Deep*	*Deep*	*Deep*
	Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]	*NYSDEC MCL*[e]					
4-Nitroaniline	mg/L	0.005	-	-	--	--	--	--	--
4-Nitrophenol	mg/L	-	-	0.05	--	--	--	--	--
Acenaphthene	mg/L	-	0.02	-	--	--	--	--	--
Acenaphthylene	mg/L	-	-	0.05	--	--	--	--	--
Anthracene	mg/L	-	0.05	-	--	--	--	--	--
Benzo(a)anthracene	mg/L	-	-	0.05	--	--	--	--	--
Benzo(a)pyrene	mg/L	-	-	0.05	--	--	--	--	--
Benzo(b)fluoranthene	mg/L	-	0.000002	-	--	--	--	--	--
Benzo(g,h,i)perylene	mg/L	-	-	0.05	--	--	--	--	--
Benzo(k)fluoranthene	mg/L	-	0.000002	-	--	--	--	--	--
bis(2-Chloroethoxy)methane	mg/L	0.005	-	-	--	--	--	--	--
bis(2-Chloroethyl)ether	mg/L	0.001	-	-	--	--	--	--	--
bis(2-Ethylhexyl)phthalate	mg/L	0.005	-	-	--	--	--	0.002 BJ	--
Butyl benzylphthalate	mg/L	-	0.05	-	--	--	--	--	--
Carbazole	mg/L	-	-	0.05	--	--	--	--	--
Chrysene	mg/L	-	0.000002	-	--	--	--	--	--
Dibenz(a,h)anthracene	mg/L	-	-	0.05	--	--	--	--	--
Dibenzofuran	mg/L	-	-	0.05	--	--	--	--	--
Diethyl phthalate	mg/L	-	0.05	-	--	--	--	--	--
Dimethyl phthalate	mg/L	-	0.05	-	--	--	--	--	--
Di-n-butylphthalate	mg/L	0.05	-	-	--	--	--	--	--
Di-n-octyl phthalate	mg/L	-	0.05	-	--	--	--	--	--
Fluoranthene	mg/L	-	0.05	-	--	--	--	--	--
Fluorene	mg/L	-	0.05	-	--	--	--	--	--
Hexachlorobenzene	mg/L	0.00004	-	-	--	--	--	--	--
Hexachlorobutadiene	mg/L	0.0005	-	-	--	--	--	--	--
Hexachlorocyclopentadiene	mg/L	0.005	-	-	--	--	--	--	--
Hexachloroethane	mg/L	0.005	-	-	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	mg/L	-	0.000002	-	--	--	--	--	--
Isophorone	mg/L	-	0.05	-	--	--	--	--	--
Naphthalene	mg/L	-	0.05	0.05	--	--	--	--	--
Nitrobenzene	mg/L	0.0004	-	-	--	--	--	--	--
N-Nitrosodi-n-propylamine	mg/L	-	-	0.05	--	--	--	--	--
N-Nitrosodiphenylamine	mg/L	-	0.05	-	--	--	--	--	--
Pentachlorophenol	mg/L	-	-	0.05	--	--	--	--	--
Phenanthrene	mg/L	-	0.05	-	--	--	--	--	--
Phenol	mg/L	-	-	0.05	--	--	--	--	--
Pyrene	mg/L	-	0.05	-	--	--	--	--	--
VOAs									
1,1,1-Trichloroethane	mg/L	0.005	-	-	--	--	--	--	--

TABLE B.8

DEEP OVERBURDEN GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:					*MW-103A*	*MW-103A*	*MW-103A*	*MW-104A*	*MW-104A*
Sample ID:					*GW-19867-10-03-PK-012*	*GW-19867-10-03-PK-013*	*GW-19867-10-03-PK-014*	*MW-104A*	*MW-104A*
Sample Date:					*10/6/2003*	*10/6/2003*	*10/6/2003*	*11/7/1996*	*8/21/2001*
Sample Matrix:					*Deep*	*Deep*	*Deep*	*Deep*	*Deep*
					Duplicate				
	Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]	*NYSDEC MCL*[e]					
1,1,2,2-Tetrachloroethane	mg/L	0.005	-	-	–	–	–	–	–
1,1,2-Trichloroethane	mg/L	0.001	-	-	–	–	–	–	–
1,1-Dichloroethane	mg/L	0.005	-	-	–	–	–	–	–
1,1-Dichloroethene	mg/L	0.005	-	-	–	–	–	–	–
1,2-Dichloroethane	mg/L	0.006	-	-	–	–	–	–	–
1,2-Dichloroethene (total)	mg/L	0.005	-	-	–	–	–	–	–
1,2-Dichloropropane	mg/L	0.001	-	-	–	–	–	–	–
2-Butanone (Methyl Ethyl Ketone)	mg/L	-	0.05	-	–	–	–	–	–
2-Hexanone	mg/L	-	0.05	-	–	–	–	–	–
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	mg/L	-	-	0.05	–	–	–	–	–
Acetone	mg/L	-	0.05	-	–	–	–	–	–
Benzene	mg/L	0.001	-	-	–	–	–	–	–
Bromodichloromethane	mg/L	-	0.05	-	–	–	–	–	–
Bromoform	mg/L	-	0.05	-	–	–	–	–	–
Bromomethane (Methyl Bromide)	mg/L	0.005	-	-	–	–	–	–	–
Carbon disulfide	mg/L	-	0.06	-	–	–	–	–	–
Carbon tetrachloride	mg/L	0.005	-	-	–	–	–	–	–
Chlorobenzene	mg/L	0.005	-	-	–	–	–	–	–
Chloroethane	mg/L	0.005	-	-	–	–	–	–	–
Chloroform (Trichloromethane)	mg/L	0.007	-	-	–	–	–	–	–
Chloromethane (Methyl Chloride)	mg/L	0.005	-	-	–	–	–	–	–
cis-1,3-Dichloropropene	mg/L	0.004	-	-	–	–	–	–	–
Dibromochloromethane	mg/L	-	0.05	-	–	–	–	–	–
Ethylbenzene	mg/L	0.005	-	-	–	–	–	–	–
Methylene chloride	mg/L	0.005	-	-	–	–	–	–	–
Styrene	mg/L	0.005	-	-	–	–	–	–	–
Tetrachloroethene	mg/L	0.005	-	-	–	–	–	–	–
Toluene	mg/L	0.005	-	-	–	–	–	–	–
trans-1,3-Dichloropropene	mg/L	0.005	-	-	–	–	–	–	–
Trichloroethene	mg/L	0.005	-	-	–	–	–	–	–
Vinyl chloride	mg/L	0.002	-	-	–	–	–	–	–
Xylene (total)	mg/L	0.005	-	-	–	–	–	–	–
Wet									
Alkalinity, Total (As CaCO3)	mg/L	-	-	-	–	–	–	440.0	–
Bicarbonate (as CaCO3)	mg/L	-	-	-	–	–	–	536.5	–
Chloride	mg/L	250	-	-	–	–	–	**260.0**[a]	–
Conductivity	umhos/cm	-	-	-	–	–	–	1171	–
Hardness	mg/L	-	-	-	–	–	–	580.0	–
Hardness Calculation	mg/L	-	-	-	–	–	–	604.1	–

TABLE B.8

DEEP OVERBURDEN GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

	Sample Location:					*MW-103A*	*MW-103A*	*MW-103A*	*MW-104A*	*MW-104A*
	Sample ID:					*GW-19867-10-03-PK-012*	*GW-19867-10-03-PK-013*	*GW-19867-10-03-PK-014*	*MW-104A*	*MW-104A*
	Sample Date:					*10/6/2003*	*10/6/2003*	*10/6/2003*	*11/7/1996*	*8/21/2001*
	Sample Matrix:					*Deep*	*Deep*	*Deep*	*Deep*	*Deep*
						Duplicate				
		Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]	*NYSDEC MCL*[e]					
pH (water)		s.u.	6.5-8.5	-	-	7.11	7.11	7.11	7.35	--
Sulfate		mg/L	250	-	-	--	--	--	69.0	--
Temperature		deg F	-	-	-	--	--	--	57	--
Turbidity		NTU	5	-	-	--	--	--	**258.0**[a]	3.38

TABLE B.8

DEEP OVERBURDEN GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:					*MW-104A*	*MW-104A*	*MW-104A*	*MW-104A*
Sample ID:					*GW-19867-08-03-PK-017*	*GW-19867-08-03-PK-018*	*GW-19867-10-03-PK-010*	*GW-19867-10-03-PK-011*
Sample Date:					*8/25/2003*	*8/25/2003*	*10/3/2003*	*10/3/2003*
Sample Matrix:					*Deep*	*Deep*	*Deep*	*Deep*
	Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]	*NYSDEC MCL*[e]				
Metals								
Aluminum	mg/L	-	-	-	–	0.0601	0.354	–
Aluminum (Dissolved)	mg/L	-	-	-	0.0384	–	–	ND(0.2)
Antimony	mg/L	0.003	-	-	–	ND(0.01)	ND(0.01)	–
Antimony (Dissolved)	mg/L	0.003	-	-	ND(0.01)	–	–	ND(0.01)
Arsenic	mg/L	0.025	-	-	–	0.0127	ND(0.025)	–
Arsenic (Dissolved)	mg/L	0.025	-	-	0.0157	–	–	ND(0.025)
Barium	mg/L	1	-	-	–	0.133	0.139	–
Barium (Dissolved)	mg/L	1	-	-	0.127	–	–	0.142
Beryllium	mg/L	-	0.003	-	–	ND(0.005)	ND(0.005)	–
Beryllium (Dissolved)	mg/L	-	0.003	-	ND(0.005)	–	–	ND(0.005)
Cadmium	mg/L	0.005	-	-	–	ND(0.005)	ND(0.005)	–
Cadmium (Dissolved)	mg/L	0.005	-	-	ND(0.005)	–	–	ND(0.005)
Calcium	mg/L	-	-	-	–	109	97.9	–
Calcium (Dissolved)	mg/L	-	-	-	98.4	–	–	104
Chromium Total	mg/L	0.05	-	-	–	ND(0.01)	0.00116 J	–
Chromium Total (Dissolved)	mg/L	0.05	-	-	0.000817	–	–	ND(0.01)
Chromium VI (Hexavalent)	mg/L	0.05	-	-	–	ND(0.01)	ND(0.01)	–
Chromium VI (Hexavalent) (Dissolved)	mg/L	0.05	-	-	ND(0.01)	–	–	ND(0.01)
Cobalt	mg/L	-	-	-	–	ND(0.02)	ND(0.02)	–
Cobalt (Dissolved)	mg/L	-	-	-	ND(0.02)	–	–	ND(0.02)
Copper	mg/L	0.2	-	-	–	0.00706	ND(0.02)	–
Copper (Dissolved)	mg/L	0.2	-	-	0.00344	–	–	ND(0.02)
Cyanide (Dissolved)	mg/L	0.2	-	-	ND(0.01)	–	–	ND(0.01)
Cyanide (total)	mg/L	0.2	-	-	–	ND(0.01)	0.00336 J	–
Iron	mg/L	0.3	-	-	–	**3.78**[a]	**3.97**[a]	–
Iron (Dissolved)	mg/L	0.3	-	-	**2.92**[a]	–	–	**3.92**[a]
Lead	mg/L	0.025	-	-	–	ND(0.005)	0.00684	–
Lead (Dissolved)	mg/L	0.025	-	-	ND(0.005)	–	–	ND(0.005)
Magnesium	mg/L	-	35	-	–	**51.6**[b]	**48.2**[b]	–
Magnesium (Dissolved)	mg/L	-	35	-	**43.5**[b]	–	–	**53.7**[b]
Manganese	mg/L	0.3	-	-	–	**0.455**[a]	**0.587**[a]	–
Manganese (Dissolved)	mg/L	0.3	-	-	**0.858**[a]	–	–	**0.469**[a]
Mercury	mg/L	0.0007	-	-	–	ND(0.0004)	ND(0.0004)	–
Mercury (Dissolved)	mg/L	0.0007	-	-	ND(0.0004)	–	–	ND(0.0004)
Nickel	mg/L	0.1	-	-	–	ND(0.02)	0.00262 J	–
Nickel (Dissolved)	mg/L	0.1	-	-	ND(0.02)	–	–	0.00232 J
Potassium	mg/L	-	-	-	–	1.23	1.11 J	–

TABLE B.8

DEEP OVERBURDEN GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:					*MW-104A*	*MW-104A*	*MW-104A*	*MW-104A*
Sample ID:					*GW-19867-08-03-PK-017*	*GW-19867-08-03-PK-018*	*GW-19867-10-03-PK-010*	*GW-19867-10-03-PK-011*
Sample Date:					*8/25/2003*	*8/25/2003*	*10/3/2003*	*10/3/2003*
Sample Matrix:					*Deep*	*Deep*	*Deep*	*Deep*
	Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]	*NYSDEC MCL*[e]				
Potassium (Dissolved)	mg/L	-	-	-	1.1	–	–	1 J
Selenium	mg/L	0.010	-	-	–	ND(0.02)	**0.0228**[a]	–
Selenium (Dissolved)	mg/L	0.010	-	-	ND(0.02)	–	–	**0.0223**[a]
Silver	mg/L	0.050	-	-	–	ND(0.01)	ND(0.01)	–
Silver (Dissolved)	mg/L	0.050	-	-	ND(0.01)	–	–	ND(0.01)
Sodium	mg/L	20	-	-	–	**139**[a]	**137**[a]	–
Sodium (Dissolved)	mg/L	20	-	-	**139**[a]	–	–	**136**[a]
Thallium	mg/L	-	0.0005	-	–	ND(0.02)	ND(0.02)	–
Thallium (Dissolved)	mg/L	-	0.0005	-	ND(0.02)	–	–	ND(0.02)
Vanadium	mg/L	-	-	-	–	ND(0.02)	0.00521 J	–
Vanadium (Dissolved)	mg/L	-	-	-	ND(0.02)	–	–	0.00378 J
Zinc	mg/L	-	2	-	–	0.0284	0.0403	–
Zinc (Dissolved)	mg/L	-	2	-	0.0263	–	–	ND(0.01)
SVOAs								
1,2-Dichlorobenzene	mg/L	0.003	-	-	–	–	–	–
1,3-Dichlorobenzene	mg/L	0.003	-	-	–	–	–	–
1,4-Dichlorobenzene	mg/L	0.003	-	-	–	–	–	–
2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) eth	mg/L	-	-	0.05	–	–	–	–
2,4,5-Trichlorophenol	mg/L	-	-	0.05	–	–	–	–
2,4,6-Trichlorophenol	mg/L	-	-	0.05	–	–	–	–
2,4-Dichlorophenol	mg/L	-	-	0.05	–	–	–	–
2,4-Dimethylphenol	mg/L	-	0.05	-	–	–	–	–
2,4-Dinitrophenol	mg/L	-	0.01	-	–	–	–	–
2,4-Dinitrotoluene	mg/L	0.005	-	-	–	–	–	–
2,6-Dinitrotoluene	mg/L	0.005	-	-	–	–	–	–
2-Chloronaphthalene	mg/L	-	-	0.05	–	–	–	–
2-Chlorophenol	mg/L	-	-	0.05	–	–	–	–
2-Methylnaphthalene	mg/L	-	-	0.05	–	–	–	–
2-Methylphenol	mg/L	-	-	0.05	–	–	–	–
2-Nitroaniline	mg/L	0.005	-	-	–	–	–	–
2-Nitrophenol	mg/L	-	-	0.05	–	–	–	–
3,3'-Dichlorobenzidine	mg/L	0.005	-	-	–	–	–	–
3-Nitroaniline	mg/L	0.005	-	-	–	–	–	–
4,6-Dinitro-2-methylphenol	mg/L	-	-	0.05	–	–	–	–
4-Bromophenyl phenyl ether	mg/L	-	-	0.05	–	–	–	–
4-Chloro-3-methylphenol	mg/L	-	-	0.05	–	–	–	–
4-Chloroaniline	mg/L	0.005	-	-	–	–	–	–
4-Chlorophenyl phenyl ether	mg/L	-	-	0.05	–	–	–	–
4-Methylphenol	mg/L	-	-	0.05	–	–	–	–

TABLE B.8

DEEP OVERBURDEN GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:					*MW-104A*	*MW-104A*	*MW-104A*	*MW-104A*
Sample ID:					*GW-19867-08-03-PK-017*	*GW-19867-08-03-PK-018*	*GW-19867-10-03-PK-010*	*GW-19867-10-03-PK-011*
Sample Date:					*8/25/2003*	*8/25/2003*	*10/3/2003*	*10/3/2003*
Sample Matrix:					*Deep*	*Deep*	*Deep*	*Deep*
	Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]	*NYSDEC MCL*[e]				
4-Nitroaniline	mg/L	0.005	-	-	--	--	--	--
4-Nitrophenol	mg/L	-	-	0.05	--	--	--	--
Acenaphthene	mg/L	-	0.02	-	--	--	--	--
Acenaphthylene	mg/L	-	-	0.05	--	--	--	--
Anthracene	mg/L	-	0.05	-	--	--	--	--
Benzo(a)anthracene	mg/L	-	-	0.05	--	--	--	--
Benzo(a)pyrene	mg/L	-	-	0.05	--	--	--	--
Benzo(b)fluoranthene	mg/L	-	0.000002	-	--	--	--	--
Benzo(g,h,i)perylene	mg/L	-	-	0.05	--	--	--	--
Benzo(k)fluoranthene	mg/L	-	0.000002	-	--	--	--	--
bis(2-Chloroethoxy)methane	mg/L	0.005	-	-	--	--	--	--
bis(2-Chloroethyl)ether	mg/L	0.001	-	-	--	--	--	--
bis(2-Ethylhexyl)phthalate	mg/L	0.005	-	-	--	--	--	--
Butyl benzylphthalate	mg/L	-	0.05	-	--	--	--	--
Carbazole	mg/L	-	-	0.05	--	--	--	--
Chrysene	mg/L	-	0.000002	-	--	--	--	--
Dibenz(a,h)anthracene	mg/L	-	-	0.05	--	--	--	--
Dibenzofuran	mg/L	-	-	0.05	--	--	--	--
Diethyl phthalate	mg/L	-	0.05	-	--	--	--	--
Dimethyl phthalate	mg/L	-	0.05	-	--	--	--	--
Di-n-butylphthalate	mg/L	0.05	-	-	--	--	--	--
Di-n-octyl phthalate	mg/L	-	0.05	-	--	--	--	--
Fluoranthene	mg/L	-	0.05	-	--	--	--	--
Fluorene	mg/L	-	0.05	-	--	--	--	--
Hexachlorobenzene	mg/L	0.00004	-	-	--	--	--	--
Hexachlorobutadiene	mg/L	0.0005	-	-	--	--	--	--
Hexachlorocyclopentadiene	mg/L	0.005	-	-	--	--	--	--
Hexachloroethane	mg/L	0.005	-	-	--	--	--	--
Indeno(1,2,3-cd)pyrene	mg/L	-	0.000002	-	--	--	--	--
Isophorone	mg/L	-	0.05	-	--	--	--	--
Naphthalene	mg/L	-	0.05	0.05	--	--	--	--
Nitrobenzene	mg/L	0.0004	-	-	--	--	--	--
N-Nitrosodi-n-propylamine	mg/L	-	-	0.05	--	--	--	--
N-Nitrosodiphenylamine	mg/L	-	0.05	-	--	--	--	--
Pentachlorophenol	mg/L	-	-	0.05	--	--	--	--
Phenanthrene	mg/L	-	0.05	-	--	--	--	--
Phenol	mg/L	-	-	0.05	--	--	--	--
Pyrene	mg/L	-	0.05	-	--	--	--	--
VOAs								
1,1,1-Trichloroethane	mg/L	0.005	-	-	--	--	--	--

TABLE B.8

DEEP OVERBURDEN GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:					*MW-104A*	*MW-104A*	*MW-104A*	*MW-104A*
Sample ID:					*GW-19867-08-03-PK-017*	*GW-19867-08-03-PK-018*	*GW-19867-10-03-PK-010*	*GW-19867-10-03-PK-011*
Sample Date:					*8/25/2003*	*8/25/2003*	*10/3/2003*	*10/3/2003*
Sample Matrix:					*Deep*	*Deep*	*Deep*	*Deep*
	Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]	*NYSDEC MCL*[e]				
1,1,2,2-Tetrachloroethane	mg/L	0.005	-	-	–	–	–	–
1,1,2-Trichloroethane	mg/L	0.001	-	-	–	–	–	–
1,1-Dichloroethane	mg/L	0.005	-	-	–	–	–	–
1,1-Dichloroethene	mg/L	0.005	-	-	–	–	–	–
1,2-Dichloroethane	mg/L	0.006	-	-	–	–	–	–
1,2-Dichloroethene (total)	mg/L	0.005	-	-	–	–	–	–
1,2-Dichloropropane	mg/L	0.001	-	-	–	–	–	–
2-Butanone (Methyl Ethyl Ketone)	mg/L	-	0.05	-	–	–	–	–
2-Hexanone	mg/L	-	0.05	-	–	–	–	–
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	mg/L	-	-	0.05	–	–	–	–
Acetone	mg/L	-	0.05	-	–	–	–	–
Benzene	mg/L	0.001	-	-	–	–	–	–
Bromodichloromethane	mg/L	-	0.05	-	–	–	–	–
Bromoform	mg/L	-	0.05	-	–	–	–	–
Bromomethane (Methyl Bromide)	mg/L	0.005	-	-	–	–	–	–
Carbon disulfide	mg/L	-	0.06	-	–	–	–	–
Carbon tetrachloride	mg/L	0.005	-	-	–	–	–	–
Chlorobenzene	mg/L	0.005	-	-	–	–	–	–
Chloroethane	mg/L	0.005	-	-	–	–	–	–
Chloroform (Trichloromethane)	mg/L	0.007	-	-	–	–	–	–
Chloromethane (Methyl Chloride)	mg/L	0.005	-	-	–	–	–	–
cis-1,3-Dichloropropene	mg/L	0.004	-	-	–	–	–	–
Dibromochloromethane	mg/L	-	0.05	-	–	–	–	–
Ethylbenzene	mg/L	0.005	-	-	–	–	–	–
Methylene chloride	mg/L	0.005	-	-	–	–	–	–
Styrene	mg/L	0.005	-	-	–	–	–	–
Tetrachloroethene	mg/L	0.005	-	-	–	–	–	–
Toluene	mg/L	0.005	-	-	–	–	–	–
trans-1,3-Dichloropropene	mg/L	0.005	-	-	–	–	–	–
Trichloroethene	mg/L	0.005	-	-	–	–	–	–
Vinyl chloride	mg/L	0.002	-	-	–	–	–	–
Xylene (total)	mg/L	0.005	-	-	–	–	–	–
Wet								
Alkalinity, Total (As CaCO3)	mg/L	-	-	-	–	–	–	–
Bicarbonate (as CaCO3)	mg/L	-	-	-	–	–	–	–
Chloride	mg/L	250	-	-	–	–	–	–
Conductivity	umhos/cm	-	-	-	–	–	–	–
Hardness	mg/L	-	-	-	–	–	–	–
Hardness Calculation	mg/L	-	-	-	–	–	–	–

TABLE B.8

DEEP OVERBURDEN GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

	Sample Location:				*MW-104A*	*MW-104A*	*MW-104A*	*MW-104A*
	Sample ID:				*GW-19867-08-03-PK-017*	*GW-19867-08-03-PK-018*	*GW-19867-10-03-PK-010*	*GW-19867-10-03-PK-011*
	Sample Date:				*8/25/2003*	*8/25/2003*	*10/3/2003*	*10/3/2003*
	Sample Matrix:				*Deep*	*Deep*	*Deep*	*Deep*
		Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]	*NYSDEC MCL*[e]			
pH (water)		s.u.	6.5-8.5	-	-	6.65	6.65	**12.02**[a]	**12.02**[a]
Sulfate		mg/L	250	-	-	--	--	--	--
Temperature		deg F	-	-	-	--	--	--	--
Turbidity		NTU	5	-	-	--	--	--	--

TABLE B.8

DEEP OVERBURDEN GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:					*MW-105A*	*MW-105A*	*MW-105A*	*MW-105A*	*MW-106A*
Sample ID:					*MW-105A*	*MW-105A*	*GW-19867-08-03-PK-020*	*GW-19867-10-03-PK-020*	*MW-106A*
Sample Date:					*11/7/1996*	*8/21/2001*	*8/28/2003*	*10/22/2003*	*3/1/2000*
Sample Matrix:					*Deep*	*Deep*	*Deep*	*Deep*	*Deep*
	Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]	*NYSDEC MCL*[e]					
Metals									
Aluminum	mg/L	-	-	-	8.65	0.115	1.89	ND(0.2)	1.75
Aluminum (Dissolved)	mg/L	-	-	-	–	ND(0.075)	–	–	–
Antimony	mg/L	0.003	-	-	ND(0.0048)	ND(0.050)	ND(0.01)	ND(0.01)	ND(0.008)
Antimony (Dissolved)	mg/L	0.003	-	-	–	ND(0.050)	–	–	–
Arsenic	mg/L	0.025	-	-	ND(0.0038)	ND(0.002)	0.0159 J	ND(0.025)	ND(0.0055)
Arsenic (Dissolved)	mg/L	0.025	-	-	–	ND(0.002)	–	–	–
Barium	mg/L	1	-	-	0.121 B	0.1	0.125	0.107	0.0387 B
Barium (Dissolved)	mg/L	1	-	-	–	0.099	–	–	–
Beryllium	mg/L	-	0.003	-	ND(0.0001)	ND(0.002)	ND(0.005)	ND(0.005)	ND(0.001)
Beryllium (Dissolved)	mg/L	-	0.003	-	–	ND(0.002)	–	–	–
Cadmium	mg/L	0.005	-	-	0.00065 B	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.001)
Cadmium (Dissolved)	mg/L	0.005	-	-	–	ND(0.005)	–	–	–
Calcium	mg/L	-	-	-	137.0	83.6	120	108	81.4 E
Calcium (Dissolved)	mg/L	-	-	-	–	83.6	–	–	–
Chromium Total	mg/L	0.05	-	-	0.0104 B	0.029	0.0438	0.00347 J	0.0017 B
Chromium Total (Dissolved)	mg/L	0.05	-	-	–	ND(0.010)	–	–	–
Chromium VI (Hexavalent)	mg/L	0.05	-	-	0.0263	ND(0.010)	**0.0590**[a]	ND(0.01)	ND(0.01)
Chromium VI (Hexavalent) (Dissolved)	mg/L	0.05	-	-	–	–	–	–	–
Cobalt	mg/L	-	-	-	0.0064 B	ND(0.010)	0.00222	ND(0.02)	0.0016 B
Cobalt (Dissolved)	mg/L	-	-	-	–	ND(0.010)	–	–	–
Copper	mg/L	0.2	-	-	0.0083 B	ND(0.017)	0.0172	ND(0.02)	0.0055 B
Copper (Dissolved)	mg/L	0.2	-	-	–	ND(0.017)	–	–	–
Cyanide (Dissolved)	mg/L	0.2	-	-	–	–	–	–	–
Cyanide (total)	mg/L	0.2	-	-	–	–	ND(0.01)	ND(0.01)	–
Iron	mg/L	0.3	-	-	**8.98**[a]	**0.333**[a]	**2.21**[a]	ND(0.2)	**1.48**[a]
Iron (Dissolved)	mg/L	0.3	-	-	–	0.1	–	–	–
Lead	mg/L	0.025	-	-	0.0176	0.003	0.0088	0.00551	0.0041
Lead (Dissolved)	mg/L	0.025	-	-	–	ND(0.001)	–	–	–
Magnesium	mg/L	-	35	-	**87.2**[b]	**46.2**[b]	**66.7**[b]	**60.1**[b]	26.2 E
Magnesium (Dissolved)	mg/L	-	35	-	–	**46.3**[b]	–	–	–
Manganese	mg/L	0.3	-	-	**1.2**[a]	**0.702**[a]	**0.675**[a]	**0.651**[a]	0.147
Manganese (Dissolved)	mg/L	0.3	-	-	–	**0.703**[a]	–	–	–
Mercury	mg/L	0.0007	-	-	ND(0.0001)	ND(0.0002)	ND(0.0004) UJ	ND(0.0004)	ND(0.0002)
Mercury (Dissolved)	mg/L	0.0007	-	-	–	ND(0.0002)	–	–	–
Nickel	mg/L	0.1	-	-	0.0197 B	0.023	0.00887 J	0.00447 J	0.0052 B
Nickel (Dissolved)	mg/L	0.1	-	-	–	ND(0.012)	–	–	–
Potassium	mg/L	-	-	-	3.14 B	2.87	3.41	2.89	1.69 B

TABLE B.8

DEEP OVERBURDEN GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:					*MW-105A*	*MW-105A*	*MW-105A*	*MW-105A*	*MW-106A*
Sample ID:					*MW-105A*	*MW-105A*	*GW-19867-08-03-PK-020*	*GW-19867-10-03-PK-020*	*MW-106A*
Sample Date:					*11/7/1996*	*8/21/2001*	*8/28/2003*	*10/22/2003*	*3/1/2000*
Sample Matrix:					*Deep*	*Deep*	*Deep*	*Deep*	*Deep*
	Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]	*NYSDEC MCL*[e]					
Potassium (Dissolved)	mg/L	-	-	-	--	2.91	--	--	--
Selenium	mg/L	0.010	-	-	ND(0.0045)	ND(0.002)	**0.0303**[a]	**0.0392**[a]	ND(0.005)
Selenium (Dissolved)	mg/L	0.010	-	-	--	ND(0.002)	--	--	--
Silver	mg/L	0.050	-	-	ND(0.001)	ND(0.010)	ND(0.01)	ND(0.01)	0.002 B
Silver (Dissolved)	mg/L	0.050	-	-	--	ND(0.010)	--	--	--
Sodium	mg/L	20	-	-	**108 E**[a]	**112**[a]	**117**[a]	**118**[a]	5.69
Sodium (Dissolved)	mg/L	20	-	-	--	**115**[a]	--	--	--
Thallium	mg/L	-	0.0005	-	ND(0.003)	ND(0.001)	ND(0.02)	ND(0.02)	ND(0.01)
Thallium (Dissolved)	mg/L	-	0.0005	-	--	ND(0.001)	--	--	--
Vanadium	mg/L	-	-	-	0.008 B	ND(0.010)	0.00345 J	0.0161 J	0.0058 B
Vanadium (Dissolved)	mg/L	-	-	-	--	ND(0.010)	--	--	--
Zinc	mg/L	-	2	-	1.02	0.142	0.357	0.237	0.0904
Zinc (Dissolved)	mg/L	-	2	-	--	0.049	--	--	--
SVOAs									
1,2-Dichlorobenzene	mg/L	0.003	-	-	--	--	--	--	ND(0.009)
1,3-Dichlorobenzene	mg/L	0.003	-	-	--	--	--	--	ND(0.009)
1,4-Dichlorobenzene	mg/L	0.003	-	-	--	--	--	--	ND(0.009)
2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) eth	mg/L	-	-	0.05	--	--	--	--	ND(0.009)
2,4,5-Trichlorophenol	mg/L	-	-	0.05	--	--	--	--	ND(0.023)
2,4,6-Trichlorophenol	mg/L	-	-	0.05	--	--	--	--	ND(0.009)
2,4-Dichlorophenol	mg/L	-	-	0.05	--	--	--	--	ND(0.009)
2,4-Dimethylphenol	mg/L	-	0.05	-	--	--	--	--	ND(0.009)
2,4-Dinitrophenol	mg/L	-	0.01	-	--	--	--	--	ND(0.023)
2,4-Dinitrotoluene	mg/L	0.005	-	-	--	--	--	--	ND(0.009)
2,6-Dinitrotoluene	mg/L	0.005	-	-	--	--	--	--	ND(0.009)
2-Chloronaphthalene	mg/L	-	-	0.05	--	--	--	--	ND(0.009)
2-Chlorophenol	mg/L	-	-	0.05	--	--	--	--	ND(0.009)
2-Methylnaphthalene	mg/L	-	-	0.05	--	--	--	--	ND(0.009)
2-Methylphenol	mg/L	-	-	0.05	--	--	--	--	ND(0.009)
2-Nitroaniline	mg/L	0.005	-	-	--	--	--	--	ND(0.023)
2-Nitrophenol	mg/L	-	-	0.05	--	--	--	--	ND(0.009)
3,3'-Dichlorobenzidine	mg/L	0.005	-	-	--	--	--	--	ND(0.009)
3-Nitroaniline	mg/L	0.005	-	-	--	--	--	--	ND(0.023)
4,6-Dinitro-2-methylphenol	mg/L	-	-	0.05	--	--	--	--	ND(0.023)
4-Bromophenyl phenyl ether	mg/L	-	-	0.05	--	--	--	--	ND(0.009)
4-Chloro-3-methylphenol	mg/L	-	-	0.05	--	--	--	--	ND(0.009)
4-Chloroaniline	mg/L	0.005	-	-	--	--	--	--	ND(0.009)
4-Chlorophenyl phenyl ether	mg/L	-	-	0.05	--	--	--	--	ND(0.009)
4-Methylphenol	mg/L	-	-	0.05	--	--	--	--	ND(0.009)

TABLE B.8

DEEP OVERBURDEN GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:					*MW-105A*	*MW-105A*	*MW-105A*	*MW-105A*	*MW-106A*
Sample ID:					*MW-105A*	*MW-105A*	*GW-19867-08-03-PK-020*	*GW-19867-10-03-PK-020*	*MW-106A*
Sample Date:					*11/7/1996*	*8/21/2001*	*8/28/2003*	*10/22/2003*	*3/1/2000*
Sample Matrix:					*Deep*	*Deep*	*Deep*	*Deep*	*Deep*
	Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]	*NYSDEC MCL*[e]					
4-Nitroaniline	mg/L	0.005	-	-	--	--	--	--	ND(0.023)
4-Nitrophenol	mg/L	-	-	0.05	--	--	--	--	ND(0.023)
Acenaphthene	mg/L	-	0.02	-	--	--	--	--	ND(0.009)
Acenaphthylene	mg/L	-	-	0.05	--	--	--	--	ND(0.009)
Anthracene	mg/L	-	0.05	-	--	--	--	--	ND(0.009)
Benzo(a)anthracene	mg/L	-	-	0.05	--	--	--	--	ND(0.009)
Benzo(a)pyrene	mg/L	-	-	0.05	--	--	--	--	ND(0.009)
Benzo(b)fluoranthene	mg/L	-	0.000002	-	--	--	--	--	ND(0.009)
Benzo(g,h,i)perylene	mg/L	-	-	0.05	--	--	--	--	ND(0.009)
Benzo(k)fluoranthene	mg/L	-	0.000002	-	--	--	--	--	ND(0.009)
bis(2-Chloroethoxy)methane	mg/L	0.005	-	-	--	--	--	--	ND(0.009)
bis(2-Chloroethyl)ether	mg/L	0.001	-	-	--	--	--	--	ND(0.009)
bis(2-Ethylhexyl)phthalate	mg/L	0.005	-	-	0.001 BJ	--	--	--	ND(0.009)
Butyl benzylphthalate	mg/L	-	0.05	-	--	--	--	--	ND(0.009)
Carbazole	mg/L	-	-	0.05	--	--	--	--	ND(0.009)
Chrysene	mg/L	-	0.000002	-	--	--	--	--	ND(0.009)
Dibenz(a,h)anthracene	mg/L	-	-	0.05	--	--	--	--	ND(0.009)
Dibenzofuran	mg/L	-	-	0.05	--	--	--	--	ND(0.009)
Diethyl phthalate	mg/L	-	0.05	-	--	--	--	--	ND(0.009)
Dimethyl phthalate	mg/L	-	0.05	-	--	--	--	--	ND(0.009)
Di-n-butylphthalate	mg/L	0.05	-	-	--	--	--	--	ND(0.009)
Di-n-octyl phthalate	mg/L	-	0.05	-	--	--	--	--	ND(0.009)
Fluoranthene	mg/L	-	0.05	-	--	--	--	--	ND(0.009)
Fluorene	mg/L	-	0.05	-	--	--	--	--	ND(0.009)
Hexachlorobenzene	mg/L	0.00004	-	-	--	--	--	--	ND(0.009)
Hexachlorobutadiene	mg/L	0.0005	-	-	--	--	--	--	ND(0.009)
Hexachlorocyclopentadiene	mg/L	0.005	-	-	--	--	--	--	ND(0.009)
Hexachloroethane	mg/L	0.005	-	-	--	--	--	--	ND(0.009)
Indeno(1,2,3-cd)pyrene	mg/L	-	0.000002	-	--	--	--	--	ND(0.009)
Isophorone	mg/L	-	0.05	-	--	--	--	--	ND(0.009)
Naphthalene	mg/L	-	0.05	0.05	--	--	--	--	ND(0.009)
Nitrobenzene	mg/L	0.0004	-	-	--	--	--	--	ND(0.009)
N-Nitrosodi-n-propylamine	mg/L	-	-	0.05	--	--	--	--	ND(0.009)
N-Nitrosodiphenylamine	mg/L	-	0.05	-	--	--	--	--	ND(0.009)
Pentachlorophenol	mg/L	-	-	0.05	--	--	--	--	ND(0.023)
Phenanthrene	mg/L	-	0.05	-	--	--	--	--	ND(0.009)
Phenol	mg/L	-	-	0.05	--	--	--	--	ND(0.009)
Pyrene	mg/L	-	0.05	-	--	--	--	--	ND(0.009)
VOAs									
1,1,1-Trichloroethane	mg/L	0.005	-	-	--	--	--	--	ND(0.01)

TABLE B.8

DEEP OVERBURDEN GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:					***MW-105A***	***MW-105A***	***MW-105A***	***MW-105A***	***MW-106A***
Sample ID:					***MW-105A***	***MW-105A***	***GW-19867-08-03-PK-020***	***GW-19867-10-03-PK-020***	***MW-106A***
Sample Date:					***11/7/1996***	***8/21/2001***	***8/28/2003***	***10/22/2003***	***3/1/2000***
Sample Matrix:					***Deep***	***Deep***	***Deep***	***Deep***	***Deep***
	Units	***NYSDEC AWQ Standard[d]***	***NYSDEC AWQ Guidance[d]***	***NYSDEC MCL[e]***					
1,1,2,2-Tetrachloroethane	mg/L	0.005	-	-	--	--	--	--	ND(0.01)
1,1,2-Trichloroethane	mg/L	0.001	-	-	--	--	--	--	ND(0.01)
1,1-Dichloroethane	mg/L	0.005	-	-	--	--	--	--	ND(0.01)
1,1-Dichloroethene	mg/L	0.005	-	-	--	--	--	--	ND(0.01)
1,2-Dichloroethane	mg/L	0.006	-	-	--	--	--	--	ND(0.01)
1,2-Dichloroethene (total)	mg/L	0.005	-	-	0.001 J	--	--	--	ND(0.01)
1,2-Dichloropropane	mg/L	0.001	-	-	--	--	--	--	ND(0.01)
2-Butanone (Methyl Ethyl Ketone)	mg/L	-	0.05	-	--	--	--	--	ND(0.01)
2-Hexanone	mg/L	-	0.05	-	--	--	--	--	ND(0.01)
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	mg/L	-	-	0.05	--	--	--	--	ND(0.01)
Acetone	mg/L	-	0.05	-	--	--	--	--	ND(0.01)
Benzene	mg/L	0.001	-	-	--	--	--	--	ND(0.01)
Bromodichloromethane	mg/L	-	0.05	-	--	--	--	--	ND(0.01)
Bromoform	mg/L	-	0.05	-	--	--	--	--	ND(0.01)
Bromomethane (Methyl Bromide)	mg/L	0.005	-	-	--	--	--	--	ND(0.01)
Carbon disulfide	mg/L	-	0.06	-	--	--	--	--	ND(0.01)
Carbon tetrachloride	mg/L	0.005	-	-	--	--	--	--	ND(0.01)
Chlorobenzene	mg/L	0.005	-	-	--	--	--	--	ND(0.01)
Chloroethane	mg/L	0.005	-	-	--	--	--	--	ND(0.01)
Chloroform (Trichloromethane)	mg/L	0.007	-	-	--	--	--	--	ND(0.01)
Chloromethane (Methyl Chloride)	mg/L	0.005	-	-	--	--	--	--	ND(0.01)
cis-1,3-Dichloropropene	mg/L	0.004	-	-	--	--	--	--	ND(0.01)
Dibromochloromethane	mg/L	-	0.05	-	--	--	--	--	ND(0.01)
Ethylbenzene	mg/L	0.005	-	-	--	--	--	--	ND(0.01)
Methylene chloride	mg/L	0.005	-	-	--	--	--	--	ND(0.01)
Styrene	mg/L	0.005	-	-	--	--	--	--	ND(0.01)
Tetrachloroethene	mg/L	0.005	-	-	--	--	--	--	ND(0.01)
Toluene	mg/L	0.005	-	-	--	--	--	--	ND(0.01)
trans-1,3-Dichloropropene	mg/L	0.005	-	-	--	--	--	--	ND(0.01)
Trichloroethene	mg/L	0.005	-	-	--	--	--	--	ND(0.01)
Vinyl chloride	mg/L	0.002	-	-	--	--	--	--	ND(0.01)
Xylene (total)	mg/L	0.005	-	-	--	--	--	--	ND(0.01)
Wet									
Alkalinity, Total (As CaCO3)	mg/L	-	-	-	520.0	--	--	--	--
Bicarbonate (as CaCO3)	mg/L	-	-	-	634.0	--	--	--	--
Chloride	mg/L	250	-	-	100.0	--	--	--	--
Conductivity	umhos/cm	-	-	-	1070	--	--	--	--
Hardness	mg/L	-	-	-	700.0	--	--	--	--
Hardness Calculation	mg/L	-	-	-	700.0	--	--	--	--

TABLE B.8

DEEP OVERBURDEN GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:					*MW-105A*	*MW-105A*	*MW-105A*	*MW-105A*	*MW-106A*
Sample ID:					*MW-105A*	*MW-105A*	*GW-19867-08-03-PK-020*	*GW-19867-10-03-PK-020*	*MW-106A*
Sample Date:					*11/7/1996*	*8/21/2001*	*8/28/2003*	*10/22/2003*	*3/1/2000*
Sample Matrix:					*Deep*	*Deep*	*Deep*	*Deep*	*Deep*
	Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]	*NYSDEC MCL*[e]					
pH (water)	s.u.	6.5-8.5	-	-	7.44	–	6.7	6.93	–
Sulfate	mg/L	250	-	-	97.0	–	–	–	–
Temperature	deg F	-	-	-	60	–	–	–	–
Turbidity	NTU	5	-	-	**723.0**[a]	**6**[a]	–	–	–

TABLE B.8

DEEP OVERBURDEN GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:					*MW-106A*	*MW-106A*	*MW-107A*	*MW-107A*	*MW-107A*
Sample ID:					*GW-19867-08-03-PK-027*	*GW-19867-10-03-PK-023*	*MW-107A*	*MW-107A*	*GW-19867-08-03-PK-028*
Sample Date:					*8/28/2003*	*10/22/2003*	*11/7/1996*	*3/1/2000*	*8/28/2003*
Sample Matrix:					*Deep*	*Deep*	*Deep*	*Deep*	*Deep*
	Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]	*NYSDEC MCL*[e]					
Metals									
Aluminum	mg/L	-	-	-	16.1	1.06	8.36	1.19	28.4
Aluminum (Dissolved)	mg/L	-	-	-	–	–	–	–	–
Antimony	mg/L	0.003	-	-	ND(0.01)	**0.00828 J**[a]	ND(0.0048)	ND(0.008)	ND(0.01)
Antimony (Dissolved)	mg/L	0.003	-	-	–	–	–	–	–
Arsenic	mg/L	0.025	-	-	**0.0251**[a]	0.0119 J	0.0055 B	ND(0.0055)	0.0249 J
Arsenic (Dissolved)	mg/L	0.025	-	-	–	–	–	–	–
Barium	mg/L	1	-	-	0.121	0.0425	0.108 B	0.0481 B	0.345
Barium (Dissolved)	mg/L	1	-	-	–	–	–	–	–
Beryllium	mg/L	-	0.003	-	0.000608 J	ND(0.005)	0.00084 B	ND(0.001)	0.00112 J
Beryllium (Dissolved)	mg/L	-	0.003	-	–	–	–	–	–
Cadmium	mg/L	0.005	-	-	ND(0.005)	ND(0.005)	0.0015 B	0.0011 B	0.00177 J
Cadmium (Dissolved)	mg/L	0.005	-	-	–	–	–	–	–
Calcium	mg/L	-	-	-	172	104	103.0	88.1 E	254
Calcium (Dissolved)	mg/L	-	-	-	–	–	–	–	–
Chromium Total	mg/L	0.05	-	-	0.0239	0.00148 J	0.0029 B	0.0038 B	0.0414
Chromium Total (Dissolved)	mg/L	0.05	-	-	–	–	–	–	–
Chromium VI (Hexavalent)	mg/L	0.05	-	-	ND(0.01)	0.0290	ND(0.003)	ND(0.01)	ND(0.01)
Chromium VI (Hexavalent) (Dissolved)	mg/L	0.05	-	-	–	–	–	–	–
Cobalt	mg/L	-	-	-	0.00608 J	ND(0.02)	0.0137 B	0.0018 B	0.0177 J
Cobalt (Dissolved)	mg/L	-	-	-	–	–	–	–	–
Copper	mg/L	0.2	-	-	0.0186	ND(0.02)	**0.295**[a]	0.0086 B	0.0521
Copper (Dissolved)	mg/L	0.2	-	-	–	–	–	–	–
Cyanide (Dissolved)	mg/L	0.2	-	-	–	–	–	–	–
Cyanide (total)	mg/L	0.2	-	-	0.00195	ND(0.01)	–	–	ND(0.01)
Iron	mg/L	0.3	-	-	**20.5**[a]	**0.843**[a]	**6.86**[a]	**0.989**[a]	**40.9**[a]
Iron (Dissolved)	mg/L	0.3	-	-	–	–	–	–	–
Lead	mg/L	0.025	-	-	**0.0261**[a]	ND(0.005)	**0.035**[a]	0.0083	**0.23**[a]
Lead (Dissolved)	mg/L	0.025	-	-	–	–	–	–	–
Magnesium	mg/L	-	35	-	**78.6**[b]	33.5	**54.8**[b]	**47.7 E**[b]	**157**[b]
Magnesium (Dissolved)	mg/L	-	35	-	–	–	–	–	–
Manganese	mg/L	0.3	-	-	**0.473**[a]	0.0456	**2.78**[a]	0.0224	**1.8**[a]
Manganese (Dissolved)	mg/L	0.3	-	-	–	–	–	–	–
Mercury	mg/L	0.0007	-	-	ND(0.0004) UJ	ND(0.0004)	ND(0.0001)	ND(0.0002)	ND(0.0004) UJ
Mercury (Dissolved)	mg/L	0.0007	-	-	–	–	–	–	–
Nickel	mg/L	0.1	-	-	0.0129 J	ND(0.02)	0.0102 B	0.0047 B	0.03
Nickel (Dissolved)	mg/L	0.1	-	-	–	–	–	–	–
Potassium	mg/L	-	-	-	4.31	1.81	1.63 B	1.39 B	7.85

TABLE B.8

DEEP OVERBURDEN GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:					*MW-106A*	*MW-106A*	*MW-107A*	*MW-107A*	*MW-107A*
Sample ID:					*GW-19867-08-03-PK-027*	*GW-19867-10-03-PK-023*	*MW-107A*	*MW-107A*	*GW-19867-08-03-PK-028*
Sample Date:					*8/28/2003*	*10/22/2003*	*11/7/1996*	*3/1/2000*	*8/28/2003*
Sample Matrix:					*Deep*	*Deep*	*Deep*	*Deep*	*Deep*
	Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]	*NYSDEC MCL*[e]					
Potassium (Dissolved)	mg/L	-	-	-	--	--	--	--	--
Selenium	mg/L	0.010	-	-	**0.0411**[a]	**0.0259**[a]	**0.0113 B**[a]	ND(0.005)	**0.0503**[a]
Selenium (Dissolved)	mg/L	0.010	-	-	--	--	--	--	--
Silver	mg/L	0.050	-	-	ND(0.01)	ND(0.01)	ND(0.001)	0.0049 B	ND(0.01)
Silver (Dissolved)	mg/L	0.050	-	-	--	--	--	--	--
Sodium	mg/L	20	-	-	7.93	7.18	15.7	11.3	**28.6**[a]
Sodium (Dissolved)	mg/L	20	-	-	--	--	--	--	--
Thallium	mg/L	-	0.0005	-	ND(0.02)	ND(0.02)	ND(0.003)	ND(0.01)	ND(0.02)
Thallium (Dissolved)	mg/L	-	0.0005	-	--	--	--	--	--
Vanadium	mg/L	-	-	-	0.0289	0.0137 J	0.0015 B	0.0047 B	0.0574
Vanadium (Dissolved)	mg/L	-	-	-	--	--	--	--	--
Zinc	mg/L	-	2	-	0.829	0.059	1.39	0.0409	1.05
Zinc (Dissolved)	mg/L	-	2	-	--	--	--	--	--
SVOAs									
1,2-Dichlorobenzene	mg/L	0.003	-	-	--	--	--	ND(0.009)	--
1,3-Dichlorobenzene	mg/L	0.003	-	-	--	--	--	ND(0.009)	--
1,4-Dichlorobenzene	mg/L	0.003	-	-	--	--	--	ND(0.009)	--
2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) eth	mg/L	-	-	0.05	--	--	--	ND(0.009)	--
2,4,5-Trichlorophenol	mg/L	-	-	0.05	--	--	--	ND(0.023)	--
2,4,6-Trichlorophenol	mg/L	-	-	0.05	--	--	--	ND(0.009)	--
2,4-Dichlorophenol	mg/L	-	-	0.05	--	--	--	ND(0.009)	--
2,4-Dimethylphenol	mg/L	-	0.05	-	--	--	--	ND(0.009)	--
2,4-Dinitrophenol	mg/L	-	0.01	-	--	--	--	ND(0.023)	--
2,4-Dinitrotoluene	mg/L	0.005	-	-	--	--	--	ND(0.009)	--
2,6-Dinitrotoluene	mg/L	0.005	-	-	--	--	--	ND(0.009)	--
2-Chloronaphthalene	mg/L	-	-	0.05	--	--	--	ND(0.009)	--
2-Chlorophenol	mg/L	-	-	0.05	--	--	--	ND(0.009)	--
2-Methylnaphthalene	mg/L	-	-	0.05	--	--	--	ND(0.009)	--
2-Methylphenol	mg/L	-	-	0.05	--	--	--	ND(0.009)	--
2-Nitroaniline	mg/L	0.005	-	-	--	--	--	ND(0.023)	--
2-Nitrophenol	mg/L	-	-	0.05	--	--	--	ND(0.009)	--
3,3'-Dichlorobenzidine	mg/L	0.005	-	-	--	--	--	ND(0.009)	--
3-Nitroaniline	mg/L	0.005	-	-	--	--	--	ND(0.023)	--
4,6-Dinitro-2-methylphenol	mg/L	-	-	0.05	--	--	--	ND(0.023)	--
4-Bromophenyl phenyl ether	mg/L	-	-	0.05	--	--	--	ND(0.009)	--
4-Chloro-3-methylphenol	mg/L	-	-	0.05	--	--	--	ND(0.009)	--
4-Chloroaniline	mg/L	0.005	-	-	--	--	--	ND(0.009)	--
4-Chlorophenyl phenyl ether	mg/L	-	-	0.05	--	--	--	ND(0.009)	--
4-Methylphenol	mg/L	-	-	0.05	--	--	--	ND(0.009)	--

TABLE B.8

DEEP OVERBURDEN GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:					*MW-106A*	*MW-106A*	*MW-107A*	*MW-107A*	*MW-107A*
Sample ID:					*GW-19867-08-03-PK-027*	*GW-19867-10-03-PK-023*	*MW-107A*	*MW-107A*	*GW-19867-08-03-PK-028*
Sample Date:					*8/28/2003*	*10/22/2003*	*11/7/1996*	*3/1/2000*	*8/28/2003*
Sample Matrix:					*Deep*	*Deep*	*Deep*	*Deep*	*Deep*
	Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]	*NYSDEC MCL*[e]					
4-Nitroaniline	mg/L	0.005	-	-	–	–	–	ND(0.023)	–
4-Nitrophenol	mg/L	-	-	0.05	–	–	–	ND(0.023)	–
Acenaphthene	mg/L	-	0.02	-	–	–	–	ND(0.009)	–
Acenaphthylene	mg/L	-	-	0.05	–	–	–	ND(0.009)	–
Anthracene	mg/L	-	0.05	-	–	–	–	ND(0.009)	–
Benzo(a)anthracene	mg/L	-	-	0.05	–	–	–	ND(0.009)	–
Benzo(a)pyrene	mg/L	-	-	0.05	–	–	–	ND(0.009)	–
Benzo(b)fluoranthene	mg/L	-	0.000002	-	–	–	–	ND(0.009)	–
Benzo(g,h,i)perylene	mg/L	-	-	0.05	–	–	–	ND(0.009)	–
Benzo(k)fluoranthene	mg/L	-	0.000002	-	–	–	–	ND(0.009)	–
bis(2-Chloroethoxy)methane	mg/L	0.005	-	-	–	–	–	ND(0.009)	–
bis(2-Chloroethyl)ether	mg/L	0.001	-	-	–	–	–	ND(0.009)	–
bis(2-Ethylhexyl)phthalate	mg/L	0.005	-	-	–	–	0.002 BJ	0.001 J	–
Butyl benzylphthalate	mg/L	-	0.05	-	–	–	–	ND(0.009)	–
Carbazole	mg/L	-	-	0.05	–	–	–	ND(0.009)	–
Chrysene	mg/L	-	0.000002	-	–	–	–	ND(0.009)	–
Dibenz(a,h)anthracene	mg/L	-	-	0.05	–	–	–	ND(0.009)	–
Dibenzofuran	mg/L	-	-	0.05	–	–	–	ND(0.009)	–
Diethyl phthalate	mg/L	-	0.05	-	–	–	–	ND(0.009)	–
Dimethyl phthalate	mg/L	-	0.05	-	–	–	–	ND(0.009)	–
Di-n-butylphthalate	mg/L	0.05	-	-	–	–	–	ND(0.009)	–
Di-n-octyl phthalate	mg/L	-	0.05	-	–	–	–	ND(0.009)	–
Fluoranthene	mg/L	-	0.05	-	–	–	–	ND(0.009)	–
Fluorene	mg/L	-	0.05	-	–	–	–	ND(0.009)	–
Hexachlorobenzene	mg/L	0.00004	-	-	–	–	–	ND(0.009)	–
Hexachlorobutadiene	mg/L	0.0005	-	-	–	–	–	ND(0.009)	–
Hexachlorocyclopentadiene	mg/L	0.005	-	-	–	–	–	ND(0.009)	–
Hexachloroethane	mg/L	0.005	-	-	–	–	–	ND(0.009)	–
Indeno(1,2,3-cd)pyrene	mg/L	-	0.000002	-	–	–	–	ND(0.009)	–
Isophorone	mg/L	-	0.05	-	–	–	–	ND(0.009)	–
Naphthalene	mg/L	-	0.05	0.05	–	–	–	ND(0.009)	–
Nitrobenzene	mg/L	0.0004	-	-	–	–	–	ND(0.009)	–
N-Nitrosodi-n-propylamine	mg/L	-	-	0.05	–	–	–	ND(0.009)	–
N-Nitrosodiphenylamine	mg/L	-	0.05	-	–	–	–	ND(0.009)	–
Pentachlorophenol	mg/L	-	-	0.05	–	–	–	ND(0.023)	–
Phenanthrene	mg/L	-	0.05	-	–	–	–	ND(0.009)	–
Phenol	mg/L	-	-	0.05	–	–	–	ND(0.009)	–
Pyrene	mg/L	-	0.05	-	–	–	–	ND(0.009)	–
VOAs									
1,1,1-Trichloroethane	mg/L	0.005	-	-	–	–	–	ND(0.01)	–

TABLE B.8

DEEP OVERBURDEN GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:					*MW-106A*	*MW-106A*	*MW-107A*	*MW-107A*	*MW-107A*
Sample ID:					*GW-19867-08-03-PK-027*	*GW-19867-10-03-PK-023*	*MW-107A*	*MW-107A*	*GW-19867-08-03-PK-028*
Sample Date:					*8/28/2003*	*10/22/2003*	*11/7/1996*	*3/1/2000*	*8/28/2003*
Sample Matrix:					*Deep*	*Deep*	*Deep*	*Deep*	*Deep*
	Units	*NYSDEC AWQ Standard*[a]	*NYSDEC AWQ Guidance*[a]	*NYSDEC MCL*[e]					
1,1,2,2-Tetrachloroethane	mg/L	0.005	-	-	--	--	--	ND(0.01)	--
1,1,2-Trichloroethane	mg/L	0.001	-	-	--	--	--	ND(0.01)	--
1,1-Dichloroethane	mg/L	0.005	-	-	--	--	--	ND(0.01)	--
1,1-Dichloroethene	mg/L	0.005	-	-	--	--	--	ND(0.01)	--
1,2-Dichloroethane	mg/L	0.006	-	-	--	--	--	ND(0.01)	--
1,2-Dichloroethene (total)	mg/L	0.005	-	-	--	--	--	ND(0.01)	--
1,2-Dichloropropane	mg/L	0.001	-	-	--	--	--	ND(0.01)	--
2-Butanone (Methyl Ethyl Ketone)	mg/L	-	0.05	-	--	--	--	ND(0.01)	--
2-Hexanone	mg/L	-	0.05	-	--	--	--	ND(0.01)	--
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	mg/L	-	-	0.05	--	--	--	ND(0.01)	--
Acetone	mg/L	-	0.05	-	--	--	--	ND(0.01)	--
Benzene	mg/L	0.001	-	-	--	--	--	ND(0.01)	--
Bromodichloromethane	mg/L	-	0.05	-	--	--	--	ND(0.01)	--
Bromoform	mg/L	-	0.05	-	--	--	--	ND(0.01)	--
Bromomethane (Methyl Bromide)	mg/L	0.005	-	-	--	--	--	ND(0.01)	--
Carbon disulfide	mg/L	-	0.06	-	--	--	--	ND(0.01)	--
Carbon tetrachloride	mg/L	0.005	-	-	--	--	--	ND(0.01)	--
Chlorobenzene	mg/L	0.005	-	-	--	--	--	ND(0.01)	--
Chloroethane	mg/L	0.005	-	-	--	--	--	ND(0.01)	--
Chloroform (Trichloromethane)	mg/L	0.007	-	-	--	--	--	ND(0.01)	--
Chloromethane (Methyl Chloride)	mg/L	0.005	-	-	--	--	--	ND(0.01)	--
cis-1,3-Dichloropropene	mg/L	0.004	-	-	--	--	--	ND(0.01)	--
Dibromochloromethane	mg/L	-	0.05	-	--	--	--	ND(0.01)	--
Ethylbenzene	mg/L	0.005	-	-	--	--	--	ND(0.01)	--
Methylene chloride	mg/L	0.005	-	-	--	--	--	ND(0.01)	--
Styrene	mg/L	0.005	-	-	--	--	--	ND(0.01)	--
Tetrachloroethene	mg/L	0.005	-	-	--	--	--	ND(0.01)	--
Toluene	mg/L	0.005	-	-	--	--	--	ND(0.01)	--
trans-1,3-Dichloropropene	mg/L	0.005	-	-	--	--	--	ND(0.01)	--
Trichloroethene	mg/L	0.005	-	-	--	--	--	ND(0.01)	--
Vinyl chloride	mg/L	0.002	-	-	--	--	--	ND(0.01)	--
Xylene (total)	mg/L	0.005	-	-	--	--	--	ND(0.01)	--
Wet									
Alkalinity, Total (As CaCO3)	mg/L	-	-	-	--	--	260.0	--	--
Bicarbonate (as CaCO3)	mg/L	-	-	-	--	--	317.0	--	--
Chloride	mg/L	250	-	-	--	--	14.0	--	--
Conductivity	umhos/cm	-	-	-	--	--	635	--	--
Hardness	mg/L	-	-	-	--	--	420.0	--	--
Hardness Calculation	mg/L	-	-	-	--	--	482.2	--	--

TABLE B.8

DEEP OVERBURDEN GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Sample Location:					*MW-106A*	*MW-106A*	*MW-107A*	*MW-107A*	*MW-107A*
Sample ID:					*GW-19867-08-03-PK-027*	*GW-19867-10-03-PK-023*	*MW-107A*	*MW-107A*	*GW-19867-08-03-PK-028*
Sample Date:					*8/28/2003*	*10/22/2003*	*11/7/1996*	*3/1/2000*	*8/28/2003*
Sample Matrix:					*Deep*	*Deep*	*Deep*	*Deep*	*Deep*
	Units	*NYSDEC AWQ Standard*[d]	*NYSDEC AWQ Guidance*[d]	*NYSDEC MCL*[e]					
pH (water)	s.u.	6.5-8.5	-	-	6.76	7.29	7.94	–	–
Sulfate	mg/L	250	-	-	–	–	150.0	–	–
Temperature	deg F	-	-	-	–	–	59	–	–
Turbidity	NTU	5	-	-	–	–	**215.0**[a]	–	–

TABLE B.8

DEEP OVERBURDEN GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Notes:

a - Indicates an exceedance of NYSDEC Ambient Water Quality Standard
b - Indicates an exceedance of NYSDEC Ambient Water Quality Guidance Value (TOGS 1.1.1)
c - Indicates an exceedance of NYSDEC Maximum Contaminant Level (MCL)
d - NYSDEC Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, Source of Drinking Water (Groundwater), June 1998 (Lat amended June 2004).
e - NYSDOH NYCRR Title 10, Part 5, Subpart 5-1, Public Water Systems, Maximum Contaminant Levels, Effective Date: May 26, 2004
NS - No Standard
ND () - Non detect at associated value
-- - No Data
J - Estimated Value
B - Value equal or greater than instrument detection limit, but less than contract required detection limit
U - Not Detected

TABLE B.9

BEDROCK GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

AOI:					*OU3*	*OU3*	*OU3*	*OU3*	*OU3*	*OU3*	*OU3*	*OU3*
Sample Location:					*MW-101B*	*MW-101B*	*MW-102B*	*MW-102B*	*MW-102B*	*MW-103B*	*MW-103B*	*MW-103B*
Sample ID:					*MW-101B (NYPA)*	*MW-101B*	*MW-102B*	*MW-102B*	*MW-102B*	*MW-103B*	*MW-103B*	*MW-103B*
Sample Date:					*11/7/1996*	*11/7/1996*	*11/7/1996*	*8/21/2001*	*8/21/2001*	*11/7/1996*	*3/1/2000*	*8/21/2001*
Matrix:					*WG*	*WG*	*WG*	*WG*	*WG*	*WG*	*WG*	*WG*
						Split			*Duplicate*			
	Units	*NYSDEC AWQ Standard a*	*NYSDEC AWQ Guidance b*	*NYSDEC MCL c*								
Metals												
Aluminum	mg/L				ND(0.05)	0.198 B	0.314	ND(0.075)	ND(0.075)	0.342	0.113 B	ND(0.075)
Aluminum (Dissolved)	mg/L				--	--	--	ND(0.075)	ND(0.075)	--	--	ND(0.075)
Antimony	mg/L	0.003			**0.0424 *[a]**	ND(0.0048)	ND(0.0048)	ND(0.050)	ND(0.050)	ND(0.0048)	ND(0.008)	ND(0.050)
Antimony (Dissolved)	mg/L	0.003			--	--	--	ND(0.050)	ND(0.050)	--	--	ND(0.050)
Arsenic	mg/L	0.025			0.0179	ND(0.0021)	ND(0.0021)	ND(0.002)	ND(0.002)	ND(0.0021)	ND(0.0055)	ND(0.002)
Arsenic (Dissolved)	mg/L	0.025			--	--	--	ND(0.002)	ND(0.002)	--	--	ND(0.002)
Barium	mg/L	1			ND(0.05)	0.0408 B	0.0331 B	0.027	0.029	0.122 B	0.101 B	0.07
Barium (Dissolved)	mg/L	1			--	--	--	0.028	0.028	--	--	0.072
Beryllium	mg/L		0.003		ND(0.001)	ND(0.0001)	ND(0.0001)	ND(0.002)	ND(0.002)	ND(0.0001)	ND(0.001)	ND(0.002)
Beryllium (Dissolved)	mg/L		0.003		--	--	--	ND(0.002)	ND(0.002)	--	--	ND(0.002)
Cadmium	mg/L	0.005			0.0018 BN	0.00039 B	0.00063 B	ND(0.005)	ND(0.005)	ND(0.0002)	ND(0.001)	ND(0.005)
Cadmium (Dissolved)	mg/L	0.005			--	--	--	ND(0.005)	ND(0.005)	--	--	ND(0.005)
Calcium	mg/L				--	215.0	141.0	129	132	109.0	88.7 E	48.7
Calcium (Dissolved)	mg/L				--	--	--	137	137	--	--	49.4
Chromium Total	mg/L	0.05			ND(0.005)	0.0028 B	0.0025 B	ND(0.010)	ND(0.010)	0.0027 B	ND(0.0015)	ND(0.010)
Chromium Total (Dissolved)	mg/L	0.05			--	--	--	ND(0.010)	ND(0.010)	--	--	ND(0.010)
Chromium VI (Hexavalent)	mg/L	0.05			ND(0.01)	ND(0.003)	0.0189	0.017	0.017	ND(0.003)	ND(0.01)	0.010
Cobalt	mg/L				ND(0.01)	ND(0.0012)	ND(0.0012)	ND(0.010)	ND(0.010)	ND(0.0012)	ND(0.0015)	ND(0.010)
Cobalt (Dissolved)	mg/L				--	--	--	ND(0.010)	ND(0.010)	--	--	ND(0.010)
Copper	mg/L	0.2			0.112 N*	ND(0.0006)	0.0044 B	ND(0.017)	ND(0.017)	0.0023 NB	0.0033 B	ND(0.017)
Copper (Dissolved)	mg/L	0.2			--	--	--	ND(0.017)	ND(0.017)	--	--	ND(0.017)
Iron	mg/L	0.3			0.104	0.0535 B	**0.444[a]**	0.285	0.23	**0.367[a]**	0.111	0.089
Iron (Dissolved)	mg/L	0.3			--	--	--	0.177	0.231	--	--	0.062
Lead	mg/L	0.025			ND(0.001)	ND(0.0024)	ND(0.0024)	0.001	0.003	ND(0.0024)	ND(0.003)	ND(0.001)
Lead (Dissolved)	mg/L	0.025			--	--	--	ND(0.001)	ND(0.001)	--	--	ND(0.001)
Magnesium	mg/L		35		**39.9[b]**	**48.7[b]**	**36.7[b]**	21.5	21.9	**67.3[b]**	**47.7 E[b]**	26.9
Magnesium (Dissolved)	mg/L		35		--	--	--	22.7	22.6	--	--	27.5
Manganese	mg/L	0.3			0.0314	0.0338	0.0447	0.01	0.011	0.0713	0.112	0.031
Manganese (Dissolved)	mg/L	0.3			--	--	--	0.012	0.011	--	--	0.032

TABLE B.9

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NIAGARA FALLS, NEW YORK

AOI:					*OU3*	*OU3*	*OU3*	*OU3*	*OU3*	*OU3*	*OU3*	*OU3*
Sample Location:					*MW-101B*	*MW-101B*	*MW-102B*	*MW-102B*	*MW-102B*	*MW-103B*	*MW-103B*	*MW-103B*
Sample ID:					*MW-101B (NYPA)*	*MW-101B*	*MW-102B*	*MW-102B*	*MW-102B*	*MW-103B*	*MW-103B*	*MW-103B*
Sample Date:					*11/7/1996*	*11/7/1996*	*11/7/1996*	*8/21/2001*	*8/21/2001*	*11/7/1996*	*3/1/2000*	*8/21/2001*
Matrix:					*WG*	*WG*	*WG*	*WG*	*WG*	*WG*	*WG*	*WG*
						Split			*Duplicate*			
	Units	*NYSDEC AWQ Standard a*	*NYSDEC AWQ Guidance b*	*NYSDEC MCL c*								
Mercury	mg/L	0.0007			ND(0.0002)	ND(0.0001)	ND(0.0001)	ND(0.0002)	ND(0.0002)	ND(0.0001)	ND(0.0002)	ND(0.0002)
Mercury (Dissolved)	mg/L	0.0007			–	–	–	ND(0.0002)	ND(0.0002)	–	–	ND(0.0002)
Nickel	mg/L	0.1			ND(0.02)	0.0119 B	0.003 B	ND(0.012)	ND(0.012)	0.0012 B	0.0017 B	ND(0.012)
Nickel (Dissolved)	mg/L	0.1			–	–	–	ND(0.012)	ND(0.012)	–	–	ND(0.012)
Potassium	mg/L				1.85 B	1.02 B	2.89 B	3.28	3.21	2.18 B	2.9 B	4.08
Potassium (Dissolved)	mg/L				–	–	–	3.4	3.36	–	–	4.23
Selenium	mg/L	0.010			ND(0.005)	ND(0.0045)	ND(0.0045)	ND(0.002)	ND(0.002)	ND(0.0045)	ND(0.005)	ND(0.002)
Selenium (Dissolved)	mg/L	0.010			–	–	–	ND(0.002)	ND(0.002)	–	–	ND(0.002)
Silver	mg/L	0.050			ND(0.005)	ND(0.001)	ND(0.001)	ND(0.010)	ND(0.010)	ND(0.001)	0.0025 B	ND(0.010)
Silver (Dissolved)	mg/L	0.050			–	–	–	ND(0.010)	ND(0.010)	–	–	ND(0.010)
Sodium	mg/L	20			**26.8[a]**	**27.4 E[a]**	**54.7 E[a]**	**51.8[a]**	**52.4[a]**	**37.7 E[a]**	**38.2[a]**	**45.8[a]**
Sodium (Dissolved)	mg/L	20			–	–	–	**54.8[a]**	**54.2[a]**	–	–	**47.4[a]**
Thallium	mg/L		0.0005		ND(0.001) N	ND(0.003)	ND(0.003)	ND(0.001)	ND(0.001)	ND(0.003)	ND(0.01)	ND(0.001)
Thallium (Dissolved)	mg/L		0.0005		–	–	–	ND(0.001)	ND(0.001)	–	–	ND(0.001)
Vanadium	mg/L				ND(0.02)	ND(0.0008)	ND(0.0008)	ND(0.010)	ND(0.010)	ND(0.0008)	ND(0.002)	ND(0.010)
Vanadium (Dissolved)	mg/L				–	–	–	ND(0.010)	ND(0.010)	–	–	ND(0.010)
Zinc	mg/L		2		0.635	0.754	0.0165 B	0.06	0.02	0.0225	0.0094 B	ND(0.020)
Zinc (Dissolved)	mg/L		2		–	–	–	ND(0.020)	ND(0.020)	–	–	ND(0.020)
Semi Volatile Organic Compounds												
1,2-Dichlorobenzene	mg/L	0.003			–	–	–	–	–	–	ND(0.009)	–
1,3-Dichlorobenzene	mg/L	0.003			–	–	–	–	–	–	ND(0.009)	–
1,4-Dichlorobenzene	mg/L	0.003			–	–	–	–	–	–	ND(0.009)	–
2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) ether)	mg/L			0.05	–	–	–	–	–	–	ND(0.009)	–
2,4,5-Trichlorophenol	mg/L			0.05	–	–	–	–	–	–	ND(0.024)	–
2,4,6-Trichlorophenol	mg/L			0.05	–	–	–	–	–	–	ND(0.009)	–
2,4-Dichlorophenol	mg/L			0.05	–	–	–	–	–	–	ND(0.009)	–
2,4-Dimethylphenol	mg/L		0.05		–	–	–	–	–	–	ND(0.009)	–
2,4-Dinitrophenol	mg/L		0.01		–	–	–	–	–	–	ND(0.024)	–
2,4-Dinitrotoluene	mg/L	0.005			–	–	–	–	–	–	ND(0.009)	–
2,6-Dinitrotoluene	mg/L	0.005			–	–	–	–	–	–	ND(0.009)	–
2-Chloronaphthalene	mg/L			0.05	–	–	–	–	–	–	ND(0.009)	–

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AOI:					*OU3*	*OU3*	*OU3*	*OU3*	*OU3*	*OU3*	*OU3*	*OU3*
Sample Location:					*MW-101B*	*MW-101B*	*MW-102B*	*MW-102B*	*MW-102B*	*MW-103B*	*MW-103B*	*MW-103B*
Sample ID:					*MW-101B (NYPA)*	*MW-101B*	*MW-102B*	*MW-102B*	*MW-102B*	*MW-103B*	*MW-103B*	*MW-103B*
Sample Date:					*11/7/1996*	*11/7/1996*	*11/7/1996*	*8/21/2001*	*8/21/2001*	*11/7/1996*	*3/1/2000*	*8/21/2001*
Matrix:					*WG*	*WG*	*WG*	*WG*	*WG*	*WG*	*WG*	*WG*
						Split			*Duplicate*			
	Units	*NYSDEC AWQ Standard a*	*NYSDEC AWQ Guidance b*	*NYSDEC MCL c*								
2-Chlorophenol	mg/L			0.05	--	--	--	--	--	--	ND(0.009)	--
2-Methylnaphthalene	mg/L			0.05	--	--	--	--	--	--	ND(0.009)	--
2-Methylphenol	mg/L			0.05	--	--	--	--	--	--	ND(0.009)	--
2-Nitroaniline	mg/L	0.005			--	--	--	--	--	--	ND(0.023)	--
2-Nitrophenol	mg/L			0.05	--	--	--	--	--	--	ND(0.009)	--
3,3'-Dichlorobenzidine	mg/L	0.005			--	--	--	--	--	--	ND(0.009)	--
3-Nitroaniline	mg/L	0.005			--	--	--	--	--	--	ND(0.023)	--
4,6-Dinitro-2-methylphenol	mg/L			0.05	--	--	--	--	--	--	ND(0.024)	--
4-Bromophenyl phenyl ether	mg/L			0.05	--	--	--	--	--	--	ND(0.009)	--
4-Chloro-3-methylphenol	mg/L			0.05	--	--	--	--	--	--	ND(0.009)	--
4-Chloroaniline	mg/L	0.005			--	--	--	--	--	--	ND(0.009)	--
4-Chlorophenyl phenyl ether	mg/L			0.05	--	--	--	--	--	--	ND(0.009)	--
4-Methylphenol	mg/L			0.05	--	--	--	--	--	--	ND(0.009)	--
4-Nitroaniline	mg/L	0.005			--	--	--	--	--	--	ND(0.023)	--
4-Nitrophenol	mg/L			0.05	--	--	--	--	--	--	ND(0.024)	--
Acenaphthene	mg/L		0.02		--	--	--	--	--	--	ND(0.009)	--
Acenaphthylene	mg/L			0.05	--	--	--	--	--	--	ND(0.009)	--
Anthracene	mg/L		0.05		--	--	--	--	--	--	ND(0.009)	--
Benzo(a)anthracene	mg/L			0.05	--	--	--	--	--	--	ND(0.009)	--
Benzo(a)pyrene	mg/L			0.05	--	--	--	--	--	--	ND(0.009)	--
Benzo(b)fluoranthene	mg/L		0.000002		--	--	--	--	--	--	ND(0.009)	--
Benzo(g,h,i)perylene	mg/L			0.05	--	--	--	--	--	--	ND(0.009)	--
Benzo(k)fluoranthene	mg/L		0.000002		--	--	--	--	--	--	ND(0.009)	--
bis(2-Chloroethoxy)methane	mg/L	0.005			--	--	--	--	--	--	ND(0.009)	--
bis(2-Chloroethyl)ether	mg/L	0.001			--	--	--	--	--	--	ND(0.009)	--
bis(2-Ethylhexyl)phthalate	mg/L	0.005			--	--	--	--	--	--	ND(0.009)	--
Butyl benzylphthalate	mg/L		0.05		--	--	--	--	--	--	ND(0.009)	--
Carbazole	mg/L			0.05	--	--	--	--	--	--	ND(0.009)	--
Chrysene	mg/L		0.000002		--	--	--	--	--	--	ND(0.009)	--
Dibenz(a,h)anthracene	mg/L			0.05	--	--	--	--	--	--	ND(0.009)	--
Dibenzofuran	mg/L			0.05	--	--	--	--	--	--	ND(0.009)	--
Diethyl phthalate	mg/L		0.05		--	--	--	--	--	--	ND(0.009)	--
Dimethyl phthalate	mg/L		0.05		--	--	--	--	--	--	ND(0.009)	--

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NIAGARA FALLS, NEW YORK

AOI:					*OU3*	*OU3*	*OU3*	*OU3*	*OU3*	*OU3*	*OU3*	*OU3*
Sample Location:					*MW-101B*	*MW-101B*	*MW-102B*	*MW-102B*	*MW-102B*	*MW-103B*	*MW-103B*	*MW-103B*
Sample ID:					*MW-101B (NYPA)*	*MW-101B*	*MW-102B*	*MW-102B*	*MW-102B*	*MW-103B*	*MW-103B*	*MW-103B*
Sample Date:					*11/7/1996*	*11/7/1996*	*11/7/1996*	*8/21/2001*	*8/21/2001*	*11/7/1996*	*3/1/2000*	*8/21/2001*
Matrix:					*WG*	*WG*	*WG*	*WG*	*WG*	*WG*	*WG*	*WG*
						Split			*Duplicate*			
	Units	*NYSDEC AWQ Standard a*	*NYSDEC AWQ Guidance b*	*NYSDEC MCL c*								
Di-n-butylphthalate	mg/L	0.05			–	–	–	–	–	–	ND(0.009)	–
Di-n-octyl phthalate	mg/L		0.05		–	–	–	–	–	–	ND(0.009)	–
Fluoranthene	mg/L		0.05		–	–	–	–	–	–	ND(0.009)	–
Fluorene	mg/L		0.05		–	–	–	–	–	–	ND(0.009)	–
Hexachlorobenzene	mg/L	0.00004			–	–	–	–	–	–	ND(0.009)	–
Hexachlorobutadiene	mg/L	0.0005			–	–	–	–	–	–	ND(0.009)	–
Hexachlorocyclopentadiene	mg/L	0.005			–	–	–	–	–	–	ND(0.009)	–
Hexachloroethane	mg/L	0.005			–	–	–	–	–	–	ND(0.009)	–
Indeno(1,2,3-cd)pyrene	mg/L		0.000002		–	–	–	–	–	–	ND(0.009)	–
Isophorone	mg/L		0.05		–	–	–	–	–	–	ND(0.009)	–
Naphthalene	mg/L		0.05	0.05	–	–	–	–	–	–	ND(0.009)	–
Nitrobenzene	mg/L	0.0004			–	–	–	–	–	–	ND(0.009)	–
N-Nitrosodi-n-propylamine	mg/L			0.05	–	–	–	–	–	–	ND(0.009)	–
N-Nitrosodiphenylamine	mg/L		0.05		–	–	–	–	–	–	ND(0.009)	–
Pentachlorophenol	mg/L			0.05	–	–	–	–	–	–	ND(0.024)	–
Phenanthrene	mg/L		0.05		–	–	–	–	–	–	ND(0.009)	–
Phenol	mg/L			0.05	–	–	–	–	–	–	ND(0.009)	–
Pyrene	mg/L		0.05		–	–	–	–	–	–	ND(0.009)	–
Volatile Organic Compounds												
1,1,1-Trichloroethane	mg/L	0.005			–	–	–	–	–	–	ND(0.01)	–
1,1,2,2-Tetrachloroethane	mg/L	0.005			–	–	–	–	–	–	ND(0.01)	–
1,1,2-Trichloroethane	mg/L	0.001			–	–	–	–	–	–	ND(0.01)	–
1,1-Dichloroethane	mg/L	0.005			–	–	–	–	–	–	ND(0.01)	–
1,1-Dichloroethene	mg/L	0.005			–	–	–	–	–	–	ND(0.01)	–
1,2-Dichloroethane	mg/L	0.006			–	–	–	–	–	–	ND(0.01)	–
1,2-Dichloroethene (total)	mg/L	0.005			–	–	–	–	–	–	ND(0.01)	–
1,2-Dichloropropane	mg/L	0.001			–	–	–	–	–	–	ND(0.01)	–
2-Butanone (Methyl Ethyl Ketone)	mg/L		0.05		–	–	–	–	–	–	ND(0.01)	–
2-Hexanone	mg/L		0.05		–	–	–	–	–	–	ND(0.01)	–
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	mg/L			0.05	–	–	–	–	–	–	ND(0.01)	–
Acetone	mg/L		0.05		–	–	–	–	–	–	ND(0.01)	–

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AOI:					*OU3*	*OU3*	*OU3*	*OU3*	*OU3*	*OU3*	*OU3*	*OU3*
Sample Location:					*MW-101B*	*MW-101B*	*MW-102B*	*MW-102B*	*MW-102B*	*MW-103B*	*MW-103B*	*MW-103B*
Sample ID:					*MW-101B (NYPA)*	*MW-101B*	*MW-102B*	*MW-102B*	*MW-102B*	*MW-103B*	*MW-103B*	*MW-103B*
Sample Date:					*11/7/1996*	*11/7/1996*	*11/7/1996*	*8/21/2001*	*8/21/2001*	*11/7/1996*	*3/1/2000*	*8/21/2001*
Matrix:					*WG*	*WG*	*WG*	*WG*	*WG*	*WG*	*WG*	*WG*
						Split			*Duplicate*			
	Units	*NYSDEC AWQ Standard a*	*NYSDEC AWQ Guidance b*	*NYSDEC MCL c*								
Benzene	mg/L	0.001			–	–	–	–	–	–	ND(0.01)	–
bis(2-Ethylhexyl)phthalate	mg/L	0.005			ND(0.05)	0.002 BJ	0.003 BJ	–	–	0.003 BJ	–	–
Bromodichloromethane	mg/L		0.05		–	–	–	–	–	–	ND(0.01)	–
Bromoform	mg/L		0.05		–	–	–	–	–	–	ND(0.01)	–
Bromomethane (Methyl Bromide)	mg/L	0.005			–	–	–	–	–	–	ND(0.01)	–
Carbon disulfide	mg/L		0.06		–	–	–	–	–	–	ND(0.01)	–
Carbon tetrachloride	mg/L	0.005			–	–	–	–	–	–	ND(0.01)	–
Chlorobenzene	mg/L	0.005			–	–	–	–	–	–	ND(0.01)	–
Chloroethane	mg/L	0.005			–	–	–	–	–	–	ND(0.01)	–
Chloroform (Trichloromethane)	mg/L	0.007			–	–	–	–	–	–	ND(0.01)	–
Chloromethane (Methyl Chloride)	mg/L	0.005			–	–	–	–	–	–	ND(0.01)	–
cis-1,3-Dichloropropene	mg/L	0.004			–	–	–	–	–	–	ND(0.01)	–
Dibromochloromethane	mg/L		0.05		–	–	–	–	–	–	ND(0.01)	–
Ethylbenzene	mg/L	0.005			–	–	–	–	–	–	ND(0.01)	–
Methylene chloride	mg/L	0.005			–	–	–	–	–	–	ND(0.01)	–
Styrene	mg/L	0.005			–	–	–	–	–	–	ND(0.01)	–
Tetrachloroethene	mg/L	0.005			–	–	–	–	–	–	ND(0.01)	–
Toluene	mg/L	0.005			–	–	–	–	–	–	ND(0.01)	–
trans-1,3-Dichloropropene	mg/L	0.005			–	–	–	–	–	–	ND(0.01)	–
Trichloroethene	mg/L	0.005			–	–	–	–	–	–	ND(0.01)	–
Vinyl chloride	mg/L	0.002			–	–	–	–	–	–	ND(0.01)	–
Xylene (total)	mg/L	0.005			–	–	–	–	–	–	ND(0.01)	–
General Chemistry												
Alkalinity, Total (As CaCO3)	mg/L				320.0	320.0	190.0	–	–	390.0	–	–
Bicarbonate (as CaCO3)	mg/L				390.1	390.1	231.7	–	–	475.5	–	–
Chloride	mg/L	250			38.0	38.0	50.0	–	–	24.0	–	–
Conductivity	umhos/cm				1000	1000	901	–	–	803	–	–
Hardness	mg/L				550.0	550.0	440.0	–	–	490.0	–	–
Hardness Calculation	mg/L				737.2	737.2	503.0	–	–	548.4	–	–
Hardness, Noncarbonate	mg/L				0.0	0.0	0.0	–	–	0.0	–	–
Oxidation reduction potential	millivolts				–	180	–	–	–	–	–	–

TABLE B.9

BEDROCK GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

AOI:					*OU3*	*OU3*	*OU3*	*OU3*	*OU3*	*OU3*	*OU3*	*OU3*
Sample Location:					*MW-101B*	*MW-101B*	*MW-102B*	*MW-102B*	*MW-102B*	*MW-103B*	*MW-103B*	*MW-103B*
Sample ID:					*MW-101B (NYPA)*	*MW-101B*	*MW-102B*	*MW-102B*	*MW-102B*	*MW-103B*	*MW-103B*	*MW-103B*
Sample Date:					*11/7/1996*	*11/7/1996*	*11/7/1996*	*8/21/2001*	*8/21/2001*	*11/7/1996*	*3/1/2000*	*8/21/2001*
Matrix:					*WG*	*WG*	*WG*	*WG*	*WG*	*WG*	*WG*	*WG*
						Split			*Duplicate*			
	Units	*NYSDEC AWQ Standard a*	*NYSDEC AWQ Guidance b*	*NYSDEC MCL c*								
pH (water)	s.u.	6.5-8.5			7.3	7.30	8.22	–	–	7.80	–	–
Sulfate	mg/L	250			**350.0[a]**	**350.0[a]**	**300.0[a]**	–	–	170.0	–	–
Temperature	deg F				59	59	58	–	–	56	–	–
Turbidity	NTU	5			2.0	2.0	**38.8[a]**	3.17	–	**20.7[a]**	–	2.6

a: NYSDEC Ambient Water Quality
b: NYSDEC AWQ Guidance Value (TOGS 1_1_1)
c: NYSDEC Maximum Contaminant Level (MCL)

TABLE B.9

BEDROCK GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

AOI:				*OU3*	*OU3*	*OU3*	*OU3*	*OU3*	*OU3*
Sample Location:				*MW-104B*	*MW-104B*	*MW-105B*	*MW-105B*	*MW-106B*	*MW-107B*
Sample ID:				*MW-104B*	*MW-104B*	*MW-105B*	*MW-105B*	*MW-106B*	*MW-107B*
Sample Date:				*11/7/1996*	*8/21/2001*	*11/7/1996*	*8/21/2001*	*3/1/2000*	*3/1/2000*
Matrix:				*WG*	*WG*	*WG*	*WG*	*WG*	*WG*
	Units	*NYSDEC AWQ Standard a*	*NYSDEC AWQ Guidance b*	*NYSDEC MCL c*						
Metals										
Aluminum	mg/L				1.03	0.132	0.39	ND(0.075)	0.0885 B	0.0862 B
Aluminum (Dissolved)	mg/L				–	0.093	–	ND(0.075)	–	–
Antimony	mg/L	0.003			ND(0.0048)	ND(0.050)	ND(0.0048)	ND(0.050)	ND(0.008)	**0.0109 B[a]**
Antimony (Dissolved)	mg/L	0.003			–	ND(0.050)	–	ND(0.050)	–	–
Arsenic	mg/L	0.025			ND() ND	ND(0.002)	ND(0.0033)	0.003	ND(0.0055)	ND(0.0055)
Arsenic (Dissolved)	mg/L	0.025			–	ND(0.002)	–	0.002	–	–
Barium	mg/L	1			0.282	0.297	0.0958 B	0.118	0.066 B	0.104 B
Barium (Dissolved)	mg/L	1			–	0.313	–	0.114	–	–
Beryllium	mg/L		0.003		ND(0.0001)	ND(0.002)	ND(0.0001)	ND(0.002)	ND(0.001)	ND(0.001)
Beryllium (Dissolved)	mg/L		0.003		–	ND(0.002)	–	ND(0.002)	–	–
Cadmium	mg/L	0.005			ND(0.0002)	ND(0.005)	ND(0.0002)	ND(0.005)	0.0012 B	ND(0.001)
Cadmium (Dissolved)	mg/L	0.005			–	ND(0.005)	–	ND(0.005)	–	–
Calcium	mg/L				134.0	108	85.5	74.6	84.6 E	78.6 E
Calcium (Dissolved)	mg/L				–	114	–	73.9	–	–
Chromium Total	mg/L	0.05			0.0059 B	ND(0.010)	0.0013 B	0.012	ND(0.0015)	ND(0.0015)
Chromium Total (Dissolved)	mg/L	0.05			–	ND(0.010)	–	ND(0.010)	–	–
Chromium VI (Hexavalent)	mg/L	0.05			0.00159	0.016	0.0115	ND(0.010) ND	ND(0.01)	ND(0.01)
Cobalt	mg/L				ND(0.0012)	ND(0.010)	0.004 B	ND(0.010)	0.0019 B	0.0024 B
Cobalt (Dissolved)	mg/L				–	ND(0.010)	–	ND(0.010)	–	–
Copper	mg/L	0.2			ND(0.0006)	ND(0.017)	ND(0.0006)	ND(0.017)	0.0052 B	0.0041 B
Copper (Dissolved)	mg/L	0.2			–	ND(0.017)	–	ND(0.017)	–	–
Iron	mg/L	0.3			**1.03[a]**	0.123	**1.96[a]**	**3.25[a]**	0.0874 B	**0.306[a]**
Iron (Dissolved)	mg/L	0.3			–	0.083	–	**2.69[a]**	–	–
Lead	mg/L	0.025			0.0063	ND(0.001)	0.0107	0.015	ND(0.003)	0.0061
Lead (Dissolved)	mg/L	0.025			–	ND(0.001)	–	0.002	–	–
Magnesium	mg/L		35		**59.6[b]**	**41.4[b]**	**54.5[b]**	**42.5[b]**	**36.5 E[b]**	**35.5 E[b]**
Magnesium (Dissolved)	mg/L		35		–	**43.3[b]**	–	**42.2[b]**	–	–
Manganese	mg/L	0.3			0.101	0.07	**0.69[a]**	**0.598[a]**	0.0446	0.0721
Manganese (Dissolved)	mg/L	0.3			–	0.073	–	**0.588[a]**	–	–

TABLE B.9

BEDROCK GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

AOI:					*OU3*	*OU3*	*OU3*	*OU3*	*OU3*	*OU3*
Sample Location:					*MW-104B*	*MW-104B*	*MW-105B*	*MW-105B*	*MW-106B*	*MW-107B*
Sample ID:					*MW-104B*	*MW-104B*	*MW-105B*	*MW-105B*	*MW-106B*	*MW-107B*
Sample Date:					*11/7/1996*	*8/21/2001*	*11/7/1996*	*8/21/2001*	*3/1/2000*	*3/1/2000*
Matrix:					*WG*	*WG*	*WG*	*WG*	*WG*	*WG*
	Units	*NYSDEC AWQ Standard a*	*NYSDEC AWQ Guidance b*	*NYSDEC MCL c*						
Mercury	mg/L	0.0007			ND(0.0001)	ND(0.0002)	ND(0.0001)	ND(0.0002)	ND(0.0002)	ND(0.0002)
Mercury (Dissolved)	mg/L	0.0007			–	ND(0.0002)	–	ND(0.0002)	–	–
Nickel	mg/L	0.1			0.0033 B	ND(0.012)	0.0097 B	0.016	0.0041 B	0.004 B
Nickel (Dissolved)	mg/L	0.1			–	ND(0.012)	–	0.02	–	–
Potassium	mg/L				1.8 B	2.88	1.16 B	2.13	1.94 B	1.48 B
Potassium (Dissolved)	mg/L				–	3.06	–	2.12	–	–
Selenium	mg/L	0.010			ND(0.0045)	ND(0.002)	ND(0.0045)	ND(0.002)	ND(0.005)	ND(0.005)
Selenium (Dissolved)	mg/L	0.010			–	ND(0.002)	–	ND(0.002)	–	–
Silver	mg/L	0.050			ND(0.001)	ND(0.010)	ND(0.001)	ND(0.010)	0.0036 B	0.002 B
Silver (Dissolved)	mg/L	0.050			–	ND(0.010)	–	ND(0.010)	–	–
Sodium	mg/L	20			**183 E[a]**	**222[a]**	**124 E[a]**	**169[a]**	**28[a]**	**29.6[a]**
Sodium (Dissolved)	mg/L	20			–	**232[a]**	–	**171[a]**	–	–
Thallium	mg/L		0.0005		ND(0.003)	ND(0.001)	ND(0.003)	ND(0.001)	ND(0.01)	ND(0.01)
Thallium (Dissolved)	mg/L		0.0005		–	ND(0.001)	–	ND(0.001)	–	–
Vanadium	mg/L				0.0097 B	ND(0.010)	ND(0.0008)	ND(0.010)	0.0027 B	ND(0.002)
Vanadium (Dissolved)	mg/L				–	ND(0.010)	–	ND(0.010)	–	–
Zinc	mg/L		2		0.0483	0.023	0.258	0.148	0.115	0.0051 B
Zinc (Dissolved)	mg/L		2		–	ND(0.020)	–	0.091	–	–
Semi Volatile Organic Compounds										
1,2-Dichlorobenzene	mg/L	0.003			–	–	–	–	ND(0.009)	ND(0.009)
1,3-Dichlorobenzene	mg/L	0.003			–	–	–	–	ND(0.009)	ND(0.009)
1,4-Dichlorobenzene	mg/L	0.003			–	–	–	–	ND(0.009)	ND(0.009)
2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) ether)	mg/L			0.05	–	–	–	–	ND(0.009)	ND(0.009)
2,4,5-Trichlorophenol	mg/L			0.05	–	–	–	–	ND(0.023)	ND(0.023)
2,4,6-Trichlorophenol	mg/L			0.05	–	–	–	–	ND(0.009)	ND(0.009)
2,4-Dichlorophenol	mg/L			0.05	–	–	–	–	ND(0.009)	ND(0.009)
2,4-Dimethylphenol	mg/L		0.05		–	–	–	–	ND(0.009)	ND(0.009)
2,4-Dinitrophenol	mg/L		0.01		–	–	–	–	ND(0.023)	ND(0.023)
2,4-Dinitrotoluene	mg/L	0.005			–	–	–	–	ND(0.009)	ND(0.009)
2,6-Dinitrotoluene	mg/L	0.005			–	–	–	–	ND(0.009)	ND(0.009)
2-Chloronaphthalene	mg/L			0.05	–	–	–	–	ND(0.009)	ND(0.009)

TABLE B.9

BEDROCK GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

AOI:				*OU3*	*OU3*	*OU3*	*OU3*	*OU3*	*OU3*
Sample Location:				*MW-104B*	*MW-104B*	*MW-105B*	*MW-105B*	*MW-106B*	*MW-107B*
Sample ID:				*MW-104B*	*MW-104B*	*MW-105B*	*MW-105B*	*MW-106B*	*MW-107B*
Sample Date:				*11/7/1996*	*8/21/2001*	*11/7/1996*	*8/21/2001*	*3/1/2000*	*3/1/2000*
Matrix:				*WG*	*WG*	*WG*	*WG*	*WG*	*WG*
	Units	*NYSDEC AWQ Standard a*	*NYSDEC AWQ Guidance b*	*NYSDEC MCL c*					
2-Chlorophenol	mg/L			0.05	–	–	–	–	ND(0.009)	ND(0.009)
2-Methylnaphthalene	mg/L			0.05	–	–	–	–	ND(0.009)	ND(0.009)
2-Methylphenol	mg/L			0.05	–	–	–	–	ND(0.009)	ND(0.009)
2-Nitroaniline	mg/L	0.005			–	–	–	–	ND(0.023)	ND(0.023)
2-Nitrophenol	mg/L			0.05	–	–	–	–	ND(0.009)	ND(0.009)
3,3'-Dichlorobenzidine	mg/L	0.005			–	–	–	–	ND(0.009)	ND(0.009)
3-Nitroaniline	mg/L	0.005			–	–	–	–	ND(0.023)	ND(0.023)
4,6-Dinitro-2-methylphenol	mg/L			0.05	–	–	–	–	ND(0.023)	ND(0.023)
4-Bromophenyl phenyl ether	mg/L			0.05	–	–	–	–	ND(0.009)	ND(0.009)
4-Chloro-3-methylphenol	mg/L			0.05	–	–	–	–	ND(0.009)	ND(0.009)
4-Chloroaniline	mg/L	0.005			–	–	–	–	ND(0.009)	ND(0.009)
4-Chlorophenyl phenyl ether	mg/L			0.05	–	–	–	–	ND(0.009)	ND(0.009)
4-Methylphenol	mg/L			0.05	–	–	–	–	ND(0.009)	ND(0.009)
4-Nitroaniline	mg/L	0.005			–	–	–	–	ND(0.023)	ND(0.023)
4-Nitrophenol	mg/L			0.05	–	–	–	–	ND(0.023)	ND(0.023)
Acenaphthene	mg/L		0.02		–	–	–	–	ND(0.009)	ND(0.009)
Acenaphthylene	mg/L			0.05	–	–	–	–	ND(0.009)	ND(0.009)
Anthracene	mg/L		0.05		–	–	–	–	ND(0.009)	ND(0.009)
Benzo(a)anthracene	mg/L			0.05	–	–	–	–	ND(0.009)	ND(0.009)
Benzo(a)pyrene	mg/L			0.05	–	–	–	–	ND(0.009)	ND(0.009)
Benzo(b)fluoranthene	mg/L		0.000002		–	–	–	–	ND(0.009)	ND(0.009)
Benzo(g,h,i)perylene	mg/L			0.05	–	–	–	–	ND(0.009)	ND(0.009)
Benzo(k)fluoranthene	mg/L		0.000002		–	–	–	–	ND(0.009)	ND(0.009)
bis(2-Chloroethoxy)methane	mg/L	0.005			–	–	–	–	ND(0.009)	ND(0.009)
bis(2-Chloroethyl)ether	mg/L	0.001			–	–	–	–	ND(0.009)	ND(0.009)
bis(2-Ethylhexyl)phthalate	mg/L	0.005			–	–	–	–	ND(0.009)	ND(0.009)
Butyl benzylphthalate	mg/L		0.05		–	–	–	–	ND(0.009)	ND(0.009)
Carbazole	mg/L			0.05	–	–	–	–	ND(0.009)	ND(0.009)
Chrysene	mg/L		0.000002		–	–	–	–	ND(0.009)	ND(0.009)
Dibenz(a,h)anthracene	mg/L			0.05	–	–	–	–	ND(0.009)	ND(0.009)
Dibenzofuran	mg/L			0.05	–	–	–	–	ND(0.009)	ND(0.009)
Diethyl phthalate	mg/L		0.05		–	–	–	–	ND(0.009)	ND(0.009)
Dimethyl phthalate	mg/L		0.05		–	–	–	–	ND(0.009)	ND(0.009)

TABLE B.9

BEDROCK GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

AOI:				*OU3*	*OU3*	*OU3*	*OU3*	*OU3*	*OU3*
Sample Location:				*MW-104B*	*MW-104B*	*MW-105B*	*MW-105B*	*MW-106B*	*MW-107B*
Sample ID:				*MW-104B*	*MW-104B*	*MW-105B*	*MW-105B*	*MW-106B*	*MW-107B*
Sample Date:				*11/7/1996*	*8/21/2001*	*11/7/1996*	*8/21/2001*	*3/1/2000*	*3/1/2000*
Matrix:				*WG*	*WG*	*WG*	*WG*	*WG*	*WG*
	Units	*NYSDEC AWQ Standard a*	*NYSDEC AWQ Guidance b*	*NYSDEC MCL c*						
Di-n-butylphthalate	mg/L	0.05			--	--	--	--	ND(0.009)	ND(0.009)
Di-n-octyl phthalate	mg/L		0.05		--	--	--	--	ND(0.009)	ND(0.009)
Fluoranthene	mg/L		0.05		--	--	--	--	ND(0.009)	ND(0.009)
Fluorene	mg/L		0.05		--	--	--	--	ND(0.009)	ND(0.009)
Hexachlorobenzene	mg/L	0.00004			--	--	--	--	ND(0.009)	ND(0.009)
Hexachlorobutadiene	mg/L	0.0005			--	--	--	--	ND(0.009)	ND(0.009)
Hexachlorocyclopentadiene	mg/L	0.005			--	--	--	--	ND(0.009)	ND(0.009)
Hexachloroethane	mg/L	0.005			--	--	--	--	ND(0.009)	ND(0.009)
Indeno(1,2,3-cd)pyrene	mg/L		0.000002		--	--	--	--	ND(0.009)	ND(0.009)
Isophorone	mg/L		0.05		--	--	--	--	ND(0.009)	ND(0.009)
Naphthalene	mg/L		0.05	0.05	--	--	--	--	ND(0.009)	ND(0.009)
Nitrobenzene	mg/L	0.0004			--	--	--	--	ND(0.009)	ND(0.009)
N-Nitrosodi-n-propylamine	mg/L			0.05	--	--	--	--	ND(0.009)	ND(0.009)
N-Nitrosodiphenylamine	mg/L		0.05		--	--	--	--	ND(0.009)	ND(0.009)
Pentachlorophenol	mg/L			0.05	--	--	--	--	ND(0.023)	ND(0.023)
Phenanthrene	mg/L		0.05		--	--	--	--	ND(0.009)	ND(0.009)
Phenol	mg/L			0.05	--	--	--	--	ND(0.009)	ND(0.009)
Pyrene	mg/L		0.05		--	--	--	--	ND(0.009)	ND(0.009)
Volatile Organic Compounds										
1,1,1-Trichloroethane	mg/L	0.005			--	--	--	--	ND(0.01)	ND(0.01)
1,1,2,2-Tetrachloroethane	mg/L	0.005			--	--	--	--	ND(0.01)	ND(0.01)
1,1,2-Trichloroethane	mg/L	0.001			--	--	--	--	ND(0.01)	ND(0.01)
1,1-Dichloroethane	mg/L	0.005			--	--	--	--	ND(0.01)	ND(0.01)
1,1-Dichloroethene	mg/L	0.005			--	--	--	--	ND(0.01)	ND(0.01)
1,2-Dichloroethane	mg/L	0.006			--	--	--	--	ND(0.01)	ND(0.01)
1,2-Dichloroethene (total)	mg/L	0.005			--	--	--	--	ND(0.01)	ND(0.01)
1,2-Dichloropropane	mg/L	0.001			--	--	--	--	ND(0.01)	ND(0.01)
2-Butanone (Methyl Ethyl Ketone)	mg/L		0.05		--	--	--	--	ND(0.01)	ND(0.01)
2-Hexanone	mg/L		0.05		--	--	--	--	ND(0.01)	ND(0.01)
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	mg/L			0.05	--	--	--	--	ND(0.01)	ND(0.01)
Acetone	mg/L		0.05		--	--	--	--	ND(0.01)	ND(0.01)

TABLE B.9

BEDROCK GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

AOI:					*OU3*	*OU3*	*OU3*	*OU3*	*OU3*	*OU3*
Sample Location:					*MW-104B*	*MW-104B*	*MW-105B*	*MW-105B*	*MW-106B*	*MW-107B*
Sample ID:					*MW-104B*	*MW-104B*	*MW-105B*	*MW-105B*	*MW-106B*	*MW-107B*
Sample Date:					*11/7/1996*	*8/21/2001*	*11/7/1996*	*8/21/2001*	*3/1/2000*	*3/1/2000*
Matrix:					*WG*	*WG*	*WG*	*WG*	*WG*	*WG*
	Units	*NYSDEC AWQ Standard a*	*NYSDEC AWQ Guidance b*	*NYSDEC MCL c*						
Benzene	mg/L	0.001			–	–	–	–	ND(0.01)	ND(0.01)
bis(2-Ethylhexyl)phthalate	mg/L	0.005			0.003 BJ	–	0.002 BJ	–	–	–
Bromodichloromethane	mg/L		0.05		–	–	–	–	ND(0.01)	ND(0.01)
Bromoform	mg/L		0.05		–	–	–	–	ND(0.01)	ND(0.01)
Bromomethane (Methyl Bromide)	mg/L	0.005			–	–	–	–	ND(0.01)	ND(0.01)
Carbon disulfide	mg/L		0.06		–	–	–	–	ND(0.01)	ND(0.01)
Carbon tetrachloride	mg/L	0.005			–	–	–	–	ND(0.01)	ND(0.01)
Chlorobenzene	mg/L	0.005			–	–	–	–	ND(0.01)	ND(0.01)
Chloroethane	mg/L	0.005			–	–	–	–	ND(0.01)	ND(0.01)
Chloroform (Trichloromethane)	mg/L	0.007			–	–	–	–	ND(0.01)	ND(0.01)
Chloromethane (Methyl Chloride)	mg/L	0.005			–	–	–	–	ND(0.01)	ND(0.01)
cis-1,3-Dichloropropene	mg/L	0.004			–	–	–	–	ND(0.01)	ND(0.01)
Dibromochloromethane	mg/L		0.05		–	–	–	–	ND(0.01)	ND(0.01)
Ethylbenzene	mg/L	0.005			–	–	–	–	ND(0.01)	ND(0.01)
Methylene chloride	mg/L	0.005			–	–	–	–	ND(0.01)	ND(0.01)
Styrene	mg/L	0.005			–	–	–	–	ND(0.01)	ND(0.01)
Tetrachloroethene	mg/L	0.005			–	–	–	–	ND(0.01)	ND(0.01)
Toluene	mg/L	0.005			–	–	–	–	ND(0.01)	ND(0.01)
trans-1,3-Dichloropropene	mg/L	0.005			–	–	–	–	ND(0.01)	ND(0.01)
Trichloroethene	mg/L	0.005			–	–	–	–	ND(0.01)	ND(0.01)
Vinyl chloride	mg/L	0.002			–	–	–	–	ND(0.01)	ND(0.01)
Xylene (total)	mg/L	0.005			–	–	–	–	ND(0.01)	ND(0.01)
General Chemistry										
Alkalinity, Total (As CaCO3)	mg/L				290.0	–	390.0	–	–	–
Bicarbonate (as CaCO3)	mg/L				353.6	–	475.5	–	–	–
Chloride	mg/L	250			**390.0[a]**	–	160.0	–	–	–
Conductivity	umhos/cm				1453	–	1007	–	–	–
Hardness	mg/L				560.0	–	420.0	–	–	–
Hardness Calculation	mg/L				579.4	–	437.2	–	–	–
Hardness, Noncarbonate	mg/L				0.0	–	0.0	–	–	–
Oxidation reduction potential	millivolts				–	–	–	–	–	–

TABLE B.9

BEDROCK GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

AOI:				OU3	OU3	OU3	OU3	OU3	OU3
Sample Location:				MW-104B	MW-104B	MW-105B	MW-105B	MW-106B	MW-107B
Sample ID:				MW-104B	MW-104B	MW-105B	MW-105B	MW-106B	MW-107B
Sample Date:				11/7/1996	8/21/2001	11/7/1996	8/21/2001	3/1/2000	3/1/2000
Matrix:				WG	WG	WG	WG	WG	WG
	Units	*NYSDEC AWQ Standard a*	*NYSDEC AWQ Guidance b*	*NYSDEC MCL c*						
pH (water)	s.u.	6.5-8.5			7.66	–	7.41	–	–	–
Sulfate	mg/L	250			110.0	–	81.0	–	–	–
Temperature	deg F				56	–	60	–	–	–
Turbidity	NTU	5			**67.2[a]**	**6.81[a]**	**28.3[a]**	4.1	–	–

a: NYSDEC Ambient Water Quality
b: NYSDEC AWQ Guidance Value (TOGS 1_1_1)
c: NYSDEC Maximum Contaminant Level (MCL)

TABLE B.9

BEDROCK GROUNDWATER ANALYTICAL DATA
REMEDIAL INVESTIGATION AND REMEDIAL ALTERNATIVES ANALYSIS/FEASIBILITY STUDY
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Notes:

a - Indicates an exceedance of NYSDEC Ambient Water Quality Standard
b - Indicates an exceedance of NYSDEC Ambient Water Quality Guidance Value (TOGS 1.1.1)
c - Indicates an exceedance of NYSDEC Maximum Contaminant Level (MCL)
d - NYSDEC Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, Source of Drinking Water (Groundwater), June 1998 (Lat amended June 2004).
e NYSDOH NYCRR Title 10, Part 5, Subpart 5-1, Public Water Systems, Maximum Contaminant Levels, Effective Date: May 26, 2004
NS - No Standard
ND () - Non detect at associated value
– - No Data
J - Estimated Value
B - Value equal or greater than instrument detection limit, but less than contract required detection limit
U - Not Detected

APPENDIX D

HUMAN HEALTH RISK ASSESSMENT

HUMAN HEALTH RISK ASSESSMENT
OPERABLE UNIT 3

VANADIUM CORPORATION OF AMERICA
TOWN OF NIAGARA, NEW YORK

APRIL 2005
REF. NO. 19867 (5)
This report is printed on recycled paper.

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1.0 INTRODUCTION

The Vanadium Corporation of America (Vanadium) site is located in the Town of Niagara, Niagara County, New York. The Vanadium site currently includes property parcels owned by Airco Properties, Inc., SKW Metals and Alloys, Inc., and the New York Power Authority (NYPA) and Niagara Mohawk Power Corporation (NiMo). The New York State Department of Environmental Conservation (NYSDEC) has designated the Vanadium site as a Class 2 inactive hazardous waste disposal site. NYSDEC has designated the SKW Metals and Alloys, Inc. parcel as Operable Unit 1 (OU1); the Airco Properties, Inc. parcel as Operable Unit 2 (OU2); and the NYPA and NiMo parcel as Operable Unit 3 (OU3). OU3 will herein be referred to as the "Site".

An Order on Consent (Index No. B9-0470-94-12) was executed by NYSDEC and NYPA, NiMo, and Cypres Amax Minerals Company (Respondents) for OU3. The Order on Consent outlines the scope of work for conducting a Remedial Investigation/Feasibility Study (RI/FS) for OU3. As presented in the Order on Consent, the work performed was done in a phased manner, as summarized below:

Phase 1 – Additional Data Collection;

Phase 2 – Evaluation of Human Health Impacts;

Phase 3 – Remedial Investigation Report; and

Phase 4 – Remedial Alternatives Analysis/Feasibility Study.

This document entitled "Human Health Risk Assessment" was prepared to meet the requirements of Phase 2 – Evaluation of Human Health Impacts. A Phase II Work Plan was submitted to NYSDEC in November 2004 (CRA, 2004a).

1.1 OBJECTIVE OF THE HHRA

The purpose of the HHRA is to evaluate the potential human health risks posed by Site-related chemicals under current and potential future Site conditions, assuming no additional remedial actions are taken at the Site. The specific goals of the risk assessment are:

- identify and provide analysis of baseline risks (defined as risks that might exist if no further remediation were applied at the Site);
- provide a basis for determining the level of chemicals that can remain on Site and still not adversely impact public health; and

- provide a basis for comparing potential health impacts of various remedial alternatives.

1.2 ORGANIZATION OF THE HHRA

This HHRA was conducted in accordance with the following Comprehensive Environmental Response, Compensation and Liability Act of 1989 (CERCLA) guidance and Risk Assessment Guidance for Superfund (RAGS) documents:

- USEPA Risk Assessment Guidance for Superfund (RAGS), Volume I, Human Health Evaluation Manual (Part) A, EPA/540/1-89/002, December 1989 (USEPA, 1989)
- USEPA RAGS Supplemental Guidance, Standard Default Exposure Factors, Interim Final, OSWER Directive 9285.6-03, March 25, 1991 (USEPA, 1991a)
- USEPA Exposure Factors Handbook, EPA/600/P-95/002Fa, August 1997 (USEPA, 1997)
- USEPA RAGS Part D, Standardized Planning, Reporting, and Review of Superfund Risk Assessments, Interim, Publication 9285.7-O1D, January 1998 (USEPA, 1998a)
- USEPA RAGS Part E, Supplemental Guidance, Dermal Risk Assessment, Final, July 2004 (USEPA, 2004a).

The HHRA is organized as follows:

- Section 1.0: Introduction

  Presents background information relevant to this HHRA, presents the purpose of this HHRA, and outlines the organization of this HHRA.

- Section 2.0: Site Characterization

  Presents a brief summary of the nature and extent of the contamination or hazard identification due to the historical operations at the Site, presents the Conceptual Site Model (CSM), and presents the selection of Chemicals of Potential Concern (COPCs).

- Section 3.0: Exposure Assessment

  Presents a summary of the exposure settings, identifies the potential exposure pathways, and quantifies exposure based on the exposure assumptions.

- Section 4.0: Toxicity Assessment

  Presents a summary of the toxicity data used to calculate the non-carcinogenic hazards and carcinogenic risks.

- Section 5.0: Risk Characterization

  Presents an assessment of the potential risks to human health posed by soil, groundwater, surface water, sediment, and air impacts and includes the uncertainty analysis.

A list of references cited in the HHRA is presented in Section 6.0.

2.0 SITE CHARACTERIZATION

2.1 SITE DESCRIPTION

The Vanadium site is located in the Town of Niagara, Niagara County, New York. The Vanadium site location is presented on Figure 2.1, and a Vanadium site plan is presented on Figure 2.2. The property is bounded on the north by an automobile depot and vacant property, to the west by Witmer Road (Route 31), on the east by Interstate 190, and on the south by vacant land and industrial facilities. The nearest water bodies are the Lower Niagara River located approximately 1.4 miles west of the property and the NYPA reservoir, located approximately 0.8 miles north of the property. Water transfer units (conduits) are located beneath the NYPA property. These conduits transfer water from the Upper Niagara River, located to the south, to the NYPA reservoir. Numerous high voltage electrical transmission lines cross the Site.

The Vanadium site consists of a 25-acre parcel owned by Airco Properties, Inc. (Airco), a 37-acre parcel owned by SKW Alloys, Inc. (SKW), and right-of-way comprising approximately 88 acres owned by NiMo and the NYPA. The SKW parcel has been designated by NYSDEC as OU1, the Airco parcel has been designated as OU2, and the NYPA and NiMo parcel has been designated as OU3 (the "Site").

2.2 GENERAL SITE USE

There are currently no buildings on the Site. Numerous high voltage electrical transmission lines cross the Site (see Figure 2.2).

Access to the Site is restricted from the west (Witmer Road). However, access from the eastern side of the Site is less restricted, and there is evidence of trespasser use on Site (e.g., all-terrain vehicle tracks).

2.3 PREVIOUS INVESTIGATIONS

Several investigations have been performed at the Vanadium site. The majority of the previous investigations focussed on OU1 and OU2. Investigation activities on OU3 commenced in 1996. This section presents a brief summary of the investigation activities that have been performed at OU3.

NYSDEC Investigations - 1996

In 1996, NYSDEC performed an investigation under the Immediate Investigative Work Assignment (IIWA) program to evaluate OU3. The investigation by NYSDEC included installing eight monitoring wells for groundwater sampling, 12 soil borings for soil sampling, two test pit samples to investigate the waste piles, and the collection of surface water and sediment samples from an existing pond located near soil boring SB-2. The results of the IIWA are presented in the IIWA Report (NYSDEC, 1997).

NYSDEC Investigations – 1999/2000

In 1999 and 2000, NYSDEC performed an IIWA Investigation for the NiMo Right-of-Way (ROW) to determine the presence and location of any waste/fill areas and to determine if the NiMo ROW is the source of the volatile organic contamination found in the Union Carbide (UCAR) well BW-4. The first phase of the investigation consisted of the installation of two overburden and bedrock groundwater monitoring well pairs, and subsequent groundwater sampling. The second phase included an on-Site soil/waste investigation, Site survey/mapping, soil/waste sampling, and laboratory analysis. The results of these investigations are presented in the IIWA Report, Niagara Mohawk Right-of-Way Site (NYSDEC, 2001).

Golder Associates Inc. - 2001

In 2001, Golder Associates performed supplemental investigations at the Site that included the collection and analyses of groundwater samples and water level measurements from the existing Site monitoring wells. Seven water samples were collected and analyzed for Target Analyte List (TAL) metals and hexavalent chromium. The results of the Golder Site investigations are presented in their report entitled "Delineation of Surface Water Bodies, Wetlands, and Ecological Receptors at the Former Vanadium Corporation of America Site" (Golder, 2001).

Conestoga-Rovers & Associates – 2003/2004

In 2003, Conestoga-Rovers & Associates (CRA) performed a Phase I Investigation at OU3. This investigation included the advancement of 15 soil borings for soil sampling, installation of 14 monitoring wells for shallow groundwater sampling, collection of hydraulic water level measurements, excavation of 21 test pit locations to delineate the extent of slag, collection of 31 surface soil samples from across the Site, and the collection of surface water and sediment samples from 17 locations from the existing

ponds/water bodies on Site. All samples were analyzed for TAL metals and hexavalent chromium. The soil and sediment samples were also laboratory analyzed for pH. The results are presented in the Phase I Letter Report (CRA, 2004b).

Relevant data collected during these investigations were included in the preparation of the HHRA, as described in Section 2.6.

2.4 NATURE AND EXTENT OF CONTAMINATION

Through previous investigation at OU3, it has been determined that the primary contaminants are TAL metals, hexavalent chromium, and pH. The following sections provide brief discussions of the chemical distribution in surface soil, subsurface soil, sediment, surface water, and groundwater. It is to be noted that surface soil and subsurface soil also include slag material. Surface soil, slag material, and subsurface soil sample locations are presented on Figures 2.3, 2,4, and 2.5, respectively. Groundwater sample locations are presented on Figure 2.6. Surface water and sediment sample locations are presented on Figure 2.7.

2.4.1 SURFACE SOIL

The results of the Phase I investigations indicate that beryllium, total chromium, copper, iron, mercury, nickel, selenium, vanadium, and zinc were detected above the NYSDEC TAGM 4046 Determination of Soil Cleanup Objectives and Cleanup Levels (RSCOs). Elevated hexavalent chromium and pH values were also detected in surface soils. In general, the highest concentrations of total and hexavalent chromium, copper, nickel, and selenium in the surface soils were detected in the areas of exposed slag. Lower concentrations were generally detected in areas where the slag is covered by common fill or topsoil. More information can be found in the Phase I Letter Report (CRA, 2004b).

2.4.2 SUBSURFACE SOIL

The subsurface soil samples collected from the slag/fill material had elevated concentrations of primarily total chromium, hexavalent chromium, and pH relative to the underlying native soil. Some of the slag samples also had elevated concentrations of copper, nickel, and zinc relative to the native soils. Several slag/fill and native soil samples also had concentrations of arsenic above the RSCO. Additional information is provided in the Phase I Letter Report (CRA, 2004b).

2.4.3 GROUNDWATER

The historical groundwater data indicate that the shallow groundwater is impacted with elevated concentrations of primarily total chromium, hexavalent chromium, and manganese. Much lower concentrations of these parameters were detected in the overburden and bedrock wells. The historical Site data are presented in the Phase I Work Plan (CRA, 2003).

The results of the Phase I investigations indicate that the highest concentrations of total chromium and total hexavalent chromium in shallow groundwater were detected in the center of the Site at monitoring wells MW-19 and MW-18, respectively. Additional information can be found in the Phase I Letter Report (CRA, 2004b).

2.4.4 SURFACE WATER

Surface water samples have been collected from the ditches and pond located on Site (see Figure 2.7). The results of the Phase I investigations indicate that, in general, iron and thallium were detected at concentrations above the NYSDEC Ambient Water Quality Standards (AWQS) in the surface water. Elevated concentrations of hexavalent chromium were also detected in surface water. The highest concentration of total chromium was detected along the ditch at the southwestern end of the Site (SW-11). The highest concentrations of hexavalent chromium were detected along the western edge of the identified slag area (SW-14).

2.4.5 SEDIMENT

Sediment samples have been collected from the ditches and pond located on Site (see Figure 2.7). The results of the Phase I investigations indicate that, in general, total chromium, copper, manganese, and zinc were detected at concentrations above the NYSDEC Lowest Effect Levels (LELs) and Severe Effect Levels (SELs) in sediment samples. Elevated hexavalent chromium and pH values were also detected in sediments. The highest concentrations of total chromium were detected in the ditch at the north end of the Site, north of and within the large pond in the middle of the Site, at the western end of the ditch that runs along the southern portion of the Site adjacent to the fence line and across Witmer Road. The highest concentrations of manganese and zinc were also found at the western end of the ditch and across Witmer Road.

Hexavalent chromium was only detected north of the large pond in the center of the Site. The highest pH values were detected around the large pond in the middle of the Site, the ditch that runs along the fence line at the north end of the Site, south of the slag area, and the east end of the ditch running along the southern portion of the Site.

2.5 CONCEPTUAL SITE MODEL

In order to evaluate the significance of the impacted media at the Site, the potential pathways by which individuals may come in contact with these media must be determined. The combination of factors (chemical source, media of concern, release mechanisms, and potential receptors) that could produce a complete exposure pathway and lead to human uptake of chemicals at the Site are assessed in what is defined as a Conceptual Site Model (CSM). The CSM for the Site is presented on Figure 2.8. Briefly, the following human receptors have been identified at the Site: maintenance worker, trespasser, industrial/commercial worker, and construction/utility worker.

Potentially impacted media at the Site include surface soil and slag, subsurface soil and slag, groundwater, air, surface water, and sediment. For the purpose of this work, surface soil and slag were considered to be the top 2 inches, and soil and slag was be considered to be 0 to 10 feet below ground surface (bgs), in accordance with NYSDEC guidance (NYSDEC, 2002). Air is also considered a potentially impacted medium based on the soil impacts, and the subsequent potential for particulate release into ambient air. Ingestion, dermal contact, and inhalation are the potential routes of exposure. All of these factors are evaluated in the CSM.

The Site contains surface soil and slag, subsurface soil and slag, groundwater, surface water, and sediment impacted by metals and elevated pH. Potential human receptors to these contaminants include maintenance workers, trespassers, industrial/commercial workers, and construction/utility worker.

Exposure pathways involving soils typically include direct contact to chemicals of potential concern (COPCs) in soil through incidental ingestion and dermal contact. Indirect exposure pathways for soil can involve soil-to-air, soil-to-groundwater, and soil-to-biota (i.e., vegetative cover).

The Site also contains groundwater impacted by metals. Potential human receptors to these contaminants include construction/utility worker exposure during ground intrusive activities.

Exposure pathways involving groundwater typically include direct contact to COPCs in water through ingestion of potable drinking water and dermal contact. Indirect exposure pathways for groundwater can involve groundwater-to-air, groundwater-to-surface water, and groundwater-to-biota (i.e., groundwater uptake by vegetative cover). There is no current potable use of groundwater at the Site. Groundwater at the Site discharges into the NYPA underground hydro conduits where it is conveyed to the forebay before ultimately discharging to the Niagara River. Hence, there is no potential for groundwater at the Site to impact groundwater off Site.

Exposure pathways involving surface water typically include direct contact to COPCs in water through incidental ingestion and dermal contact.

Exposure pathways involving sediment typically include direct contact to chemicals of potential concern (COPCs) in sediment through incidental ingestion and dermal contact.

Currently, there are no buildings on Site. It is highly unlikely that any buildings would be constructed on the Site in the future. Therefore, the soil-to-indoor air and groundwater-to-indoor air were not evaluated as a potential future exposure.

Exposure pathways involving air typically include direct inhalation of COPCs in air.

Potential exposure to soil and slag were evaluated as a combined soil and slag data set as well as two separate soil and slag data sets. The three separate exposure scenarios were evaluated to determine the risk and hazards associated with each exposure media for all the potential on-Site receptors.

Table 2.1 presents a summary of the potentially complete pathways and relevant receptors to be evaluated in the risk assessment.

2.6 SELECTION OF CHEMICALS OF POTENTIAL CONCERN (COPCs)

This section presents the process for establishing COPCs for the Site. COPCs are chemicals related to the Site that pose the greatest potential public health risk. In general, detected chemicals are identified as COPCs based upon their concentrations and known toxicity characteristics.

As part of the identification of COPCs, the selection of COCs for each medium was completed using a screening process. The COPC screening process involved a

comparison of the maximum detected concentration of each contaminant in a specific medium to a risk-based concentration associated with target risks and conservative default exposure assumptions. The most up-to-date risk-based concentrations (RBCs) from USEPA Region III (R3-RBCs) (USEPA-III, 2004), Region IX preliminary remediation goals (R9-PRGs) (USEPA-IX, 2004), and Technical and Administrative Guidance Memorandum (TAGM) 4046 - Determination of Soil Cleanup Objectives and Cleanup Levels established by the NYSDEC (NYSDEC, 1994) were used to identify COPCs in the soil, slag, and sediment for the HHRA. COPCs in groundwater were identified based on a comparison to the NYSDOH Maximum Contaminant Levels (MCLs) (NYSDOH, 2004) and tap water from R3-RBCs and R9-PRGs. COPCs in surface water were identified based on a comparison to the NYSDEC Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1 (NYSDEC, 1998) and tap water from R3-RBCs and R9-PRGs. For each medium, chemicals with maximum concentrations less than their respective screening value were not identified as COPCs, and were not retained in the HHRA quantitative process. Essential nutrients such as calcium, magnesium, potassium, and sodium were not identified as being Site-related contaminants and, therefore, were disregarded from further evaluation.

Soil and sediment analytical data collected during the Phase I investigation and previous Site investigations were used in the HHRA. Only the surface water and groundwater analytical data collected within the last 2 years were used in the HHRA as these data are considered to be the most representative of current conditions. Analytical data were validated prior to application in the HHRA. Non-detect sample results for a chemical were included in the assessment if the chemical has been positively detected in another sample of the same medium. Estimated results, usually indicated by a qualifier, were included in the evaluation.

The soil data set consists of surface soil, which are all soils less than or equal to 2 inches bgs and subsurface soil which are all soils from greater than 2 inches bgs to a depth of 10 feet bgs.

2.6.1 SURFACE SOIL AND SLAG (0 TO 2 INCHES BGS)

Combined Surface Soil and Slag Data Set (0 to 2 inches bgs)

As presented in Table 2.2, aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, hexavalent chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, thallium, vanadium, and zinc, were detected at maximum concentrations greater than the screening criteria for surface soil and slag based on the

ingestion and dermal exposure pathways. As a result, these chemicals were identified as COPCs for surface soil and slag.

Surface Soil Data Set (0 to 2 inches bgs)

As presented in Table 2.3, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, iron, manganese, mercury, nickel, selenium, thallium, and zinc, were detected at maximum concentrations greater than the screening criteria for surface soil based on the ingestion and dermal exposure pathways. As a result, these chemicals were identified as COPCs for surface soil.

Surface Slag Data Set (0 to 2 inches bgs)

As presented in Table 2.4, aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, hexavalent chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, thallium, vanadium, and zinc, were detected at maximum concentrations greater than the screening criteria for soil based on the ingestion and dermal exposure pathways. As a result, these chemicals were identified as COPCs for slag.

2.6.2 SUBSURFACE SOIL AND SLAG (0 TO 10 FEET BGS)

Combined Subsurface Soil and Slag Data Set (0 to 10ft bgs)

As presented in Table 2.5, aluminum, arsenic, barium, beryllium, cadmium, chromium, hexavalent chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, thallium, vanadium, and zinc, were detected at maximum concentrations greater than the screening criteria for soil and slag based on the ingestion and dermal exposure pathways. As a result, these chemicals were identified as COPCs for soil and slag.

Soil Data Set (0 to 10 ft bgs)

As presented in Table 2.6, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, and zinc, were detected at maximum concentrations greater than the screening criteria for soil based on the ingestion and dermal exposure pathways. As a result, these chemicals were identified as COPCs for soil.

Slag Data Set (0 to 10 ft bgs)

As presented in Table 2.7, aluminum, arsenic, barium, beryllium, cadmium, chromium, hexavalent chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, thallium, vanadium, and zinc, were detected at maximum concentrations greater than the screening criteria for slag based on the ingestion and dermal exposure pathways. As a result, these chemicals were identified as COPCs for slag.

2.6.3 GROUNDWATER

As presented in Table 2.8, antimony (dissolved), arsenic (dissolved), chromium (dissolved), iron (dissolved), manganese (dissolved), selenium (dissolved), zinc (dissolved), aluminum (total), antimony (total), arsenic (total), chromium (total), hexavalent chromium (total), iron (total), lead (total), manganese (total), selenium (total), thallium (total), vanadium (total), and zinc (total), were detected at maximum concentrations greater than the screening criteria for groundwater based on the ingestion and dermal exposure pathways. As a result, these metals were identified as COPCs for groundwater.

2.6.4 SURFACE WATER

As presented in Table 2.9, aluminum, antimony, arsenic, barium, beryllium, chromium, hexavalent chromium, copper, iron, lead, manganese, mercury, nickel, selenium, thallium, vanadium, and zinc, were detected at maximum concentrations greater than the screening criteria for surface water based on the ingestion and dermal exposure pathways. As a result, these chemicals were identified as COPCs for surface water.

2.6.5 SEDIMENT

As presented in Table 2.10, arsenic, barium, beryllium, cadmium, chromium, copper, iron, mercury, nickel, selenium, and zinc, were detected at maximum concentrations greater than the screening criteria for sediment based on the ingestion and dermal exposure pathways. As a result, these chemicals were identified as COPCs for sediment.

3.0 EXPOSURE ASSESSMENT

Exposure is defined as the contact of a receptor (i.e., person) with a chemical or physical agent. The exposure assessment is the estimation of the magnitude, frequency, duration, and routes of exposure. An exposure assessment provides a systematic analysis of the potential exposure mechanism by which a receptor may be exposed to chemical or physical agents at or originating from a study area. The objectives of an exposure assessment are as follows:

1. Characterization of exposure setting.
2. Identification of potential exposure pathways.
3. Quantification of exposure.

3.1 CHARACTERIZATION OF EXPOSURE SETTING

As part of the HHRA process, potential exposure pathways are determined through an evaluation of the physical setting of the Site and the potentially exposed populations. A brief description of the physical setting of the Site is presented in Section 2.0. The consideration of Site-specific factors related to land usage is important in the development of realistic exposure scenarios and quantification of risks and hazards. The current and future potential land uses that are reasonably expected for the Site determine what populations may potentially be exposed. The Site land uses are discussed in the following subsections.

3.1.1 CURRENT LAND USE

The Site is currently owned by NYPA and NiMo and is classified by NYSDEC as an inactive Class 2 waste disposal site. Portions of the site were reportedly used for the disposal of ferromanganese slag, calcium hydroxide, and ferrochromium silicon dust. The Site is currently used as a hydroelectric utility corridor with restricted access. The current potentially exposed population includes persons who may trespass on the Site and occasional maintenance workers.

3.1.2 FUTURE LAND USE

It is reasonable to assume that the Site will remain under the current land use for the foreseeable future. Future maintenance or construction activities on the Site may necessitate some below-grade excavation.

The future potentially exposed population includes persons who may trespass on the Site, industrial/commercial workers, and construction/utility workers.

3.2 IDENTIFICATION OF POTENTIAL EXPOSURE PATHWAYS

An exposure pathway describes a mechanism by which humans may come into contact with site-related COPCs. An exposure pathway is complete (i.e., it could result in a receptor contacting a COPC) if the following four elements are present:

1. A source or a release from a source (e.g., COPCs released to soil due to historical releases during plant operations).
2. A probable environmental migration route of a site-related COPC (e.g., leaching or partitioning from one medium to another).
3. An exposure point where a receptor may come in contact with a site-related COPC (e.g., surface and subsurface soil).
4. A route by which a site-related COPC may enter a potential receptor's body (e.g., ingestion, dermal contact, or inhalation).

If any of these four elements are not present, the exposure pathway is considered incomplete and does not contribute to the total exposure from the Site.

The first element is satisfied at the Site, as previously indicated in Section 2.0.

3.2.1 FATE AND TRANSPORT IN RECEIVING MEDIA

Many complex factors control the partitioning of a COPC in the environment; thus measured concentrations at the Site only represent Site conditions at a discrete point in time. An understanding of the general fate and transport characteristics of the COPCs is important when predicting future exposure, linking sources with currently contaminated media, and identifying potentially complete pathways to Site media. Therefore, the fate and transport analysis conducted at this stage of the exposure

assessment is not intended to provide a quantitative evaluation of media-specific COPC concentrations; it is meant to identify media that are likely to receive Site-related COPCs.

The following sections provide a fate and transport evaluation to determine the relative significance of the release sources and mechanisms. The concentration and distribution of COPCs in the environment are constantly subject to change due to dispersal by wind and water, and chemical and biological degradation by microorganisms. Once released to the environment, COPCs can partition between air, water, sediment, soil, and biota, and be subsequently subjected to one or more of the following processes:

1. Transportation (e.g., convection by wind or water).
2. Physical transformation (e.g., volatilization, precipitation).
3. Chemical transformation (e.g., photolysis, hydrolysis, oxidation, reduction).
4. Biological transformation (e.g., biodegradation, metabolization by plants or animals).
5. Accumulation in one or more media.

Several transport mechanisms, such as advection and dispersion, are controlled primarily by the physical characteristics of the Site, and thus are essentially the same for all COPCs. However, other transport and transformation processes, such as volatilization, sorption, and biodegradation, depend on certain physical and chemical properties and, therefore, vary for each COPC.

3.2.2 POTENTIAL EXPOSURE ROUTES

An exposure route is the fourth element of an exposure pathway. Exposure routes are identified by: i) determining the COPC sources and receiving media, ii) analyzing the movement of the COPCs from the source (Section 3.2.1), and iii) determining the possible exposure points (Section 3.2.2).

Humans can be exposed to a variety of contaminated media, including soil, groundwater, surface water, sediment, air, and biota that has contact with other contaminated media. Based on the physical conditions of the Site, potential exposure routes associated with Site soil and slag include incidental ingestion, direct dermal contact, and inhalation (airborne particulate and/or vapors). Potential exposure routes associated with Site surface water, sediment and groundwater include incidental ingestion and direct dermal contact.

3.2.3 EXPOSURE SCENARIOS AND COMPLETED EXPOSURE PATHWAYS

Based on an understanding of the four components of an exposure pathway and the current/future conditions of the Site, human exposure pathways were identified in the HHRA. The potential human populations considered relevant to the HHRA included trespassers (outdoors), a general industrial/commercial worker (outdoor), and a worker involved in general construction activities or utility excavations. Trespassers use the Site for off-roading with ATVs. Therefore, an on-Site trespasser exposure to Site media was evaluated in the HHRA.

Based on these assumptions and the results of the media-specific screening presented in Section 2.6, the exposure scenarios and pathways quantified in the HHRA are summarized in Table 2.1 and Figure 2.8. The Conceptual Site Model shown on Figure 2.8 presents a summary of the exposure media, exposure pathways, exposure routes, and exposed receptors considered in this HHRA. The following media and potential human exposures (i.e., complete pathways) have been identified for quantitative evaluation in the HHRA:

1. On-Site Soil and Slag– Current Condition:
   - dermal contact with surface soil and slag by maintenance workers;
   - incidental ingestion of surface soil and slag by maintenance workers; and
   - inhalation of surface soil and slag particulate by maintenance workers.
2. On-Site Soil and Slag– Current/Future Condition:
   - dermal contact with surface soil and slag by trespassers;
   - incidental ingestion of surface soil and slag by trespassers; and
   - inhalation of surface soil and slag particulate by trespassers.
3. On-Site Soil and Slag – Future Condition:
   - dermal contact with soil and slag by industrial/commercial workers and construction/utility workers;
   - incidental ingestion of soil and slag by industrial/commercial workers and construction/utility workers; and
   - inhalation of soil and slag particulate by industrial/commercial workers and construction/utility workers.
4. On-Site Groundwater – Future Condition:
   - dermal contact with groundwater by construction/utility workers; and

- incidental ingestion of groundwater by construction/utility workers.

5. Surface Water - Current:
   - dermal contact with surface water by maintenance workers; and
   - incidental ingestion of surface water by maintenance workers.
6. Surface Water - Current/Future:
   - dermal contact with surface water by trespassers; and
   - incidental ingestion of surface water by trespassers.
7. Surface Water - Future:
   - dermal contact with surface water by industrial/commercial workers and construction/utility workers; and
   - incidental ingestion of surface water by industrial/commercial workers and construction/utility workers.
8. Sediment – Current:
   - dermal contact with sediment by maintenance workers; and
   - incidental ingestion of sediment by maintenance workers.
9. Sediment – Current/Future:
   - dermal contact with sediment by trespassers; and
   - incidental ingestion of sediment by trespassers.
10. Sediment –Future:
    - dermal contact with sediment by industrial/commercial workers and construction/utility workers; and
    - incidental ingestion of sediment by industrial/commercial workers and construction/utility workers.

Descriptions of each of these potential exposure scenarios are presented in Section 3.3.2.

3.3 QUANTIFICATION OF EXPOSURE

To quantify exposure, potential exposure scenarios were developed using guidance presented in the following USEPA documents:

- USEPA Risk Assessment Guidance for Superfund (RAGS), Volume I, Human Health Evaluation Manual (Part) A, EPA/540/1-89/002, December 1989 (USEPA, 1989);

- USEPA RAGS Supplemental Guidance, Standard Default Exposure Factors, Interim Final, OSWER Directive 9285.6-03, March 25, 1991(USEPA, 1991a);
- USEPA Exposure Factors Handbook, EPA/600/P-95/002Fa, August 1997 (USEPA, 1997);
- USEPA RAGS Part D, Standardized Planning, Reporting, and Review of Superfund Risk Assessments, Interim, Publication 9285.7-O1D, January 1998 (USEPA, 1998a); and
- USEPA RAGS Part E, Supplemental Guidance, Dermal Risk Assessment, Final, July 2004 (USEPA, 2004a).

In the absence of USEPA guidance, professional judgment was applied to develop conservative assumptions that are representative of the Reasonable Maximum Exposure (RME) and are protective of human health.

Two levels of exposure scenarios are presented. The Central Tendency (CT) presents the average or mean exposure, and approximates the most probable exposure conditions. The RME presents a conservative exposure scenario that generally utilizes the 90th to 95th percentile assumptions, depending upon available data.

The CT and RME values for the various exposure scenarios were determined based on the observed data distribution and the percentage of censored data points (non-detected results). Duplicate samples were averaged and considered as one sample. Appendix A contains a detailed description of the statistical methods used to determine the CT and RME values.

The arithmetic mean, maximum, and 95% UCL concentrations for the COPCs identified in the various media are summarized in the following:

- Table 3.1 - Surface Soil and Slag;
- Table 3.2 - Surface Soil;
- Table 3.3 - Surface Slag;
- Table 3.4 - Soil and Slag (0 to 10 feet bgs);
- Table 3.5 - Soil (0 to 10 feet bgs);
- Table 3.6 - Slag (0 to 10 feet bgs);
- Table 3.7 - Groundwater;
- Table 3.8 - Surface Water; and
- Table 3.9 - Sediment.

3.3.1 GENERIC ESTIMATION OF INTAKE

In the HHRA, exposure estimates reflect chemical concentration, contact rate, exposure time, and body weight in a term called "intake" or "dose". A generic equation for calculating chemical intake (USEPA, 1989) is:

$$CDI = \frac{CS \times IR \times ABS \times CF \times EF \times ED}{BW \times AT}$$

Where:

CDI = Chronic Daily intake (mg/kg body weight/day)

CS = Chemical concentration (e.g., mg/kg for soil)

IR = Ingestion Rate of Soil (e.g., mg soil/day)

ABS = Absorption Factor (%/100)

CF = Conversion factors as appropriate (e.g., kg/mg)

EF = Exposure frequency (days/year)

ED = Exposure duration (years)

BW = Body weight (kg)

AT = Averaging time (period over which exposure is averaged, e.g., days)

Carcinogens

A lifetime average daily dose of the chemical is estimated for carcinogens. This prorates the total cumulative intake over a lifetime. An averaging time (AT) of 70 years is used for carcinogens.

Non-carcinogens

The chemical intake of non-carcinogens is estimated over the appropriate exposure period or averaging time. The averaging time selected depends on the toxic endpoint being assessed.

3.3.2 EXPOSURE SCENARIO ASSUMPTIONS

Different exposure scenarios were developed for each receptor population evaluated in the HHRA. Descriptions of each exposure scenario and associated exposure assumptions are presented in the following subsections.

Receptor characteristics had values assigned for CT and RME scenarios. In some cases these values differed between scenarios (e.g., exposure concentration, exposure frequency, etc.) and in other cases these values were the same for both CT and RME scenarios (e.g., body weight, skin surface area, soil ingestion rate, etc.). The assignment of receptor characteristics by scenarios followed standard practices used by the USEPA and risk assessment professionals. Where default values were used, the value presented by USEPA was selected. The specific values used are presented in the following sections.

Based on the generic screening criteria, COPCs have been identified in surface soil and slag, subsurface soil and slag, groundwater, surface water, and sediment.

3.3.2.1 SURFACE SOIL AND SLAG EXPOSURE

Current Maintenance Worker Exposure to Surface Soil and Slag

Under the current Site conditions, a maintenance worker may be exposed to surface soil and slag at the Site. The maintenance worker exposure scenario involving surface soil and slag was developed to reflect exposure patterns typical of a maintenance worker who occasionally works at the Site. It was assumed that the maintenance worker would be exposed to surface soil and slag through combined incidental ingestion, dermal contact, and inhalation. As the USEPA has not developed exposure scenarios specific to maintenance workers, professional judgment was largely used in the development of the maintenance worker exposure scenario. Table 3.10 presents a summary of the conservative and health-protective assumptions used to calculate the maintenance worker surface soil and slag exposure. The exposure assumptions are as follows:

i) the exposure point concentration was the mean concentration for the CT (most likely) exposure scenario and the 95% UCL or the maximum detected concentration, whichever was lower, for the RME exposure scenario;

ii) the inadvertent surface soil and slag ingestion rate for the maintenance worker was 100 mg/day for both the CT and RME (USEPA, 2002a);

iii) the maintenance worker receptors were assumed to be adults;

iv) the exposed skin surface area for the adult maintenance worker was 3,300 cm^2 for the CT and RME based on USEPA (2004a);

v) the soil-to-skin adherence factor was 0.02 mg/cm^2 for CT and 0.2 mg/cm^2 for RME based on USEPA (2004a);

vi) the relative absorption factor (RAF) for the ingestion route was 1;

vii) the exposure frequency was assumed to be 8 days/year for CT and 16 days/year for RME. These frequencies were based on the assumption that a maintenance worker will do maintenance (e.g., cut grass) for 1 day/month from April to November (CT) and 2 days/month from April to November (RME);

viii) the exposure duration (ED) for the maintenance worker was assumed to be 9 years for CT and 25 years for RME based on USEPA (2004a);

ix) the body weight for the maintenance worker was 70 kg based on USEPA (2002a); and

x) the carcinogenic averaging time was 365 days per year for 70 years (25,550 days). The averaging time for non-carcinogens was 365 days per year times the exposure duration (ED).

Current/Future Trespasser Exposure to Surface Soil and Slag

Under the current and future Site conditions, a trespasser may be exposed to surface soil and slag at the Site. The trespasser exposure scenario involving surface soil and slag was developed to reflect relatively frequent trespasser exposure patterns typical of an adolescent who could potentially gain access to the Site via trespassing. It was assumed that the trespasser would be exposed to surface soil and slag through combined incidental ingestion, dermal contact, and inhalation. As the USEPA has not developed exposure scenarios specific to trespassers, professional judgment was largely used in the development of the trespasser exposure scenario. Table 3.11 presents a summary of the conservative and health-protective assumptions used to calculate the trespasser surface soil and slag exposure. The exposure assumptions are as follows:

i) the exposure point concentration was the mean concentration for the CT (most likely) exposure scenario and the 95% UCL or the maximum detected concentration, whichever was lower, for the RME exposure scenario;

ii) the inadvertent surface soil and slag ingestion rate for the trespasser was 100 mg/day for both the CT and RME (USEPA, 1997);

iii) the trespasser receptors were assumed to be adolescents aged 7 to 18 years old;

iv) the exposed skin surface area for the adolescent trespasser was 4,400 cm^2 for the CT and RME based on USEPA (1997);

v) the soil-to-skin adherence factor was 0.04 mg/cm^2 for CT and 0.2 mg/cm^2 for RME based on USEPA (2004a);

vi) the relative absorption factor (RAF) for the ingestion route was 1;

vii) the exposure frequency was assumed to be 64 days/year for CT and 128 days/year for RME. These frequencies were based on the assumption that an adolescent would trespass for 8 days/month from April to November (CT) and 16 days/month from April to November (RME);

viii) the exposure duration (ED) for the trespasser was assumed to be 12 years (CT and RME), based on professional judgment;

ix) the age-adjusted body weight for the trespasser was 50 kg. This value represents the average of 13 year old mean body weights (USEPA, 1997); and

x) the carcinogenic averaging time was 365 days per year for 70 years (25,550 days). The averaging time for non-carcinogens was 365 days per year times the exposure duration (ED).

3.3.2.2 SOIL AND SLAG EXPOSURE

Future Industrial/Commercial Worker Exposure to Soil and Slag

Under future Site land use conditions, excavation and construction activities could hypothetically lead to a mixing of the upper 10 feet of soil. Thus a future industrial/ commercial worker on Site may be exposed to soil and slag derived from both surface and subsurface soil, and this potential exposure pathway was evaluated in the HHRA. The assumptions regarding industrial/commercial worker exposure to soil and slag on Site are summarized in Table 3.12. The exposure assumptions corresponded to those of the current maintenance worker exposure to surface soil and slag (see above), with the exception of the following:

i) the exposure frequency for the future industrial/commercial worker was assumed to be 219 days/year (CT) and 250 days/year (RME) based on USEPA (2004a).

Future Construction/Utility Worker Exposure to Soil and Slag

Under future Site land use conditions, excavation and construction activities could hypothetically lead to a mixing of the upper 10 feet of soil and slag. Thus a future

construction/utility worker on Site may be exposed to soil and slag derived from both surface and subsurface soil, and this potential exposure pathway was evaluated in the HHRA. The assumptions regarding construction/utility worker exposure to soil and slag are summarized in Table 3.13. The exposure assumptions corresponded to those of the current maintenance worker exposure to surface soil and slag (see above), with the exception of the following:

i) the ingestion rate of soil was assumed to be 330 mg/day for CT and RME (USEPA, 2002a);

ii) the exposure frequency for the future construction/utility worker was assumed to be 10 days/year (CT) based on professional judgment and 20 days/year (RME), based on professional judgment;

iii) the exposure duration (ED) for the future construction/utility worker was assumed to be 1 year for CT and RME, based on professional judgment;

iv) the averaging time for non-carcinogens was 365 days for CT and RME based on USEPA (1989); and

v) the soil-to-skin adherence factor was 0.1 mg/cm^2 for CT and 0.3 mg/cm^2 for RME based on USEPA (2004a).

3.3.2.3 GROUNDWATER EXPOSURE

Future Construction/Utility Worker Exposure to Groundwater

Excavation activities may occur during possible future Site construction activities. Excavation activities were assumed to involve excavations or trenching, that could involve exposure to groundwater. Thus a hypothetical future construction/utility worker exposure to groundwater was evaluated in the HHRA. It was assumed that the construction/utility worker would be exposed to groundwater through incidental ingestion and dermal contact while excavating and working within the excavation areas. As the USEPA has not developed an exposure frequency specific for construction worker, professional judgment was used in the development of the construction/utility worker exposure frequency and duration. The assumptions regarding construction/ utility exposure to groundwater are summarized in Table 3.15. The exposure assumptions are as follows:

i) the exposure point concentration was the mean concentration for the CT (most likely) exposure scenario and the 95% UCL or the maximum detected concentration, whichever was lower, for the RME exposure scenario;

ii) the inadvertent groundwater ingestion rate for the future construction/utility worker was 0.005 L/hour for both the CT and RME. This ingestion rate was derived from the incidental ingestion rate of 50 mL/hour for an adult while swimming (USEPA, 1989). Because the workers are not swimming in the exposed groundwater, but instead may have only occasional limited contact, a factor of 10 was applied to arrive at the reasonable incidental ingestion rate of 0.005 L/hr;

iii) the exposed skin surface area for the future construction/utility worker was 3,300 cm^2 for the CT and RME, per USEPA, 2004a;

iv) the permeability constants are chemical-specific and were taken from the USEPA (2004a);

v) the exposure time for the construction/utility worker was assumed to be 1 hour/day (CT) and 2 hours/day (RME), based on professional judgment;

vi) the exposure frequency for the future construction/utility worker was 10 days/year (CT) and 20 days/year (RME), based on professional judgment;

vii) the exposure duration (ED) for the future construction/utility worker was assumed to be 1.0 year (CT and RME), based on professional judgment;

viii) the body weight for the adult worker was 70 kg based USEPA (2002a); and

ix) the carcinogenic averaging time was 365 days per year for 70 years (25,550 days). The averaging time for non-carcinogens was 365 times the exposure duration (ED) based on USEPA (1989).

3.3.2.4 SURFACE WATER

Current Maintenance Worker Exposure to Surface Water

It was assumed that the current maintenance worker would be exposed to surface water through incidental ingestion and dermal contact. As the USEPA has not developed exposure time and frequency specific for maintenance workers, professional judgment was used in the development of the maintenance worker exposure time and frequency. The assumptions regarding current maintenance worker exposure to surface water are summarized in Table 3.16. The exposure assumptions corresponded to those of the future construction/utility worker exposure to groundwater (see above), with the exception of the following:

i) the exposure time for the current maintenance worker was assumed to be 0.5 hour/day (CT) and 1 hour/day (RME), based on professional judgment;

ii) the exposure frequency for the current maintenance worker was 8 days/year (CT) and 16 days/year (RME) based on professional judgment. These frequencies were based on the assumption that a maintenance worker will do maintenance for 1 day/month from April to November (CT) and 2 days/month from April to November (RME);

iii) the exposure duration (ED) for the current maintenance worker was 9 years CT and 25 years RME based on USEPA (2004a);

iv) the body weight for the maintenance worker was 70 kg based on USEPA (2002a); and

v) the carcinogenic averaging time was 365 days per year for 70 years (25,550 days). The averaging time for non-carcinogens was 365 times the exposure duration (ED) based on USEPA (1989).

Current/Future Trespasser Exposure to Surface Water

It was assumed that the current/future trespasser would be exposed to surface water through incidental ingestion and dermal contact while trespassing. As the USEPA has not developed exposure frequency and duration specific for trespassers, professional judgment was used in the development of the trespasser exposure frequency and duration. The assumptions regarding current/future trespasser exposure to surface water are summarized in Table 3.17. The exposure assumptions corresponded to those of the future construction/utility worker exposure to groundwater (see above), with the exception of the following:

i) the exposed skin surface area for the current/future trespasser was 4,400 cm^2 for the CT and RME, per USEPA (1997);

ii) the exposure time for the current/future trespasser was assumed to be 2 hours/day (CT) and 4 hours/day (RME), based on professional judgment;

iii) the exposure frequency for the current/future trespasser was 64 days/year (CT) and 128 days/year (RME) based on professional judgment. These frequencies were based on the assumption that an adolescent will trespass for 8 days/month from April to November (CT) and 16 days/month from April to November (RME);

iv) the exposure duration (ED) for the current/future trespasser was assumed to be 12 years (CT and RME), based on professional judgment;

vi) the age-adjusted body weight for the trespasser was 50 kg. This value represents the average of 13 year old mean body weights (USEPA, 1997); and

vii) the carcinogenic averaging time was 365 days per year for 70 years (25,550 days). The averaging time for non-carcinogens was 365 times the exposure duration (ED) based on USEPA (1989).

Future Industrial/Commercial Worker Exposure to Surface Water

It was assumed that the future industrial/commercial worker would be exposed to surface water through incidental ingestion and dermal contact. The assumptions regarding the future industrial/commercial worker exposure to surface water are summarized in Table 3.18. The exposure assumptions corresponded to those of the future construction/utility worker exposure to groundwater (see above), with the exception of the following:

i) the exposure time for the future industrial/commercial worker was assumed to be 0.5 hour/day (CT) and 1 hour/day (RME), based on professional judgment;

ii) the exposure frequency for the future industrial/commercial worker was 219 days/year (CT) and 250 days/year (RME) based on USEPA (2004a); and

iii) the exposure duration (ED) for the future industrial/commercial worker was assumed to be 9 years (CT) and 25 years (RME) based on USEPA (2004a).

Future Construction/Utility Worker Exposure to Surface Water

It was assumed that the future construction/utility worker would be exposed to surface water through incidental ingestion and dermal contact while conducting short-term work. The assumptions regarding the future construction/utility worker exposure to surface water are summarized in Table 3.19. The exposure assumptions corresponded to those of the future construction/utility worker exposure to groundwater (see Section 3.3.2.3).

3.3.2.5 SEDIMENT EXPOSURE

Current Maintenance Worker Exposure to Sediment

Under current conditions, a maintenance worker on Site may be exposed to sediment. It was assumed that the maintenance worker would be exposed to sediment through incidental ingestion and dermal contact while doing maintenance. As the USEPA has not developed exposure scenarios specific to maintenance workers for exposure frequency and ingestion absorption factors, professional judgment was used in the development of the maintenance worker exposure frequency and ingestion absorption

factors. Table 3.20 presents a summary of the assumptions used to calculate the maintenance worker exposure to sediment. The exposure assumptions are as follows:

i) the exposure point concentration was the mean concentrations for the CT (most likely) exposure scenario and the 95% UCL or the maximum detected concentration in sediment, whichever was lower, for the RME exposure scenario;

ii) the inadvertent ingestion rate for the maintenance worker was 100 mg/day for both the CT and RME (USEPA, 2002a);

iii) the exposed skin surface area for the maintenance worker was 3,300 cm^2 for the CT and RME, as per USEPA (2004a);

iv) the soil-to-skin adherence factor was 0.02 mg/cm^2 for CT and 0.2 mg/cm^2 for RME (USEPA, 2004a);

v) the dermal absorption factors are chemical-specific and were taken from USEPA (2004a);

vi) the exposure frequency was assumed to be 8 days/year for CT and 16 days/year for RME. These frequencies were based on the assumption that a maintenance worker will do maintenance for 1 day/month from April to November (CT) or 2 days/month from April to November (RME), based on professional judgment;

vii) the exposure duration (ED) for the current maintenance worker was 9 years for CT and 25 years for RME based on USEPA (2004a);

viii) the body weight for the maintenance worker was 70 kg based on USEPA (2002a); and

ix) the carcinogenic averaging time was 365 days per year for 70 years (25,550 days). The averaging time for non-carcinogens was 365 times the exposure duration (ED) based on USEPA (1989).

Current/Future Trespasser Exposure to Sediment

Under current and future conditions, a trespasser on Site may be exposed to sediment. It was assumed that the trespasser would be exposed to sediment through incidental ingestion and dermal contact while trespassing. As the USEPA has not developed exposure scenarios specific to trespassers, professional judgment was used in the development of the trespasser exposure scenario. Table 3.21 presents a summary of the assumptions used to calculate the trespasser exposure to sediment. The exposure assumptions corresponded to those of the current maintenance worker exposure to sediment (see above), with the exception of the following:

i) the exposed skin surface area for the trespasser was 4,400 cm^2 for the CT and RME, as per USEPA (1997);

ii) the soil-to-skin adherence factor was 0.04 mg/cm^2 for CT and 0.2 mg/cm^2 for RME (USEPA, 2004a);

iii) the exposure frequency was assumed to be 64 days/year for CT and 128 days/year for RME. These frequencies were based on the assumption that an adolescent will trespass for 8 days/month from April to November (CT) or 16 days/month from April to November (RME), based on professional judgment;

iv) the exposure duration (ED) for the current/future trespasser was 12 years for both CT and RME, based on professional judgment; and

v) the age-adjusted body weight for the trespasser was 50 kg. This value represents the average of 13 year old mean body weights (USEPA, 1997).

Future Industrial/Commercial Worker Exposure to Sediment

Under future conditions, an industrial/commercial worker may be exposed to sediments. It was assumed that the industrial/commercial worker would be exposed to sediment through incidental ingestion and dermal contact while conducting work on Site. Table 3.22 presents a summary of the conservative and health-protective assumptions used to calculate the industrial/commercial worker exposure to sediment. The exposure assumptions corresponded to those of the current maintenance worker exposure to sediment (see above), with the exception of the following:

i) the exposure frequency for the industrial/commercial worker was 219 days/year for (CT) and 250 days/year for (RME), by USEPA (2004a).

Future Construction/Utility Worker Exposure to Sediment

Under future conditions, a construction/utility worker on Site may be exposed to sediments. It was assumed that the construction/utility worker would be exposed to sediment through incidental ingestion and dermal contact while conducting short-term work on Site. Table 3.23 presents a summary of the conservative and health-protective assumptions used to calculate the construction/utility worker exposure to sediment. The exposure assumptions corresponded to those of the current maintenance exposure to sediment (see above), with the exception of the following:

i) the exposure frequency for the construction/utility worker was 10 days/year for (CT) and 20 days/year for (RME), based on professional judgment;

ii) the exposure duration (ED) for the construction/utility worker was assumed to be 1 year for CT and for RME, based on professional judgment; and

iii) the soil-to-skin adherence factor was 0.1 mg/cm^2 for CT and 0.3 mg/cm^2 for RME (USEPA, 2004a).

3.3.3 AMBIENT AIR EXPOSURE

Current Maintenance Worker Exposure to Ambient Air

The soil-to-ambient air exposure pathway is potentially complete for maintenance workers under current conditions, and therefore was evaluated in the HHRA. Exposure to ambient air occurs through inhalation of particulates. Soil chemical data were used to model potential air emission concentrations on Site for the current maintenance worker. As the USEPA has not developed exposure time and frequency scenarios specific to maintenance workers, professional judgment was used in the development of the maintenance worker exposure time and frequency scenarios. Table 3.10 presents the conservative and health-protective assumptions used to calculate maintenance worker inhalation exposure. The exposure assumptions are as follows:

i) the exposure point concentration was the mean concentration for the CT (most likely) exposure scenario and the 95% UCL or the maximum detected concentration, whichever was lower, for the RME exposure scenario;

ii) the inhalation rate for the maintenance worker was 0.83 m^3/hour for both the CT and RME (USEPA, 2002a);

iii) The maintenance worker receptors were assumed to be adults;

iv) The exposure frequency was assumed to be 8 days/year for CT and 16 days/year for RME. These frequencies were based on the assumption that a maintenance worker will do maintenance for 1 day/month from April to November (CT) and 2 days/month from April to November (RME);

v) The exposure duration (ED) for the maintenance worker was assumed to be 9 years for CT and 25 years for RME based on USEPA (2004);

vi) the exposure time for the maintenance worker was assumed to be 8 hours/day for CT and RME, based on professional judgment;

vii) The particulate emission factor was assumed to be 1.36E+09 m^3/kg for CT and RME (USEPA, 2002a);

viii) The body weight of the maintenance worker was 70 kg based on USEPA (2002a); and

ix) the carcinogenic averaging time was 365 days per year for 70 years (25,550 days). The averaging time for non-carcinogens was 365 days per year times the exposure duration (ED) based on USEPA (1989).

Current/Future Trespasser Exposure to Ambient Air

The soil-to-ambient air exposure pathway is potentially complete for trespassers under current/future conditions, and therefore was evaluated in the HHRA. Exposure to ambient air occurs through inhalation of particulates. Soil chemical data were used to model potential air emission concentrations on Site for the current/future trespasser. As the USEPA has not developed exposure scenarios specific to trespassers, professional judgment was used in the development of the trespasser exposure scenario. Table 3.11 presents the conservative and health-protective assumptions used to calculate trespasser inhalation exposure. The exposure assumptions corresponded to those of the current maintenance worker exposure to ambient air on Site (see above), with the exception of the following:

i) the inhalation rate for the trespasser was 1.2 m^3/hour for both the CT and RME based on the short-term exposure inhalation rate for children performing moderate activities (USEPA, 1997);

ii) The trespasser receptors were assumed to be adolescents aged 7 to 18 years old;

iii) The exposure frequency was assumed to be 64 days/year for CT and 128 days/year for RME. These frequencies were based on the assumption that an adolescent will trespass for 8 days/month from April to November (CT) and 16 days/month from April to November (RME);

iv) The exposure duration (ED) for the trespasser was assumed to be 12 years (CT and RME), based on professional judgment;

v) the exposure time for the trespasser was assumed to be 2 hours/day for CT and 4 hours/day for RME, based on professional judgment; and

vi) The age-adjusted body weight for the trespasser was 50 kg. This value represents the average of 13 year old mean body weights (USEPA, 1997).

Future Industrial/Commercial Worker Exposure to Ambient Air

The soil-to-ambient air exposure pathway is potentially complete for the industrial/ commercial worker under future on-Site conditions, and therefore was evaluated in the HHRA. Exposure to ambient air occurs through inhalation of particulates. Soil chemical data were used to model potential air emission concentrations on Site. Table 3.12 includes the conservative and health-protective assumptions used to calculate the

industrial/commercial worker exposure to ambient air. The exposure assumptions corresponded to those of the current maintenance worker exposure to ambient air on Site (see above), with the exception of the following:

i) the exposure frequency for the industrial/commercial worker was 219 days/year for (CT) and 250 days/year for (RME), by USEPA (2004a).

Future Construction/Utility Worker Exposure to Ambient Air

The soil-to-ambient air exposure pathways are potentially complete for the construction/utility worker exposure scenario evaluated under future Site conditions, and therefore were evaluated in the HHRA. Exposure to ambient air occurs through inhalation of particulates. Soil chemical data were used to model potential air emission concentrations on Site. Table 3.13 provides the conservative and health-protective assumptions used to calculate the construction/utility worker exposure to ambient air. The exposure assumptions corresponded to those of the current maintenance worker exposure to ambient air (see above), with the exception of the following:

i) the exposure frequency for the construction/utility worker was assumed to be 10 days/year (CT) and 20 days/year (RME), based on professional judgment;

ii) the exposure duration (ED) for the construction/utility worker was assumed to be 1.0 year, based on professional judgment; and

iii) the particulate emission factor was calculated to be 4.72E+07 m^3/kg for CT and RME following the methodology presented in USEPA (2002a) and shown on Table 3.14.

3.4 EVALUATION OF ADULT EXPOSURES TO LEAD IN SOIL AND WATER

The best available method for determining hazards associated with adult exposures to lead-impacted soil and water is based on the adult lead exposure equation as presented in the USEPA document "Recommendations of the Technical Review Workgroup (TRW) for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil" (USEPA, 2003).

The hazard associated with adult lead exposure stems from the relationship between the lead concentration in site media and the blood lead concentration in the developing fetus of a pregnant woman exposed to site media. Current Office of Solid Waste and

Emergency Response (OSWER) guidance (USEPA, 1998b) calls for the establishment of cleanup goals to limit childhood risk of exceeding 10 micrograms per deciliter (μg/dL) to 5 percent of the population.

Lead was identified as a COPC in soil, slag, groundwater, and surface water associated with the Site. As such, it is reasonably anticipated that a maintenance worker on Site, a trespasser in this area, a construction/utility worker performing excavations and an industrial/commercial worker on Site would contact lead. Therefore, the fetal 95th percentile blood lead level was conservatively estimated for an adolescent female trespasser and adult women maintenance worker, construction/utility worker, and industrial/commercial worker with Site exposure.

3.4.1 ADULT EXPOSURE EQUATION

The TRW has indicated that the Adult Exposure Equation is a suitable and appropriate model for assessing adult exposures to lead under an industrial setting. The Adult Exposure Equation recommended for use by the TRW is as follows:

$$PbB_{fetal,0.95} = \left(PbB_{adult,0} + PbB_{adult,site}\right) \bullet GSD_{i,adult}^{1.645} \bullet R_{fetal/maternal}$$

Where:

$PbB_{fetal,\,0.95}$ = 95th percentile target blood lead (PbB) concentration in the fetus (μg/dL)

$PbB_{adult,0}$ = typical lead concentration (μg/g) (appropriate average concentration for individual)

$R_{fetal/maternal}$ = mean ratio of fetal to maternal PbB

$GSD_{i,adult}$ = individual Geometric Standard Deviation, an exponent of 1.645 represents the standard normal deviate used to calculate the 95th percentile from a lognormal distribution of blood lead concentration

$PbB_{adult,\,site}$ = adult blood lead concentration (μg/dL) contributed by exposure to lead containing media on Site as shown below

$$PbB_{adult,site} = \frac{BKSF \bullet [(PbS \bullet IR_S \bullet AF_S \bullet EF_S) + (PbW \bullet IR_W \bullet AF_W \bullet EF_W)]}{AT}$$

Where:

BKSF = BioKinetic Slope Factor (μg/dL blood lead increase per μg/day lead uptake)

PbS = Soil Lead Concentration (μg/g)

PbW = Water Lead Concentration (μg/L)

IR_S = Ingestion Rate of soil (g/day)

IR_W = Ingestion Rate of water (L/day)

EF_S = Exposure Frequency for contact with assessed soils (days/yr)

EF_W = Exposure Frequency for contact with assessed water (days/yr)

AF_S = absolute Absorption Fraction of lead in soil

AF_W = absolute Absorption Fraction of lead in water

AT = Averaging Time; 365 days/year for non-carcinogen exposures

3.4.2 ADULT EXPOSURE EQUATION INPUT PARAMETERS

The basis for selection of input parameters for the above model is discussed below and shown in Tables 3.24, 3.25, 3.26, and 3.27.

i) Media Lead Concentrations (PbS, PbW):

The exposure unit specific RME concentrations of lead in the media were used. Lead was identified in surface soil and slag, surface soil and slag, surface water and groundwater as follows:

Maintenance Worker:

Surface Soil and Slag (μg/g)	*Surface Soil (μg/g)*	*Slag (μg/g)*	*Surface Water (μg/L)*
309	-	1,221	184

Adolescent Trespasser:

Surface Soil and Slag (μg/g)	*Surface Soil (μg/g)*	*Slag (μg/g)*	*Surface Water (μg/L)*
309	-	1,221	184

Industrial/Commercial Worker:

Soil and Slag (0 to 10 feet bgs) (μg/g)	*Soil (0 to 10 feet bgs) (μg/g)*	*Slag (0 to 10 feet bgs) (μg/g)*	*Surface Water (μg/L)*
81.6	226	133	184

Construction/Utility Worker:

Soil and Slag (0 to 10 feet bgs) (µg/g)	*Soil (0 to 10 feet bgs) (µg/g)*	*Slag (0 to 10 feet bgs) (µg/g)*	*Groundwater (µg/L)*
81.6	226	133	61.4

ii) Mean Ratio of Fetal to Maternal PbB (Rfetal/maternal):

Various studies have estimated an average fetal-to-maternal PbB ratio of 0.9 based on a weight of evidence approach. This value has also been used by USEPA in applying the Adult Exposure Model. The value of 0.9 for was used in the modeling.

iii) Individual Geometric Standard Deviation ($GSD_{i,adult}$):

This parameter is used to assess variability in blood lead concentrations among different individuals. Few data are available regarding GSD values reflecting individual variability. Instead, GSD values reflecting community variability (which would be expected to be greater than individual variability) are frequently applied to estimate individual variability. Various studies have indicated that community GSDs may range from approximately 1.8 to 2.1 depending on the demographics. A value for GSD of 2.0 was selected from the NHANES III survey (USEPA, 2002b) of the adult female in the Northeast region (Table 3a of USEPA 2002b).

iv) Baseline PbB Value (PbBadult,0):

This parameter is specific to the population in the area of interest. At this time, no source of data describing blood lead levels for the population in the vicinity of the Site has been identified. Therefore, published reference data were used to determine a representative value. Various studies have indicated that Baseline PbB values range from approximately 1.7 to 2.2 depending on the demographics. A value of 1.98 µg/dL was chosen for this input parameter based on the NHANES III survey (USEPA, 2002b) of the adult female in the Northeast region (Table 3a of USEPA 2002b).

v) Biokinetic Slope Factor (BKSF in µg/dL per µg/day):

The TRW adopted a BKSF of 0.4, derived from USEPA (2003). The default value of 0.4 for the parameter BKSF was used in the modeling.

vi) Soil Absolute Absorption Fraction of Lead (AFs):

The TRW uses 12 percent as the absorbed fraction of lead from soil for adults, based on an absorption factor for soluble lead of 0.20 (soil/soluble) (USEPA, 2003).

vii) Water Absolute Absorption Fraction of Lead (AFW):

The TRW uses 20 percent as the absorbed fraction of lead from water for adults, based on an absorption factor for soluble lead of 0.20 (USEPA, 2003).

viii) Soil Ingestion Rate (IRS in g/day):

Soil ingestion rates of 0.1 g/day for a maintenance worker, 0.1 g/day, 0.1 g/day for an adolescent trespassers, 0.1 g/day for an industrial/commercial worker, and 0.33 g/day for a construction/utility worker were applied at the Site (USEPA, 2002a).

ix) Water Ingestion Rate (IRW in L/day):

Water ingestion rates were calculated based on an incidental ingestion rate of 0.005 L/h, for exposure duration of 1 hour/day for the maintenance worker, adolescent trespasser, industrial/commercial worker, and construction/utility worker.

x) Exposure Frequency (EFS and EFW in days/yr):

For the maintenance worker an exposure frequency of 16 days/year was used as a realistic maximum exposure in the modeling. For the adolescent trespasser, an exposure frequency of 128 days/year was determined(scenario specific). For the industrial/commercial worker, an exposure frequency of 250 days/year (5 days per week for 50 weeks, based on 2 weeks holidays) was used as a realistic maximum exposure in the modeling. For the construction/utility worker scenario, an exposure frequency of 20 days/year was used as a realistic maximum exposure in the modeling.

4.0 TOXICITY ASSESSMENT

The toxicity assessment weighs the available evidence regarding the potential for a particular COPC to cause adverse effects in exposed individuals and estimates the extent of exposure and possible severity of adverse effects. To develop toxicity values, two steps are taken: hazard identification and dose-response assessment. The hazard identification determines the potential adverse effects associated with exposure to a COPC. In the dose-response assessment, numerical toxicity values are determined or selected from the available toxicity data.

In the selection of toxicity values, preference has been given to the most recently developed values because these would incorporate the most recent toxicological information and would provide the best basis upon which to assess potential health hazards/risks. Toxicity values were primarily obtained from the IRIS (Integrated Risk Information System) database (USEPA 2004b), Health Effects Assessment Summary Table (HEAST, 1997), and the USEPA-NCEA provisional values as presented in the USEPA Region IX PRGs (USEPA-IX, 2004) and USEPA Region III RBCs (USEPA-III, 2004).

4.1 NON-CARCINOGENIC HAZARDS

4.1.1 TOXICITY INFORMATION FOR NON-CARCINOGENIC EFFECTS

For substances suspected to cause non-carcinogenic chronic effects, the health criteria are usually expressed as chronic intake levels or reference dose (RfDs) [in units of mg/(kg day^{-1})] below which, no adverse effects are expected. In other words, there is a level of exposure to a chemical below which no toxic effects are expected. In contrast to the toxicological model used to assess carcinogenic risk, which assumes no concentration threshold, the non-carcinogenic dose-response model postulates a "threshold".

In this risk assessment, chronic RfDs are used as the toxicity values for non-carcinogenic health effects. A chronic RfD is defined as an estimate (with an uncertainty spanning an order of magnitude or greater) of a daily exposure level for the human population, including sensitive sub-populations, which poses no appreciable risk of deleterious effects over a lifetime of exposure. Uncertainty factors are incorporated into the RfDs to account for extrapolations from animal toxicity data, data quality, and to protect sensitive sub-populations. The basis of an RfD is usually the highest dose level administered to laboratory animals that did not cause observable adverse effects after

chronic (usually lifetime) exposure. This is called the No-Observed Adverse Effect Level (NOAEL). The NOAEL is then divided by an uncertainty (safety) factor, and sometimes an additional modifying factor, to obtain the RfD. In general, an uncertainty factor of 10 is used to account for interspecies variation and another factor of 10 to account for sensitive human populations. Additional factors of 10 are included in the uncertainty factor if the RfD is based on the Lowest-Observed Adverse Effect Level (LOAEL) instead of the NOAEL, or if data inadequacies are present (e.g., the experiment for which the RfD was derived had less than lifetime exposure). The LOAEL is the dose level administered to laboratory animals that causes the lowest adverse effect (i.e., liver toxicity - although this is species and chemical-specific) after chronic exposure.

Table 4.1 presents the non-cancer toxicity data (RfDs) used to estimate human health effects for oral and dermal exposure routes. Table 4.2 presents RfDs used for the inhalation exposure route.

4.2 CARCINOGENIC RISKS

4.2.1 TOXICITY INFORMATION FOR CARCINOGENIC EFFECTS

Cancer Slope Factors (CSFs) are quantitative risk estimates of carcinogenic potency. Slope factors relate the lifetime probability of excess cancers to the lifetime average exposure dose of a substance. CSFs are estimated using mathematical extrapolation models, most commonly the linearized multistage (LMS) model, and are presented as risk per mg/(kg-day^{-1}) (i.e., mg carcinogen per kg body weight per day). These models assume low dose-response linearity and thus may not be appropriate for some suspect carcinogens, in particular those that function as promoters. As well, the body's natural repair processes and defense mechanisms may decrease cancer risk at low exposure levels. Thus, the risks at lower exposure levels are likely overestimated using the LMS model. When adequate human epidemiology data are available, maximum likelihood estimates (MLEs) of model parameters are used to generate a CSF. When only animal data are available, the CSF is derived from the largest possible linear slope that is consistent with the data (within the upper 95 percent confidence limit). In other words, the true risk to humans, while not identifiable, is not likely to exceed the upper-bound estimate. This is a conservative estimate, and in some cases a linear slope of zero may be as appropriate for the data (i.e., no carcinogenic risk).

Known or suspect human carcinogens have been evaluated and identified by the Carcinogen Assessment Group using the USEPA Weight-of-Evidence approach for carcinogenicity classification (HEAST, 1997). The USEPA classification is based on an

evaluation of the likelihood that the agent is a human carcinogen. The evidence is characterized separately for human and animal studies as follows:

Group A - Known Human Carcinogen (sufficient evidence of carcinogenicity in humans);

Group B - Probable Human Carcinogen (B1 - limited evidence of carcinogenicity in humans; B2 - sufficient evidence of carcinogenicity in animals with inadequate or lack of evidence in humans);

Group C - Possible Human Carcinogen (limited evidence of carcinogenicity in animals and inadequate or lack of human data);

Group D - Not Classifiable as to Human Carcinogenicity (inadequate or no evidence); and

Group E - Evidence of Noncarcinogenicity for Humans (no evidence of carcinogenicity in animal studies).

The COPCs were classified utilizing the USEPA system. Table 4.3 presents the cancer toxicity data (CSFs) used in the HHRA to estimate the risk of cancer for the oral and dermal exposure routes. Table 4.4 presents CSFs for the inhalation exposure route.

4.3 POTENTIAL RISK FROM CARCINOGENS

A CSF is applied to estimate the potential risk of cancer from exposure to carcinogenic chemicals. The CSF, when multiplied by the lifetime average daily intake, provides an estimate of the probability that the intake will cause cancer during the lifetime of the exposed individual. This increased cancer risk is expressed, for example, as 1×10^{-6} or 1.0E-06 (1 in 1 million increased cancer risk). This is an upper limit estimate of the risk, based on very conservative health-protective assumptions and conservative statistical evaluations of data from animal experiments or epidemiological studies. To state that a chemical exposure causes a 1E-06 added upper limit risk of cancer means that if 1,000,000 people are exposed to this concentration of the chemical for their lifetimes, a maximum of one additional incident of cancer may occur. This is a very conservative estimate, and, in fact, there may be no additional cases of cancer due to the chemical exposure.

5.0 RISK CHARACTERIZATION

The objective of this risk characterization is to integrate information developed in the exposure assessment (Section 3.0) and the toxicity assessment (Section 4.0) into a complete evaluation of the potential human health risks associated with exposure to potentially contaminated surface soil and slag, subsurface soil and slag, groundwater, surface water, and sediment at the Site. The methods used in this risk characterization are based on USEPA RA guidance for human exposures (USEPA, 1989, 1991a, 1991b, 1997, 1998a, 2002a, 2004a).

5.1 HAZARD ESTIMATES

The potential for non-cancer health effects from exposure to a COPC is evaluated by comparing an exposure level over a specified time period to a reference dose (RfD) for a similar time period. This ratio, termed the hazard quotient, is calculated according to the following general equation:

$$HQ = \frac{CDI}{RfD}$$

Where:

HQ = The Hazard Quotient (unitless) is the ratio of the exposure dose of a chemical to a reference dose not expected to cause adverse effects from a lifetime exposure. A hazard quotient equal to or below 1.0 is considered protective of human health.

CDI = The Chronic Daily Intake is the chemical dose calculated by applying the exposure scenario assumptions and expressed as mg/(kg day^{-1}). The intake represents the average daily chemical dose over the expected period of exposure.

RfD = The Reference Dose is a daily dose believed not to cause an adverse effect from even a lifetime exposure [mg/(kg day^{-1})]. The RfD is based on experimental data and/or epidemiological studies.

The Hazard Index (HI) is the sum of Hazard Quotients for individual COPCs for a specific exposure scenario.

The summation of non-carcinogenic effects is only additive if they pertain to similar target organs. The HIs presented in Section 5.3 conservatively sum the non-carcinogenic effects without regard to target organs. HIs summed across similar target organs are presented on the hazard quotient calculation tables for the Site.

5.2 CANCER RISK ESTIMATES

Exposure scenarios may involve potential exposure to more than one carcinogen. To represent the potential carcinogenic effects posed by exposure to multiple carcinogens, it is assumed, in the absence of information on synergistic or antagonistic effects, that these risks are additive. Cancer risks are calculated utilizing the following general equation:

Cancer Risk = LADD x CSF

Where:

Cancer Risk = Estimated upper bound on additional risk of cancer over a lifetime in a population exposed to the carcinogen for a specified exposure period (unitless).

LADD = The Lifetime Average Daily Dose of the chemical calculated using exposure scenario assumptions and expressed in mg/(kg-day^{-1}). The intake represents the total lifetime chemical dose averaged over an individual expected lifetime of 70 years.

CSF = The Cancer Slope Factor models the potential carcinogenic response and is expressed as [mg/(kg-day^{-1})]$^{-1}$.

For estimating cancer risks from exposure to multiple carcinogens from a single exposure route, the following equation is used:

$$Risk_T = \sum_{i=1}^{N} Risk_i$$

Where:

$Risk_T$ = Total cancer risk from route of exposure

$Risk_i$ = Cancer risk for the chemical

N = Number of chemicals

The cumulative carcinogenic risks are presented and discussed in Section 5.3.

5.3 RISK QUANTIFICATION SUMMARY

The hazard indices and excess lifetime cancer risks for the various exposure scenarios for on-Site media are presented below.

5.3.1 CALCULATION OF NON-CANCER HAZARDS AND CALCULATED LIFETIME CANCER RISKS FOR RECEPTORS

The non-cancer hazard calculations and calculated lifetime cancer risks for potential receptors at the Site are presented in Appendix B and summarized below.

Receptor	Medium	Route	Exposure	Non-Carcinogenic Hazard Index	Appendix Table Reference	Carcinogenic Risk	Appendix Table Reference
Maintenance Worker (Current)	Surface Soil and Slag	Ingestion Dermal Inhalation	CT	1.1E-02	B.1.1.CT	4.0E-08	B.2.1.CT
			RME	7.7E-02	B.1.1.RME	7.3E-07	B.2.1.RME
Maintenance Worker (Current)	Surface Soil	Ingestion Dermal Inhalation	CT	5.9E-03	B.1.2.CT	3.9E-08	B.2.2.CT
			RME	4.9E-02	B.1.2.RME	3.2E-07	B.2.2.RME
Maintenance Worker (Current)	Surface Slag	Ingestion Dermal Inhalation	CT	2.4E-02	B.1.3.CT	2.9E-08	B.2.3.CT
			RME	2.2E-01	B.1.3.RME	5.6E-07	B.2.3.RME
Trespasser (Current/ Future)	Surface Soil and Slag	Ingestion Dermal Inhalation	CT	1.4E-01	B.1.4.CT	6.1E-07	B.2.4.CT
			RME	9.8E-01	B.1.4.RME	4.1E-06	B.2.4.RME
Trespasser (Current/ Future)	Surface Soil	Ingestion Dermal Inhalation	CT	6.9E-02	B.1.5.CT	6.0E-07	B.2.5.CT
			RME	6.2E-01	B.1.5.RME	1.8E-06	B.2.5.RME
Trespasser (Current/ Future)	Surface Slag	Ingestion Dermal Inhalation	CT	3.0E-01	B.1.6.CT	4.4E-07	B.2.6.CT
			RME	2.8E+00	B.1.6.RME	3.2E-06	B.2.6.RME
Industrial/ Commercial Worker (Future)	Soil and Slag	Ingestion Dermal Inhalation	CT	2.7E-01	B.1.7.CT	1.2E-06	B.2.7.CT
			RME	7.8E-01	B.1.7.RME	6.1E-06	B.2.7.RME
Industrial/ Commercial Worker (Future)	Soil	Ingestion Dermal Inhalation	CT	1.2E-01	B.1.8.CT	1.0E-06	B.2.8.CT
			RME	4.5E-01	B.1.8.RME	4.5E-06	B.2.8.RME

Receptor	Medium	Route	Exposure	Non-Carcinogenic Hazard Index	Appendix Table Reference	Carcinogenic Risk	Appendix Table Reference
Industrial/ Commercial Worker (Future)	Slag	Ingestion Dermal Inhalation	CT	3.6E-01	B.1.9.CT	1.1E-06	B.2.9.CT
			RME	2.0E+00	B.1.9.RME	6.9E-06	B.2.9.RME
Construction/ Utility Worker (Future)	Soil and Slag	Ingestion Dermal Inhalation	CT	4.8E-02	B.1.10.CT	2.1E-08	B.2.10.CT
			RME	1.7E-01	B.1.10.RME	6.3E-08	B.2.10.RME
Construction/ Utility Worker (Future)	Soil	Ingestion Dermal Inhalation	CT	2.3E-02	B.1.11.CT	1.8E-08	B.2.11.CT
			RME	1.3E-01	B.1.11.RME	4.4E-08	B.2.11.RME
Construction/ Utility Worker (Future)	Slag	Ingestion Dermal Inhalation	CT	6.9-02	B.1.12.CT	1.9E-08	B.2.12.CT
			RME	5.1E-01	B.1.12.RME	7.3E-08	B.2.12.RME
Construction/ Utility Worker (Future)	Ground water	Ingestion Dermal	CT	3.8E-03	B.1.13.CT	1.5E-09	B.2.13.CT
			RME	2.7E-02	B.1.13.RME	7.2E-09	B.2.13.RME
Maintenance Worker (Current)	Surface Water	Ingestion Dermal	CT	2.5E-03	B.1.14.CT	4.9E-09	B.2.14.CT
			RME	1.5E-02	B.1.14.RME	6.3E-08	B.2.14.RME
Trespasser (Current/ Future)	Surface Water	Ingestion Dermal	CT	1.4E-01	B.1.15.CT	3.3E-07	B.2.15.CT
			RME	8.8E-01	B.1.15.RME	1.5E-06	B.2.15.RME
Industrial/ Commercial (Future)	Surface Water	Ingestion Dermal	CT	6.8E-02	B.1.16.CT	1.3E-07	B.2.16.CT
			RME	2.4E-01	B.1.16.RME	9.8E-07	B.2.16.RME
Construction/ Utility Worker (Future)	Surface Water	Ingestion Dermal	CT	6.2E-03	B.1.17.CT	1.4E-09	B.2.17.CT
			RME	3.9E-02	B.1.17.RME	6.3E-09	B.2.17.RME
Maintenance Worker (Current)	Sediment	Ingestion Dermal	CT	3.2E-03	B.1.18.CT	4.9E-08	B.2.18.CT
			RME	1.2E-02	B.1.18.RME	5.4E-07	B.2.18.RME
Trespasser (Current/ Future)	Sediment	Ingestion Dermal	CT	7.3E-02	B.1.19.CT	7.5E-07	B.2.19.CT
			RME	5.3E-01	B.1.19.RME	3.0E-06	B.2.19.RME
Industrial/ Commercial (Future)	Sediment	Ingestion Dermal	CT	8.9E-02	B.1.20.CT	1.3E-06	B.2.20.CT
			RME	1.8E-01	B.1.20.RME	8.4E-06	B.2.20.RME
Construction/ Utility Worker (Future)	Sediment	Ingestion Dermal	CT	1.3E-02	B.1.21.CT	2.3E-08	B.2.21.CT
			RME	4.3E-02	B.1.21.RME	8.1E-08	B.2.21.RME

5.4 SUMMATION OF RISKS

A given human population may be exposed to a chemical by several exposure routes and through more than one medium. The purpose of this section is to identify the risks associated with a population that may be exposed to Site COPCs through a combination of exposure pathways.

USEPA (1989) states that risks should be combined across exposure pathways only where the following situation occurs:

a) reasonable exposure pathway combinations are identified; and

b) it appears likely that the same individuals would consistently face the "reasonable maximum exposure" (RME) through more than one pathway.

Instead of encouraging the calculation of combined risks from across exposure pathways, USEPA (1989) cautions that each RME estimate includes many conservative assumptions and that combining estimates is not appropriate unless the combination itself is a RME:

> *"For real world situations in which contaminant concentrations vary over time and space, the same individual may or may not experience the RME for more than one pathway over the same period of time. One individual might face the RME through one pathway, and a different individual face the RME through a different pathway. Only if you can explain why the key RME assumptions for more than one pathway apply to the same individual or sub-population should the RME risks for more than one pathway be combined.*
>
> *In some situations, it may be appropriate to combine one pathway's RME risks with other pathways' risk estimates that have been derived from more typical exposure parameter values". [Emphasis added].*

It is improbable that the same person would experience all potential exposures associated with the study area or even over the periods of years specified in the individual RME scenarios. As a result, it is considered inappropriate to add together the estimated risks and hazards for the different exposure routes and pathways, because this would result in the exaggeration of an appropriate RME for the summed exposures. The summation of the CT estimates is likely the more appropriate representation of a cumulative maximum exposure. However, where appropriate and for completeness, both cumulative CT and RME risks and hazards from separate exposure routes and media were combined to estimate total CT and RME exposures.

The cumulative HIs and lifetime cancer risks across all applicable exposure routes for receptors on Site are presented in Appendix B and summarized below.

Receptor	Media	Exposure	Cumulative Non-Carcinogenic Hazard Index	Cumulative Carcinogenic Risk	Appendix Table Reference
Maintenance Worker (Current)	Surface Soil and Slag, Surface Water, Sediment	CT	1.7E-02	9.4E-08	B.3.1.CT
		RME	1.0E-01	1.3E-06	B.3.1.RME
Maintenance Worker (Current)	Surface Soil, Surface Water, Sediment	CT	1.2E-02	9.2E-08	B.3.1.CT
		RME	7.6E-02	9.2E-07	B.3.1.RME
Maintenance Worker (Current)	Surface Slag, Surface Water, Sediment	CT	3.0E-02	8.2E-08	B.3.1.CT
		RME	2.5E-01	1.2E-06	B.3.1.RME
Trespasser (Current/Future)	Surface Soil and Slag, Surface Water, Sediment	CT	3.2E-01	1.7E-06	B.3.2.CT
		RME	2.0E+00	8.7E-06	B.3.2.RME
Trespasser (Current/Future)	Surface Soil, Surface Water, Sediment	CT	2.5E-01	1.7E-06	B.3.2.CT
		RME	1.6E+00	6.4E-06	B.3.2.RME
Trespasser (Current/Future)	Surface Slag, Surface Water, Sediment	CT	4.8E-01	1.5E-06	B.3.2.CT
		RME	3.9E+00	7.8E-06	B.3.2.RME
Industrial/ Commercial Worker (Future)	Soil and Slag	CT	4.2E-01	2.6E-06	B.3.3.CT
		RME	1.2E+00	1.6E-05	B.3.3.RME
Industrial/ Commercial Worker (Future)	Soil	CT	2.8E-01	2.5E-06	B.3.3.CT
		RME	8.8E-01	1.4E-05	B.3.3.RME
Industrial/ Commercial Worker (Future)	Slag	CT	5.1E-01	2.6E-06	B.3.3.CT
		RME	2.4E+00	1.6E-05	B.3.3.RME
Construction/Utility Worker (Future)	Soil and Slag	CT	7.1E-02	4.5E-08	B.3.4.CT
		RME	2.8E-01	1.5E-07	B.3.4.RME
Construction/Utility Worker (Future)	Soil	CT	4.6E-02	4.2E-08	B.3.4.CT
		RME	2.3E-01	1.3E-07	B.3.4.RME
Construction/Utility Worker (Future)	Slag	CT	9.3-02	4.3E-08	B.3.4.CT
		RME	6.1E-01	1.6E-07	B.3.4.RME

5.5 RISK AND HAZARD COPC CONTRIBUTIONS

The contribution to total risk and hazard of each COPC for a specific combined exposure scenario varies, depending on the COPC exposure point concentration and relative toxicity. Frequently, most of the risk estimated for an exposure scenario can be attributed to a few COPCs. The following sub-sections present a summary of the COPCs contributing the majority of risk and/or hazard at the Site.

Current/Future Trespasser

Table 5.1 presents the COPCs contributing the majority of the combined hazard for the RME current/future trespasser exposure to surface soil and slag, surface soil, and slag, through ingestion, dermal contact, and inhalation at the Site. The RME cumulative HI for surface soil and slag, surface soil, and slag, were 2.0, 1.6, and 3.9, respectively. No single compound accounts for more than 10 percent of the cumulative HI.

Future Industrial/Commercial Worker

Table 5.2 presents the COPCs contributing the majority of the combined hazard for the RME future industrial/commercial worker exposure to surface soil and slag, surface soil, and slag, through ingestion, dermal contact, and inhalation. The RME cumulative HI for surface soil and slag, surface soil, and slag, was 1.21, 0.88, and 2.43, respectively. No single compound accounts for more than 10 percent of the cumulative HI.

5.6 HAZARD ASSESSMENT FOR LEAD EXPOSURES

5.6.1 ADULT LEAD RESULTS

Lead was identified as a COPC in surface soil and slag, slag and surface water in current/future receptors; soil and slag, soil, slag and groundwater in future receptors. Pathways considered for exposure to lead were maintenance worker incidental ingestion and dermal contact of surface soil and slag, maintenance worker incidental ingestion and dermal contact of surface slag, and maintenance worker incidental ingestion and dermal contact of surface water; trespasser incidental ingestion and dermal contact of surface soil and slag, trespasser incidental ingestion and dermal contact of surface slag, and trespasser incidental ingestion and dermal contact of surface water; industrial/commercial worker incidental ingestion and dermal contact of soil and slag, industrial/commercial worker incidental ingestion and dermal contact of soil, industrial/commercial worker incidental ingestion and dermal contact of slag, and industrial/commercial worker incidental ingestion and dermal contact of surface water; construction/utility worker incidental ingestion and dermal contact of soil and slag, construction/utility worker incidental ingestion and dermal contact of soil, construction/utility worker incidental ingestion and dermal contact of slag, and construction/utility worker incidental ingestion and dermal contact of groundwater. The RME surface soil and slag lead concentration for maintenance workers was 309 µg/g. The slag lead RME concentration for maintenance workers was 1,221 µg/g and the surface water lead RME concentration was 184 µg/L. The RME surface soil and

slag lead concentration for trespassers was 309 μg/g. The slag lead RME concentration for trespassers was 1,221 μg/g and the surface water lead RME concentration was 184 μg/L. The RME soil and slag, soil, and slag lead concentration for industrial/commercial workers were 81.6 μg/g, 226 μg/g, and 133 μg/g, respectively. The RME surface water lead concentration for industrial/commercial workers was 184 μg/L. The RME soil and slag, soil, and slag lead concentration for construction/utility workers were 81.6 μg/g, 226 μg/g, and 133 μg/g, respectively. Groundwater lead concentration was 61.2 μg/L for the construction/utility workers.

The estimated 95th percentile for fetal blood lead levels for female for maintenance worker exposure to lead in surface soil, slag, and surface water; surface water; and slag and surface water, presented in Table 3.24, were 5.77, 5.58, and 6.31 μg/dL, respectively. Based on the TRW recommended fetal blood lead of 10 μg/dL, the hazard indices (HI) for maintenance workers are 0.58, 0.56, and 0.63, respectively.

The estimated 95th percentile for fetal blood lead levels for female adolescent trespasser exposure to lead in surface soil, slag, and surface water; surface water; and slag and surface water, presented in Table 3.25, were 7.11, 5.65, and 11.43 μg/dL, respectively. Based on the TRW recommended fetal blood lead of 10 μg/dL, the hazard indices (HI) for trespassers are 0.71, 0.57, and 1.1, respectively.

The estimated 95th percentile for fetal blood levels for female adult industrial/ commercial worker exposure to lead in soil and slag, soil, and slag, (combined with lead exposure in surface water), presented in Table 3.26 were 6.47, 7.81, and 6.95 μg/dL, respectively. Based on the TRW recommended fetal blood lead of 10 μg/dL, the hazard indices (HI) for industrial/commercial workers are 0.65, 0.78, and 0.7, respectively.

The 95th percentile for fetal blood lead levels estimated for female adult construction/ utility worker exposure to lead in soil and slag, soil, and slag (combined with lead exposure in groundwater) presented in Table 3.27 were 5.79, 6.14, and 5.91 μg/dL, respectively. Based on the TRW recommended fetal blood lead level of 10 μg/dL, the hazard indices (HI) for future construction/utility workers were 0.58, 0.61, and 0.59, respectively.

5.7 UNCERTAINTY ANALYSIS

The purpose of this section is to provide a summary and discussion regarding the uncertainties associated with the HHRA evaluation. The various uncertainties are discussed below in the following sections.

5.7.1 SAMPLING PROCEDURE BIAS

The sampling strategy is a factor that impacts the health evaluation for chemicals at the Site. Often in the sampling procedures, samples are taken from locations that are visibly contaminated or where contamination would be expected and not from areas of the Site that are potentially uncontaminated. This creates a sampling bias toward worst-case (higher) exposure point concentrations in the media sampled. The utilization of such biased data in the HHRA increases the conservative or health-protective nature of the health risk and hazard assessment.

The data used to estimate CT and RME scenarios for the Site were, primarily, collected in such a biased manner. The groundwater and soil samples were collected from known historic areas of known contamination, and should represent the highest COPC concentrations. Sampling rounds usually focussed on additional characterization of the more heavily contaminated areas, thus introducing a high bias in both CT and RME scenarios.

5.7.2 EXPOSURE SCENARIO ASSUMPTIONS

This section evaluates the uncertainty associated with the primary exposure scenario assumptions such as land use and frequency of exposure. Because the assumptions used in the scenarios are often not objectively based but rather are subjective estimates based on judgment, conservatism, and experience applied to available data, the tendency is to select conservative, health-protective values to guard against under-estimating exposure (and associated risks). This leads to a general over-estimation of exposure. When each individual exposure is over-estimated, the net effect is compounded. That is, the total exposure is over-estimated to an even greater degree than the individual exposures. Exposure scenarios are, therefore, conservative in nature, and thereby provide the necessary safety factor for protection of human health. It is very likely that the calculated exposure concentrations are greater than the actual exposure concentrations.

The intent of the HHRA was to estimate the potential point exposures for both the "average" [Central Tendency (CT) or Mean] and the reasonable maximum exposure (RME) exposure scenarios. In order to accomplish this goal, a series of standardized USEPA exposure assumptions were utilized, where available and applicable. In the absence of available or applicable exposure assumptions, professional judgment was used to establish necessary assumptions protective of human health. The CT exposure

scenario represents an "average" exposure scenario that is reasonably expected to occur. The RME scenario represents the reasonable maximum exposure expected to occur. The exposure scenarios (CT and RME) were developed to evaluate possible risk under both current and future land use conditions.

The major uncertainties regarding the physical exposure scenarios used in the HHRA are summarized as follows:

i) Because of limited data for most chemicals in the surface soil, the mean values (for CT) and the maximum reported values (for RME) have been used as point concentrations to estimate exposures to the trespasser population. Although the use of maximum values is generally recognized as an appropriate conservative screening approach, it should be recognized that this procedure will likely overestimate actual exposure by orders of magnitude. Use of maximum detected COPC concentrations in other exposure scenarios will lead to similar overestimates.

ii) The actual frequency of trespassing entry to the Site is unknown. As a result, USEPA default values and professional judgment were used to conservatively estimate media exposure on Site.

iii) Long-term exposure point concentrations are inherently uncertain because COPC concentrations are assumed to remain constant over time. The assumptions that the measured concentrations are equivalent during sampling and exposure over the duration of exposure will overestimate the intake and resulting risk.

iv) For most COPCs, the HHRA assumed that 100 percent absorption occurs after oral ingestion. Actual absorption rates from ingested contaminants may vary from 5 to 100 percent due to the tendency for strong adsorption of the COPCs to the ingested soil and sediment, which would reduce or prevent uptake into the body. Thus, assumption of 100 percent absorption of ingested COPCs overestimates the associated risks.

5.7.3 DOSE RESPONSE

One of the major uncertainties in estimating Site-specific risk is the application of published toxicity information. Factors introducing uncertainty associated with toxicity value application are as follows:

i) Applicability of animal toxicity data - chemicals may be assumed to be human carcinogens based on animal studies even when there is limited or no available evidence that the chemical is a human carcinogen.

ii) Differences in chemical concentrations - CSFs are derived from high concentration animal studies and therefore may not be applicable to low concentration exposures.

iii) Assumptions in toxicity values - CSFs are developed in a conservative manner.

iv) Assumptions in toxicity values (Non-carcinogenic Hazard) - RfDs are also established with conservative safety factors compared to actual studies.

5.7.4 THEORETICAL NATURE OF RISK ESTIMATES

A human health risk assessment assigns a numerical value to the excess probability (above background cancer rates) of a case of cancer developing in a population exposed to a specified amount of chemical that is a known or suspect carcinogen. This numerical value is presented as an upper limit excess cancer risk such as 1.0E-05, or one additional cancer case in a one hundred thousand people exposed to the chemical and at the specific chemical concentration for their entire lifetime, which is assumed to be 70 years. The model that is applied to calculate this numerical risk value is intentionally biased to give a high value so the true value would be lower. The Cancer Risk Model and the assumptions used to estimate exposure are protective of the most sensitive populations. The true risk is expected to be lower than that calculated, and may quite reasonably be zero. Thus risk estimates are overestimated by the HHRA methodology itself.

5.7.5 SYNERGISTIC, ADDITIVE, AND ANTAGONISTIC EFFECTS

Receptor exposure to a mixture of chemicals can in some cases lead to synergistic, additive, or antagonistic health effects. Synergistic effects occur when chemicals interact in the receptor and cause an effect significantly greater than the sum of effects of the individual chemicals. There is no apparent scientific basis to suspect that the COPCs identified at the Site will have synergistic effects. Potential synergistic effects were not evaluated in the HHRA, and thus if these are occurring, then the calculated risks and hazards may be underestimated. Alternatively, chemicals may interact in the receptor in such a way as to cause an overall effect that is less than the sum of effects of the individual chemicals. These potential antagonistic effects were not evaluated in the HHRA, and thus, if they are occurring, the calculated risks and hazards may be overestimated.

It was assumed in the HHRA that carcinogenic and non-carcinogenic effects were additive, such that individual chemical cancer risks and non-carcinogenic hazards were added to obtain a total risk and hazard estimate. All compounds were treated as if they all affect the receptor in a similar manner although if each COPC had a different mode of action, then the resulting risks would presumably be non-additive. For a conservative assessment, the potential carcinogenic risk and non-carcinogenic hazard ratios for each COPC were added to yield a total risk or hazard. Although the carcinogenic risks and non-carcinogenic hazards for individual chemicals were summed, there is no basis to suspect the toxic effects are additive. This suggests that the total calculated risks and hazards estimated for the potential Site receptors may be higher than will actually occur.

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TABLE 2.1

SELECTION OF EXPOSURE PATHWAY SCENARIOS
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe	*Medium*	*Exposure Medium*	*Exposure Point*	*Receptor Population*	*Receptor Age*	*Exposure Route*	*Type of Analysis*	*Rationale for Selection or Exclusion of Exposure Pathway*
Current	Surface Soil and Slag	Surface Soil	Direct Contact	Maintenance Worker	Adult	Ingestion Dermal Inhalation	Quant	Potential exposure to contaminated surface soil and slag while doing maintenance work.
	Surface Soil	Surface Soil	Direct Contact	Maintenance Worker	Adult	Ingestion Dermal Inhalation	Quant	Potential exposure to contaminated surface soil while doing maintenance work.
	Slag	Surface Soil	Direct Contact	Maintenance Worker	Adult	Ingestion Dermal Inhalation	Quant	Potential exposure to contaminated slag while doing maintenance work.
	Surface Water	Surface Water	Direct Contact	Maintenance Worker	Adult	Ingestion Dermal	Quant	Potential exposure to contaminated surface water while doing maintenance work.
	Sediment	Sediment	Direct Contact	Maintenance Worker	Adult	Ingestion Dermal	Quant	Potential exposure to contaminated sediment while doing maintenance work.

TABLE 2.2

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN IN SURFACE SOIL AND SLAG - CURRENT/FUTURE RECEPTORS
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/ Future
Medium: Surface Soil and Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal and inhalation

CAS Number	Chemical	Minimum (1,2) Concentration	Minimum Qualifier	Maximum (1,2) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency (2)	Range of Detection Limits (2)	Concentration Used for Screening (2)	NYSDEC TAGM 4046 (3)	R3-RBC Soil Industrial (4)	R9-PRG Soil Industrial (5)	Screening (6) Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (7) Contaminant Deletion or Selection
	Metals																		
7429-90-5	Aluminum	5030	*	113000		mg/kg	SS-3 (slag; 11/07/96)	57/57	--	113000	--	78000	76000	76000	N	N/A	N/A	X	ASC
7440-36-0	Antimony	1.7	N	339		mg/kg	SB-3A (slag; 11/07/96)	18/38	0.893 - 7.2	339	--	31	31	31	N	N/A	N/A	X	ASC
7440-38-2	Arsenic	0.67	B	45.3		mg/kg	SS-16 (0-0.167 ftbgs; slag; 07/18/03)	45/57	0.47 - 2.06	45.3	7.5	0.43	0.39	0.39	C	N/A	N/A	X	ASC
7440-39-3	Barium	27.8		1410	*	mg/kg	Green Surface Waste (11/07/96)	57/57	--	1410	300	5500	5400	300	N	N/A	N/A	X	ASC
7440-41-7	Beryllium	0.09	B	3.5		mg/kg	Green Surface Waste (11/07/96)	48/57	0.05 - 1.0	3.5	0.16	160	150	0.16	C	N/A	N/A	X	ASC
7440-43-9	Cadmium	0.0696	J	141		mg/kg	SS-3 (slag; 11/07/96)	37/57	0.17 - 1.67	141	1.0	3900	37	1.0	N	N/A	N/A	X	ASC
7440-70-2	Calcium	2450	*	217000		mg/kg	WT-108-92 (slag; 01/01/89)	39/39	--	217000	--	--	--	--	N	N/A	N/A		NUT
7440-47-3	Chromium	9.0	E	11800		mg/kg	SB-3A (slag; 11/07/96)	55/55	--	11800	10	120000	210	10	N	N/A	N/A	X	ASC
18540-29-9	Chromium VI (Hexavalent)	0.15	BN	91.6		mg/kg	WT-108-92 (slag; 01/01/89)	26/54	0.003 - 6.7	91.6	--	230	30	30	N	N/A	N/A	X	ASC
7440-48-4	Cobalt	2.9		536	B	mg/kg	SS-4 (surface soil; 11/07/96)	56/57	0.83	536	30	1600	900	30	C	N/A	N/A	X	ASC
7440-50-8	Copper	3.7	B	5420	E	mg/kg	SS-3 (slag; 11/07/96)	57/57	--	5420	25	3100	3100	25	N	N/A	N/A	X	ASC
57-12-5	Cyanide	0.176	J	0.421	J	mg/kg	SS-17 (0-0.167 ftbgs; surface soil; 07/21/03)	21/31	0.509 - 0.635	0.421	--	1600	1200	1200	N	N/A	N/A		BSC
7439-89-6	Iron	1890		51300		mg/kg	SB-3A (slag; 11/07/96)	57/57	--	51300	2000	23000	23000	2000	N	N/A	N/A	X	ASC
7439-92-1	Lead	3.6	J	1760		mg/kg	SS-3 (slag; 11/07/96)	57/57	--	1760	--	--	400 [8]	400	C	N/A	N/A	X	ASC
7439-95-4	Magnesium	354		99200		mg/kg	WT-108-92 (slag; 01/01/89)	57/57	--	99200	--	--	--	--	N	N/A	N/A		NUT
7439-96-5	Manganese	134		24400	E*	mg/kg	Green Surface Waste (11/07/96)	57/57	--	24400	--	1600	1800	1600	N	N/A	N/A	X	ASC
7439-97-6	Mercury	0.0115	J	11.8		mg/kg	B-1-GRID (0-0.25 ftbgs; surface soil; 03/01/00)	34/57	0.04 - 0.14	11.8	0.1	7.8	6.1	0.1	N	N/A	N/A	X	ASC
7440-02-0	Nickel	1.6	B	5160		mg/kg	SB-3A (slag; 11/07/96)	56/57	1.2	5160	13	1600	1600	13	N	N/A	N/A	X	ASC
7440-09-7	Potassium	336		8240		mg/kg	Green Surface Waste (11/07/96)	48/57	36.1 - 1000	8240	--	--	--	--	N	N/A	N/A		NUT
7782-49-2	Selenium	0.95	J	26.3		mg/kg	SS-15 (0-0.167 ftbgs; slag; 07/18/03)	32/55	0.943 - 23.4	26.3	2.0	390	390	2.0	N	N/A	N/A	X	ASC
7440-22-4	Silver	0.147	J	7.6	N	mg/kg	Green Surface Waste (11/07/96)	33/56	0.23 - 2.0	7.6	--	390	390	390	N	N/A	N/A		BSC
7440-23-5	Sodium	129	B	1090	B	mg/kg	B-1-GRID (0-0.25 ftbgs; surface soil; 03/01/00)	13/57	28.8 - 1000	1090	--	--	--	--	N	N/A	N/A		NUT
7440-28-0	Thallium	0.486	J	31.2		mg/kg	SS-22 (0-0.167 ftbgs; slag; 07/18/03)	24/52	0.27 - 2.3	31.2	--	5.5	5.2	5.2	N	N/A	N/A	X	ASC
7440-62-2	Vanadium	3.9	B	263		mg/kg	SS-20 (0-0.167 ftbgs; slag; 07/18/03)	57/57	--	263	150	78	78	78	N	N/A	N/A	X	ASC
7440-66-6	Zinc	9.7	J	1400		mg/kg	SS-3 (slag; 11/07/96)	55/55	--	1400	20	23000	23000	20	N	N/A	N/A	X	ASC

Notes:

(1) Minimum/maximum detected concentration.

(2) Based on data collected from surface soil and slag sampling locations: A-2-GRID, A-5-GRID, B-1-GRID, B-4A-GRID, C-0-GRID, C-5-GRID, C-12-GRID, Green Surface Waste, MOUND1-GRID, MW-101A, MW-102A, MW-103A, MW-104A, MW-105A, SB-3A, SB-9A, SB-10A, SS-1, SS-2, SS-3, SS-4, SS-5, SS-6, SS-7, SS-8, SS-9, SS-10, SS-11, SS-12, SS-13, SS-14, SS-15, SS-16, SS-17, SS-18, SS-19, SS-20, SS-21, SS-22, SS-23, SS-24, SS-25, SS-26, SS-27, SS-28, SS-29 SS-30, SS-31, SS-32, SS-33, SS-34, SS-35, SS-36, SS-37, SS-38, SS-39, SS-40, WT-105-92, WT-106-92, WT-107-92, WT-108-92.

(3) Technical and Administrative Guidance Memorandum #4046, Determination of Soil Cleanup Objectives and Cleanup Levels, NYSDEC, January 24, 1994.

(4) Region III Risk-Based Concentration (R3-RBC) Table, Soil Residential, October 8, 2004.

(5) Region IX Preliminary Remediation Goals (R9-PRG) Table, Soil Residential, October 20, 2004.

(6) Screening criterion is the lower of the NYSDEC TAGM 4046, R3-RBC Soil Residential or R9-PRG Soil Residential value.

(7) Rationale Codes
Selection Reason: Maximum detected above Screening Criterion (ASC)
Deletion Reason: Maximum detected below Screening Criterion (BSC)
Essential Nutrient (NUT)

(8) Value derived using USEPA IUEBK pharmacokinetic model.

Definitions:
C = Carcinogenic
N = Non-Carcinogenic
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
-- = Not Available
N/A = Not Applicable
J = Associated value is estimated.
E = Estimated above quantification limit.
N = Spike sample recovery not within control limits.
* = Duplicate analysis not within control limits.
B = Value greater or equal to the instrument detection limit but less than the contract required detection limit.

TABLE 2.3

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN IN SURFACE SOIL - CURRENT/FUTURE RECEPTORS
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/ Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal and Inhalation

CAS Number	Chemical	Minimum (1,2) Concentration	Minimum Qualifier	Maximum (1,2) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency (2)	Range of Detection Limits (2)	Concentration Used for Screening (2)	NYSDEC TAGM 4046 (3)	R3-RBC Soil Industrial (4)	R9-PRG Soil Industrial (5)	Screening (6) Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (7) Contaminant Deletion or Selection
	Metals																		
7429-90-5	Aluminum	5030	*	49600		mg/kg	Green Surface Waste (11/07/96)	39/39	--	49600	--	78000	76000	76000	N	N/A	N/A		BSC
7440-36-0	Antimony	1.7	BJ, N	64.9		mg/kg	SS-4 (11/07/96)	12/30	0.893 - 7.2	64.9	--	31	31	31	N	N/A	N/A	X	ASC
7440-38-2	Arsenic	0.67	B	21.9	*	mg/kg	SB-10A (11/07/96)	35/39	0.51 - 0.59	21.9	7.5	0.43	0.39	0.39	C	N/A	N/A	X	ASC
7440-39-3	Barium	35.3	B	1410	*	mg/kg	Green Surface Waste (11/07/96)	39/39	--	1410	300	5500	5400	300	N	N/A	N/A	X	ASC
7440-41-7	Beryllium	0.09	B	3.5		mg/kg	Green Surface Waste (11/07/96)	36/39	0.05 - 0.28	3.5	0.16	160	150	0.16	C	N/A	N/A	X	ASC
7440-43-9	Cadmium	0.0696	J	4.0		mg/kg	SS-5 (11/07/96)	32/39	0.17 - 0.631	4.0	1.0	3900	37	1.0	N	N/A	N/A	X	ASC
7440-70-2	Calcium	2450	*	74200		mg/kg	SS-26 (0-0.167 ftbgs; 07/18/03)	23/23	--	74200	--	--	--	--	N	N/A	N/A		NUT
7440-47-3	Chromium	9.0	E	2260		mg/kg	SS-4 (11/07/96)	39/39	--	2260	10	120000	210	10	N	N/A	N/A	X	ASC
18540-29-9	Chromium VI (Hexavalent)	0.15	BN	24.6		mg/kg	SS-2 (11/07/96)	13/37	1.0 - 6.7	24.6	--	230	30	30	N	N/A	N/A		BSC
7440-48-4	Cobalt	3.4	B	536	B	mg/kg	SS-4 (11/07/96)	38/39	0.83	536	30	1600	900	30	C	N/A	N/A	X	ASC
7440-50-8	Copper	3.7	B	104		mg/kg	B-1-GRID (0-0.25 ftbgs; 03/01/00)	39/39	--	104	25	3100	3100	25	N	N/A	N/A	X	ASC
57-12-5	Cyanide	0.193	J	0.421	J	mg/kg	SS-17 (0-0.167 ftbgs; 07/21/03)	13/19	0.532 - 0.635	0.421	--	1600	1200	1200	N	N/A	N/A		BSC
7439-89-6	Iron	1890		48200	E*	mg/kg	C-5-GRID (0-0.25 ftbgs; 03/01/00)	39/39	--	48200	2000	23000	23000	2000	N	N/A	N/A	X	ASC
7439-92-1	Lead	6.5	N*	187	*	mg/kg	MW-105A (11/07/96)	39/39	--	187	--	--	400 [8]	400	C	N/A	N/A		BSC
7439-95-4	Magnesium	2780		73100		mg/kg	SS-7 (11/07/96)	39/39	--	73100	--	--	--	--	N	N/A	N/A		NUT
7439-96-5	Manganese	134		24400	E*	mg/kg	Green Surface Waste (11/07/96)	39/39	--	24400	--	1600	1800	1600	N	N/A	N/A	X	ASC
7439-97-6	Mercury	0.0298	J	11.8		mg/kg	B-1-GRID (0-0.25 ftbgs; 03/01/00)	22/39	0.05 - 0.14	11.8	0.1	7.8	6.1	0.1	N	N/A	N/A	X	ASC
7440-02-0	Nickel	1.6	B	54.1	8	mg/kg	C-5-GRID (0-0.25 ftbgs; 03/01/00)	38/39	1.2	54.1	13	1600	1600	13	N	N/A	N/A	X	ASC
7440-09-7	Potassium	558	BE	8240		mg/kg	Green Surface Waste (11/07/96)	34/39	43.3 - 45	8240	--	--	--	--	N	N/A	N/A		NUT
7782-49-2	Selenium	0.95	J	15.9		mg/kg	Green Surface Waste (11/07/96)	18/39	0.943 - 23.1	15.9	2.0	390	390	2.0	N	N/A	N/A	X	ASC
7440-22-4	Silver	0.147	J	7.6	N	mg/kg	Green Surface Waste (11/07/96)	20/39	0.24 - 0.943	7.6	--	390	390	390	N	N/A	N/A		BSC
7440-23-5	Sodium	190	B	1090	B	mg/kg	B-1-GRID (0-0.25 ftbgs; 03/01/00)	8/39	28.8 - 150	1090	--	--	--	--	N	N/A	N/A		NUT
7440-28-0	Thallium	0.486	J	18.8		mg/kg	Green Surface Waste (11/07/96)	18/39	0.27 - 2.3	18.8	--	5.5	5.2	5.2	N	N/A	N/A	X	ASC
7440-62-2	Vanadium	3.9	B	71.2		mg/kg	SS-4 (11/07/96)	39/39	--	71.2	150	78	78	78	N	N/A	N/A		BSC
7440-66-6	Zinc	12.7		633	E	mg/kg	C-5-GRID (0-0.25 ftbgs; 03/01/00)	39/39	--	633	20	23000	23000	20	N	N/A	N/A	X	ASC

Notes:

(1) Minimum/maximum detected concentration.

(2) Based on data collected from surface soil sampling locations: A-2-GRID, A-5-GRID, B-1-GRID, B-4A-GRID, C-0-GRID, C-5-GRID, C-12-GRID, Green Surface Waste, MOUND1-GRID, MW-101A, MW-102A, MW-103A, MW-104A, MW-105A, SB-9A, SB-10A, SS-1, SS-2, SS-4, SS-5, SS-6, SS-7, SS-8, SS-9, SS-10, SS-11, SS-12, SS-13, SS-14, SS-17, SS-18, SS-19, SS-21, SS-25, SS-26, SS-28, SS-29, SS-33, SS-34, SS-35, SS-36, SS-38, SS-39.

(3) Technical and Administrative Guidance Memorandum #4046, Determination of Soil Cleanup Objectives and Cleanup Levels, NYSDEC, January 24, 1994.

(4) Region III Risk-Based Concentration (R3-RBC) Table, Soil Residential, October 8, 2004.

(5) Region IX Preliminary Remediation Goals (R9-PRG) Table, Soil Residential, October 20, 2004.

(6) Screening criterion is the lower of the NYSDEC TAGM 4046, R3-RBC Soil Residential or R9-PRG Soil Residential value.

(7) Rationale Codes
Selection Reason: Maximum detected above Screening Criterion (ASC)
Deletion Reason: Maximum detected below Screening Criterion (BSC)
Essential Nutrient (NUT)

(8) Value derived using USEPA IUEBK pharmacokinetic model.

Definitions:
C = Carcinogenic
N = Non-Carcinogenic
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
-- = Not Available
N/A = Not Applicable
J = Associated value is estimated.
E = Estimated above quantification limit.
N = Spike sample recovery not within control limits.
* = Duplicate analysis not within control limits.
B = Value greater or equal to the instrument detection limit but less than the contract required detection limit.

TABLE 2.4

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN IN SLAG - CURRENT/FUTURE RECEPTORS
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/ Future
Medium: Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal and Inhalation

CAS Number	Chemical	Minimum (1,2) Concentration	Minimum Qualifier	Maximum (1,2) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency (2)	Range of Detection Limits (2)	Concentration Used for Screening (2)	NYSDEC TAGM 4046 (3)	R3-RBC Soil Industrial (4)	R9-PRG Soil Industrial (5)	Screening (6) Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (7) Contaminant Deletion or Selection
	Metals																		
7429-90-5	Aluminum	5960		113000		mg/kg	SS-3 (11/07/96)	18/18	--	113000	--	78000	76000	76000	N	N/A	N/A	X	ASC
7440-36-0	Antimony	22.3		339		mg/kg	SB-3A (11/07/96)	6/8	0.98 - 2.2	339	--	31	31	31	N	N/A	N/A	X	ASC
7440-38-2	Arsenic	2.46		45.3		mg/kg	SS-16 (0-0.167 ftbgs; 07/18/03)	10/18	0.47 - 2.06	45.3	7.5	0.43	0.39	0.39	C	N/A	N/A	X	ASC
7440-39-3	Barium	27.8		675		mg/kg	SS-24 (0-0.167 ftbgs; 07/18/03)	18/18	--	675	300	5500	5400	300	N	N/A	N/A	X	ASC
7440-41-7	Beryllium	0.186	J	1.1		mg/kg	WT-105-92 (01/01/89)	12/18	0.05 - 1.0	1.1	0.16	160	150	0.16	C	N/A	N/A	X	ASC
7440-43-9	Cadmium	0.191	J	141		mg/kg	SS-3 (11/07/96)	5/18	0.49 - 1.67	141	1.0	3900	37	1.0	N	N/A	N/A	X	ASC
7440-70-2	Calcium	5370		217000		mg/kg	WT-108-92 (01/01/89)	16/16	--	217000	--	--	--	--	N	N/A	N/A		NUT
7440-47-3	Chromium	278		11800		mg/kg	SB-3A (11/07/96)	16/16	--	11800	10	120000	210	10	N	N/A	N/A	X	ASC
18540-29-9	Chromium VI (Hexavalent)	0.5		91.6		mg/kg	WT-108-92 (01/01/89)	13/17	0.003 - 5.6	91.6	--	230	30	30	N	N/A	N/A	X	ASC
7440-48-4	Cobalt	2.9		72.3		mg/kg	SB-3A (11/07/96)	18/18	--	72.3	30	1600	900	30	C	N/A	N/A	X	ASC
7440-50-8	Copper	7.0		5420	E	mg/kg	SS-3 (11/07/96)	18/18	--	5420	25	3100	3100	25	N	N/A	N/A	X	ASC
57-12-5	Cyanide	0.176	J	0.309	J	mg/kg	SS-32 (0-0.167 ftbgs; 07/18/03)	8/12	0.509 - 0.587	0.309	--	1600	1200	1200	N	N/A	N/A		BSC
7439-89-6	Iron	2390		51300		mg/kg	SB-3A (11/07/96)	18/18	--	51300	2000	23000	23000	2000	N	N/A	N/A	X	ASC
7439-92-1	Lead	3.6	J	1760		mg/kg	SS-3 (11/07/96)	18/18	--	1760	--	--	400 [8]	400	C	N/A	N/A	X	ASC
7439-95-4	Magnesium	354		99200		mg/kg	WT-108-92 (01/01/89)	18/18	--	99200	--	--	--	--	N	N/A	N/A		NUT
7439-96-5	Manganese	288		8990		mg/kg	SS-15 (0-0.167 ftbgs; 07/18/03)	18/18	--	8990	--	1600	1800	1600	N	N/A	N/A	X	ASC
7439-97-6	Mercury	0.0115	J	0.375		mg/kg	SS-40 (0-0.167 ftbgs; 07/18/03)	12/18	0.04 - 0.05	0.375	0.1	7.8	6.1	0.1	N	N/A	N/A	X	ASC
7440-02-0	Nickel	8.6	J	5160		mg/kg	SB-3A (11/07/96)	18/18	--	5160	13	1600	1600	13	N	N/A	N/A	X	ASC
7440-09-7	Potassium	336		2730		mg/kg	SS-32 (0-0.167 ftbgs; 07/18/03)	14/18	36.1 - 1000	2730	--	--	--	--	N	N/A	N/A		NUT
7782-49-2	Selenium	2.0		26.3		mg/kg	SS-15 (0-0.167 ftbgs; 07/18/03)	14/16	1	26.3	2.0	390	390	2.0	N	N/A	N/A	X	ASC
7440-22-4	Silver	0.215	J	4.38		mg/kg	SS-15 (0-0.167 ftbgs; 07/18/03)	13/17	0.23 - 2.0	4.38	--	390	390	390	N	N/A	N/A		BSC
7440-23-5	Sodium	129	B	836		mg/kg	WT-105-92 (01/01/89)	5/18	29.1 - 1000	836	--	--	--	--	N	N/A	N/A		NUT
7440-28-0	Thallium	0.82	B	31.2		mg/kg	SS-22 (0-0.167 ftbgs; 07/18/03)	6/13	0.64 - 1.26	31.2	--	5.5	5.2	5.2	N	N/A	N/A	X	ASC
7440-62-2	Vanadium	5.4		263		mg/kg	SS-20 (0-0.167 ftbgs; 07/18/03)	18/18	--	263	150	78	78	78	N	N/A	N/A	X	ASC
7440-66-6	Zinc	9.7	J	1400		mg/kg	SS-3 (11/07/96)	16/16	--	1400	20	23000	23000	20	N	N/A	N/A	X	ASC

Notes:

(1) Minimum/maximum detected concentration.

(2) Based on data collected from slag sampling locations: SB-3A, SS-3, SS-15, SS-16, SS-20, SS-22, SS-23, SS-24, SS-27, SS-30, SS-32, SS-32, SS-37, SS-40, WT-105-92, WT-106-92, WT-107-92, WT-108-92.

(3) Technical and Administrative Guidance Memorandum #4046, Determination of Soil Cleanup Objectives and Cleanup Levels, NYSDEC, January 24, 1994.

(4) Region III Risk-Based Concentration (R3-RBC) Table, Soil Residential, October 8, 2004.

(5) Region IX Preliminary Remediation Goals (R9-PRG) Table, Soil Residential, October 20, 2004.

(6) Screening criterion is the lower of the NYSDEC TAGM 4046, R3-RBC Soil Residential or R9-PRG Soil Residential value.

(7) Rationale Codes
Selection Reason: Maximum detected above Screening Criterion (ASC)
Deletion Reason: Maximum detected below Screening Criterion (BSC)
Essential Nutrient (NUT)

(8) Value derived using USEPA IUEBK pharmacokinetic model.

Definitions:
C = Carcinogenic
N = Non-Carcinogenic
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
-- = Not Available
N/A = Not Applicable
J = Associated value is estimated.
E = Estimated above quantification limit.
B = Value greater or equal to the instrument detection limit but less than the contract required detection limit.

TABLE 2.5

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN IN SOIL AND SLAG - FUTURE RECEPTORS
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Soil and Slag (0-10 ftbgs)
Exposure Medium: Soil
Exposure Point: Ingestion, Dermal and Inhalation

CAS Number	Chemical	Minimum (1,2) Concentration	Minimum Qualifier	Maximum (1,2) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency (2)	Range of Detection Limits (2)	Concentration Used for Screening (2)	NYSDEC TAGM 4046 (3)	R3-RBC Soil Industrial (4)	R9-PRG Soil Industrial (5)	Screening (6) Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (7) Contaminant Deletion or Selection
	Metals																		
7429-90-5	Aluminum	1500		113000		mg/kg	SS-3 (surface slag; 11/07/96)	105/105	--	113000	--	1000000	100000	100000	N	N/A	N/A	X	ASC
7440-36-0	Antimony	1.7	N	339		mg/kg	SB-3A (surface slag; 11/07/96)	44/86	0.893 - 24.2	339	--	410	410	410	N	N/A	N/A		BSC
7440-38-2	Arsenic	0.34	B	70		mg/kg	MW-20 (4.5-6.0 ftbgs; slag; 07/25/03)	85/105	0.47 - 2.06	70	7.5	1.9	1.6	1.6	C	N/A	N/A	X	ASC
7440-39-3	Barium	11.3	J	1410	*	mg/kg	Green Surface Waste (surface soil; 11/07/96)	105/105	--	1410	300	72000	67000	300	N	N/A	N/A	X	ASC
7440-41-7	Beryllium	0.06	B	3.5		mg/kg	Green Surface Waste (surface soil; 11/07/96)	86/105	0.05 - 1.0	3.5	0.16	2000	1900	0.16	C	N/A	N/A	X	ASC
7440-43-9	Cadmium	0.0609	J	141		mg/kg	SS-3 (surface slag; 11/07/96)	57/105	0.17 - 1.67	141	1.0	510	450	1.0	N	N/A	N/A	X	ASC
7440-70-2	Calcium	2100	*	249000		mg/kg	MW-18 (2-4 ftbgs; slag; 07/28/03)	68/68	--	249000	--	--	--	--	N	N/A	N/A		NUT
7440-47-3	Chromium	4.9		11800		mg/kg	SB-3A (surface slag; 11/07/96)	103/103	--	11800	10	1500000	450	10	N	N/A	N/A	X	ASC
18540-29-9	Chromium VI (Hexavalent)	0.15	BN	430		mg/kg	MW-21 (8-10 ftbgs; slag; 07/28/03)	52/98	0.003 - 6.7	430	--	3100	64	64	N	N/A	N/A	X	ASC
7440-48-4	Cobalt	0.265	J	536	B	mg/kg	SS-4 (surface soil; 11/07/96)	101/105	0.83 - 3.3	536	30	20000	1900	30	C	N/A	N/A	X	ASC
7440-50-8	Copper	2.31	J	5420	E	mg/kg	SS-3 (surface slag; 11/07/96)	104/105	2.47	5420	25	41000	41000	25	N	N/A	N/A	X	ASC
57-12-5	Cyanide	0.176	J	1.4		mg/kg	MW-20 (4.5-6.0 ftbgs; slag; 07/25/03)	26/52	0.495 - 0.826	1.4	--	20000	12000	12000	N	N/A	N/A		BSC
7439-89-6	Iron	533		123000	E*	mg/kg	B1/B2COMP-GRID (0.25-1.0 ftbgs; soil; 03/01/00)	105/105	--	123000	2000	310000	100000	2000	N	N/A	N/A	X	ASC
7439-92-1	Lead	1.25		1870		mg/kg	B1/B2COMP-GRID (0.25-1.0 ftbgs; soil; 03/01/00)	102/105	0.63 - 0.75	1870	--	--	800 [8]	800	C	N/A	N/A	X	ASC
7439-95-4	Magnesium	354		118000		mg/kg	MW-21 (8-10 ftbgs; slag; 07/28/03)	105/105	--	118000	--	--	--	--	N	N/A	N/A		NUT
7439-96-5	Manganese	134		78300	E*	mg/kg	SB-4B (2-4 ftbgs; slag; 11/07/96)	105/105	--	78300	--	20000	19000	19000	N	N/A	N/A	X	ASC
7439-97-6	Mercury	0.0108	J	16.8		mg/kg	B1/B2COMP-GRID (0.25-1.0 ftbgs; soil; 03/01/00)	53/105	0.0284 - 0.16	16.8	0.1	100	62	0.1	N	N/A	N/A	X	ASC
7440-02-0	Nickel	1.6	B	5160		mg/kg	SB-3A (surface slag; 11/07/96)	101/105	0.31 - 5.6	5160	13	20000	20000	13	N	N/A	N/A	X	ASC
7440-09-7	Potassium	42		8240		mg/kg	Green Surface Waste (surface soil; 11/07/96)	86/105	24.1 - 1000	8240	--	--	--	--	N	N/A	N/A		NUT
7782-49-2	Selenium	0.95	J	40.4		mg/kg	SB-4B (2-4 ftbgs; slag; 11/07/96)	49/103	0.943 - 24.2	40.4	2.0	5100	5100	2.0	N	N/A	N/A	X	ASC
7440-22-4	Silver	0.147	J	11.9	N	mg/kg	SB-4B (2-4 ftbgs; slag; 11/07/96)	48/104	0.23 - 2.0	11.9	--	5100	5100	5100	N	N/A	N/A		BSC
7440-23-5	Sodium	83.7	J	1750		mg/kg	C-5-GRID (soil; 03/01/00)	47/105	28.8 - 2420	1750	--	--	--	--	N	N/A	N/A		NUT
7440-28-0	Thallium	0.486	J	89.6		mg/kg	MW-20 (4.5-6.0 ftbgs; slag; 07/25/03)	29/101	0.24 - 10.6	89.6	--	72	67	67	N	N/A	N/A	X	ASC
7440-62-2	Vanadium	3.9	B	278		mg/kg	SB-6B (7-8 ftbgs; slag; 11/07/96)	105/105	--	278	150	1000	1000	150	N	N/A	N/A	X	ASC
7440-66-6	Zinc	9.7	J	1400		mg/kg	SS-3 (surface slag; 11/07/96)	102/103	1.86	1400	20	310000	100000	20	N	N/A	N/A	X	ASC

Notes:

(1) Minimum/maximum detected concentration.

(2) Based on data collected from soil and slag sampling locations: A-2-GRID, A-5-GRID, B-1-GRID, B-4A-GRID, C-0-GRID, C-5-GRID, C-12-GRID, Green Surface Waste, MOUND1-GRID, MW-101A, MW-102A, MW-103A, MW-104A, MW-105A, SB-3A, SB-9A, SB-10A, SS-1, SS-2, SS-3, SS-4, SS-5, SS-6, SS-7, SS-8, SS-9, SS-10, SS-11, SS-12, SS-13, SS-14, SS-15, SS-16, SS-17, SS-18, SS-19, SS-20, SS-21, SS-22, SS-23, SS-24, SS-25, SS-26, SS-27, SS-28, SS-29, SS-30, SS-31, SS-31, SS-33, SS-34, SS-35, SS-36, SS-37, SS-38, SS-39, SS-40, WT-105-92, WT-106-92, WT-107-92, WT-108-92, B-1A, B-2, B-2-GRID, B-3, BH-12, B1/B2COMP-GRID, MW-15, MW-16, MW-18, MW-20, MW-21, MW-22, MW-23, MW-25, MW-25, MW-26, MW-27, MW-28, TP-1, TP-2, SB-1B, SB-2B, SB-2C, SB-3B, SB-4B, SB-4C, SB-5C, SB-6B, SB-6C, SB-12E.

(3) Technical and Administrative Guidance Memorandum #4046, Determination of Soil Cleanup Objectives and Cleanup Levels, NYSDEC, January 24, 1994.

(4) Region III Risk-Based Concentration (R3-RBC) Table, Soil Industrial, October 8, 2004.

(5) Region IX Preliminary Remediation Goals (R9-PRG) Table, Soil Industrial, October 20, 2004.

(6) Screening criterion is the lower of the NYSDEC TAGM 4046, R3-RBC Soil Industrial or R9-PRG Soil Industrial value.

(7) Rationale Codes
Selection Reason: Maximum detected above Screening Criterion (ASC)
Deletion Reason: Maximum detected below Screening Criterion (BSC)
Essential Nutrient (NUT)

(8) Value derived using USEPA IUEBK pharmacokinetic model.

Definitions:
C = Carcinogenic
N = Non-Carcinogenic
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
-- = Not Available
N/A = Not Applicable
J = Associated value is estimated.
E = Estimated above quantification limit.
N = Spike sample recovery not within control limits.
* = Duplicate analysis not within control limits.
B = Value greater or equal to the instrument detection limit but less than the contract required detection limit.

TABLE 2.6

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN IN SOIL - FUTURE RECEPTORS
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Ingestion, Dermal and Inhalation

CAS Number	Chemical	Minimum (1,2) Concentration	Minimum Qualifier	Maximum (1,2) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency (2)	Range of Detection Limits (2)	Concentration Used for Screening (2)	NYSDEC TAGM 4046 (3)	R3-RBC Soil Industrial (4)	R9-PRG Soil Industrial (5)	Screening (6) Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (7) Contaminant Deletion or Selection
	Metals																		
7429-90-5	Aluminum	1500		49600		mg/kg	Green Surface Waste (surface soil; 11/07/96)	81/81	--	49600	--	1000000	100000	100000	N	N/A	N/A		BSC
7440-36-0	Antimony	1.6	B	64.9		mg/kg	SS-4 (surface soil; 11/07/96)	19/72	0.736 - 7.2	64.9	--	410	410	410	N	N/A	N/A		BSC
7440-38-2	Arsenic	0.67	B	21.9	*	mg/kg	SB-10A (surface soil; 11/07/96)	76/81	0.51 - 1.1	21.9	7.5	1.9	1.6	1.6	C	N/A	N/A	X	ASC
7440-39-3	Barium	11.3	J	1410	*	mg/kg	Green Surface Waste (surface soil; 11/07/96)	81/81	--	1410	300	72000	67000	300	N	N/A	N/A	X	ASC
7440-41-7	Beryllium	0.09	B	3.5		mg/kg	Green Surface Waste (surface soil; 11/07/96)	76/81	0.05 - 0.28	3.5	0.16	2000	1900	0.16	C	N/A	N/A	X	ASC
7440-43-9	Cadmium	0.0609	J	5.4		mg/kg	SB-6C (8-9 ftbgs; soil; 11/07/96)	53/81	0.17 - 0.631	5.4	1.0	510	450	1.0	N	N/A	N/A	X	ASC
7440-70-2	Calcium	2100	*	163000		mg/kg	BH-12 (8-10 ftbgs; soil; 07/23/03)	47/47	--	163000	--	--	--	--	N	N/A	N/A		NUT
7440-47-3	Chromium	4.9		2260		mg/kg	SS-4 (surface soil; 11/07/96)	81/81	--	2260	10	1500000	450	10	N	N/A	N/A	X	ASC
18540-29-9	Chromium VI (Hexavalent)	0.15	BN	24.6		mg/kg	SS-2 (surface soil; 11/07/96)	20/70	1.0 - 6.7	24.6	--	3100	64	64	N	N/A	N/A		BSC
7440-48-4	Cobalt	1.47	J	536	B	mg/kg	SS-4 (surface soil; 11/07/96)	80/81	0.83	536	30	20000	1900	30	C	N/A	N/A	X	ASC
7440-50-8	Copper	3.7	B	257		mg/kg	B1/B2COMP-GRID (0.25-1.0 ftbgs; soil; 03/01/00)	81/81	--	257	25	41000	41000	25	N	N/A	N/A	X	ASC
57-12-5	Cyanide	0.193	J	0.937		mg/kg	MW-16 (2-4 ftbgs; soil; 07/27/03)	14/35	0.495 - 0.635	0.937	--	20000	12000	12000	N	N/A	N/A		BSC
7439-89-6	Iron	1890		123000	E*	mg/kg	B1/B2COMP-GRID (0.25-1.0 ftbgs; soil; 03/01/00)	81/81	--	123000	2000	310000	100000	2000	N	N/A	N/A	X	ASC
7439-92-1	Lead	5.1	*	1870	*	mg/kg	B1/B2COMP-GRID (0.25-1.0 ftbgs; soil; 03/01/00)	81/81	--	1870	--	--	800 [8]	800	C	N/A	N/A	X	ASC
7439-95-4	Magnesium	2600	*	101000		mg/kg	BH-12 (8-10 ftbgs; soil; 07/23/03)	81/81	--	101000	--	--	--	--	N	N/A	N/A		NUT
7439-96-5	Manganese	134		24400	E*	mg/kg	Green Surface Waste (surface soil; 11/07/96)	81/81	--	24400	--	20000	19000	19000	N	N/A	N/A	X	ASC
7439-97-6	Mercury	0.0108	J	16.8		mg/kg	B1/B2COMP-GRID (0.25-1.0 ftbgs; soil; 03/01/00)	36/81	0.0284 - 0.14	16.8	0.1	100	62	0.1	N	N/A	N/A	X	ASC
7440-02-0	Nickel	1.6	B	54.1	*	mg/kg	C-5-GRID (0-0.25 ftbgs; surface soil; 03/01/00)	80/81	1.2	54.1	13	20000	20000	13	N	N/A	N/A	X	ASC
7440-09-7	Potassium	101	BE	8240		mg/kg	Green Surface Waste (surface soil; 11/07/96)	76/81	43.3 - 45	8240	--	--	--	--	N	N/A	N/A		NUT
7782-49-2	Selenium	0.95	J	15.9		mg/kg	Green Surface Waste (surface soil; 11/07/96)	39/81	0.943 - 23.1	15.9	2.0	5100	5100	2.0	N	N/A	N/A	X	ASC
7440-22-4	Silver	0.147	J	7.6	N	mg/kg	Green Surface Waste (surface soil; 11/07/96)	27/81	0.23 - 1.22	7.6	--	5100	5100	5100	N	N/A	N/A		BSC
7440-23-5	Sodium	105	B	1750		mg/kg	C-5-GRID (soil; 03/01/00)	42/81	28.8 - 150	1750	--	--	--	--	N	N/A	N/A		NUT
7440-28-0	Thallium	0.486	J	18.8		mg/kg	Green Surface Waste (surface soil; 11/07/96)	18/81	0.24 - 3.72	18.8	--	72	67	67	N	N/A	N/A		BSC
7440-62-2	Vanadium	3.9	B	71.2		mg/kg	SS-4 (surface soil; 11/07/96)	81/81	--	71.2	150	1000	1000	150	N	N/A	N/A		BSC
7440-66-6	Zinc	12.7		1090	E	mg/kg	B1/B2COMP-GRID (0.25-1.0 ftbgs; soil; 03/01/00)	81/81	--	1090	20	310000	100000	20	N	N/A	N/A	X	ASC

Notes:

(1) Minimum/maximum detected concentration.

(2) Based on data collected from soil sampling locations: A-2-GRID, A-5-GRID, B-1-GRID, B-4A-GRID, C-0-GRID, C-5-GRID, C-12-GRID, Green Surface Waste, MOUND1-GRID, MW-101A, MW-102A, MW-103A, MW-104A, MW-105A, SB-9A, SB-10A, SS-1, SS-2, SS-4, SS-5, SS-6, SS-7, SS-8, SS-9, SS-10, SS-11, SS-12, SS-13, SS-14, SS-17, SS-18, SS-19, SS-21, SS-25, SS-26, SS-28, SS-29, SS-33, SS-34, SS-35, SS-36, SS-38, SS-39, B-2, B-2-GRID, B-3, BH-12, B1/B2COMP-GRID, MW-15, MW-16, MW-17, MW-19, MW-20, MW-22, MW-23, MW-24, MW-25, MW-26, MW-27, MW-28, SB-2C, SB-3C, SB-4C, SB-5C, SB-6C, SB-7C, SB-8C, SB-9C, SB-10C, SB-11C, SB-12C.

(3) Technical and Administrative Guidance Memorandum #4046, Determination of Soil Cleanup Objectives and Cleanup Levels, NYSDEC, January 24, 1994.

(4) Region III Risk-Based Concentration (R3-RBC) Table, Soil Industrial, October 8, 2004.

(5) Region IX Preliminary Remediation Goals (R9-PRG) Table, Soil Industrial, October 20, 2004.

(6) Screening criterion is the lower of the NYSDEC TAGM 4046, R3-RBC Soil Industrial or R9-PRG Soil Industrial value.

(7) Rationale Codes
Selection Reason: Maximum detected above Screening Criterion (ASC)
Deletion Reason: Maximum detected below Screening Criterion (BSC)
Essential Nutrient (NUT)

(8) Value derived using USEPA IUEBK pharmacokinetic model.

Definitions:
C = Carcinogenic
N = Non-Carcinogenic
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
-- = Not Available
N/A = Not Applicable
J = Associated value is estimated.
E = Estimated above quantification limit.
N = Spike sample recovery not within control limits.
* = Duplicate analysis not within control limits.
B = Value greater or equal to the instrument detection limit but less than the contract required detection limit.

TABLE 2.7

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN IN SLAG - FUTURE RECEPTORS
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Slag
Exposure Medium: Soil
Exposure Point: Ingestion, Dermal and Inhalation

CAS Number	Chemical	Minimum (1,2) Concentration	Minimum Qualifier	Maximum (1,2) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency (2)	Range of Detection Limits (2)	Concentration Used for Screening (2)	NYSDEC TAGM 4046 (3)	R3-RBC Soil Industrial (4)	R9-PRG Soil Industrial (5)	Screening (6) Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (7) Contaminant Deletion or Selection
	Metals																		
7429-90-5	Aluminum	5100		113000		mg/kg	SS-3 (surface slag; 11/07/96)	56/56	--	113000	--	1000000	100000	100000	N	N/A	N/A	X	ASC
7440-36-0	Antimony	1.77	J	339		mg/kg	SB-3A (surface slag; 11/07/96)	37/46	0.98 - 24.2	339	--	410	410	410	N	N/A	N/A		BSC
7440-38-2	Arsenic	0.34	B	70		mg/kg	MW-20 (4.5-6.0 ftbgs; slag; 07/25/03)	34/56	0.47 - 2.06	70	7.5	1.9	1.6	1.6	C	N/A	N/A	X	ASC
7440-39-3	Barium	16	B	675		mg/kg	SS-24 (0-0.167 ftbgs; surface slag; 07/18/03)	56/56	--	675	300	72000	67000	300	N	N/A	N/A	X	ASC
7440-41-7	Beryllium	0.06	B	3.04		mg/kg	BH-12 (4.0-6.5 ftbgs; slag; 07/23/03)	36/56	0.05 - 1.0	3.04	0.16	2000	1900	0.16	C	N/A	N/A	X	ASC
7440-43-9	Cadmium	0.191	J	141		mg/kg	SS-3 (surface slag; 11/07/96)	17/56	0.24 - 1.67	141	1.0	510	450	1.0	N	N/A	N/A	X	ASC
7440-70-2	Calcium	5370		249000		mg/kg	MW-18 (2-4 ftbgs; slag; 07/28/03)	31/31	--	249000	--	--	--	--	N	N/A	N/A		NUT
7440-47-3	Chromium	17.6	E	11800		mg/kg	SB-3A (surface slag; 11/07/96)	54/54	--	11800	10	1500000	450	10	N	N/A	N/A	X	ASC
18540-29-9	Chromium VI (Hexavalent)	0.08	BN	430		mg/kg	MW-21 (8-10 ftbgs; slag; 07/28/03)	44/54	0.003 - 5.6	430	--	3100	64	64	N	N/A	N/A	X	ASC
7440-48-4	Cobalt	0.265	J	132		mg/kg	SB-4B (2-4 ftbgs; slag; 11/07/96)	52/56	2.4 - 3.3	132	30	20000	1900	30	C	N/A	N/A	X	ASC
7440-50-8	Copper	1.8	B*	5420	E	mg/kg	SS-3 (surface slag; 11/07/96)	55/56	2.47	5420	25	41000	41000	25	N	N/A	N/A	X	ASC
57-12-5	Cyanide	0.176	J	1.4		mg/kg	MW-20 (4.5-6.0 ftbgs; slag; 07/25/03)	12/27	0.509 - 0.826	1.4	--	20000	12000	12000	N	N/A	N/A		BSC
7439-89-6	Iron	533		65500		mg/kg	MW-25 (2-3 ftbgs; slag; 07/23/03)	56/56	--	65500	2000	310000	100000	2000	N	N/A	N/A	X	ASC
7439-92-1	Lead	1.25		1760		mg/kg	SS-3 (surface slag; 11/07/96)	48/56	0.63 - 0.98	1760	--	--	800 (8)	800	C	N/A	N/A	X	ASC
7439-95-4	Magnesium	354		118000		mg/kg	MW-21 (8-10 ftbgs; slag; 07/28/03)	56/56	--	118000	--	--	--	--	N	N/A	N/A		NUT
7439-96-5	Manganese	131		78300	E*	mg/kg	SB-4B (2-4 ftbgs; slag; 11/07/96)	56/56	--	78300	--	20000	19000	19000	N	N/A	N/A	X	ASC
7439-97-6	Mercury	0.0115	J	0.375		mg/kg	SS-40 (0-0.167 ftbgs; surface slag; 07/18/03)	20/56	0.0358 - 0.16	0.375	0.1	100	62	0.1	N	N/A	N/A	X	ASC
7440-02-0	Nickel	3.2	B	5160		mg/kg	SB-3A (surface slag; 11/07/96)	47/56	0.31 - 5.6	5160	13	20000	20000	13	N	N/A	N/A	X	ASC
7440-09-7	Potassium	42		3730		mg/kg	MW-18 (12-14 ftbgs; slag; 07/28/03)	34/56	24.1 - 1000	3730	--	--	--	--	N	N/A	N/A		NUT
7782-49-2	Selenium	1.6		40.4		mg/kg	SB-4B (2-4 ftbgs; slag; 11/07/96)	28/54	0.429 - 24.2	40.4	2.0	5100	5100	2.0	N	N/A	N/A	X	ASC
7440-22-4	Silver	0.215	J	11.9	N	mg/kg	SB-4B (2-4 ftbgs; slag; 11/07/96)	24/55	0.23 - 2.0	11.9	--	5100	5100	5100	N	N/A	N/A		BSC
7440-23-5	Sodium	83.7	J	836		mg/kg	WT-105-92 (surface slag; 01/01/89)	21/56	29.1 - 2420	836	--	--	--	--	N	N/A	N/A		NUT
7440-28-0	Thallium	0.792	J	89.6		mg/kg	MW-20 (4.5-6.0 ftbgs; slag; 07/25/03)	11/52	0.24 - 10.6	89.6	--	72	67	67	N	N/A	N/A	X	ASC
7440-62-2	Vanadium	5.4		278		mg/kg	SB-6B (7-8 ftbgs; slag; 11/07/96)	56/56	--	278	150	1000	1000	150	N	N/A	N/A	X	ASC
7440-66-6	Zinc	4.7	B	1400		mg/kg	SS-3 (surface slag; 11/07/96)	53/54	1.86	1400	20	310000	100000	20	N	N/A	N/A	X	ASC

Notes:

(1) Minimum/maximum detected concentration.

(2) Based on data collection from slag sampling locations: SS-3, SS-15, SS-16, SS-20, SS-22, SS-23, SS-24, SS-27, SS-30, SS-31, SS-32, SS-37, SS-40, WT-105-92, WT-106-92, WT-107-92, WT-108-92, MW-18, MW-19, MW-20, MW-21, MW-22, MW-23, MW-24, MW-25, MW-26, MW-27, MW-28, MW-104A, B-1A, B-2, B-3, BH-12, SB-1B, SB-2B, SB-3A, SB-3B, SB-4B, SB-6B, SB-7B, SB-8B, SB-9B, SB-10B, SB-11B, SB-12B, SB-12D, SB-12E, TP-1, TP-2, Next to TP-20.

(3) Technical and Administrative Guidance Memorandum #4046, Determination of Soil Cleanup Objectives and Cleanup Levels, NYSDEC, January 24, 1994.

(4) Region III Risk-Based Concentration (R3-RBC) Table, Soil Industrial, October 8, 2004.

(5) Region IX Preliminary Remediation Goals (R9-PRG) Table, Soil Industrial, October 20, 2004.

(6) Screening criterion is the lower of the NYSDEC TAGM 4046, R3-RBC Soil Industrial or R9-PRG Soil Industrial value.

(7) Rationale Codes
Selection Reason: Maximum detected above Screening Criterion (ASC)
Deletion Reason: Maximum detected below Screening Criterion (BSC)
Essential Nutrient (NUT)

(8) Value derived using USEPA IUEBK pharmacokinetic model.

Definitions:
C = Carcinogenic
N = Non-Carcinogenic
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
-- = Not Available
N/A = Not Applicable
J = Associated value is estimated.
E = Estimated above quantification limit.
N = Spike sample recovery not within control limits.
* = Duplicate analysis not within control limits.
B = Value greater or equal to the instrument detection limit but less than the contract required detection limit.

TABLE 2.8

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN IN GROUNDWATER - FUTURE RECEPTORS
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Ingestion and Dermal

CAS Number	Chemical	Minimum (1,2) Concentration	Minimum Qualifier	Maximum (1,2) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency (2)	Range of Detection Limits (2)	Concentration Used for Screening (2)	NYSDOH MCLs (3)	R3-RBC Tap Water (4)	R9-PRG Tap Water (5)	Screening (6) Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (7) Contaminant Deletion or Selection
	Dissolved Metals																		
7429-90-5	Aluminum	0.0384		1.82		mg/L	MW-20 (Shallow; 10/01/03)	9/14	0.2	1.82	--	37	36	36	N	N/A	N/A		BSC
7440-36-0	Antimony	0.00817	J	0.00915	J	mg/L	MW-27 (Shallow; 10/03/03)	2/14	0.01	0.00915	0.006	0.015	0.015	0.006	N	N/A	N/A	X	ASC
7440-38-2	Arsenic	0.0112	J	0.0232	J	mg/L	MW-20 (Shallow; 08/18/03)	8/14	0.025	0.0232	0.05	0.000045	0.000045	0.000045	C	N/A	N/A	X	ASC
7440-39-3	Barium	0.06		0.208		mg/L	MW-23 (Shallow; 08/20/03)	14/14	--	0.208	2.0	2.6	2.6	2.0	N	N/A	N/A		BSC
7440-70-2	Calcium	66.8		732		mg/L	MW-23 (Shallow; 08/20/03)	14/14	--	732	--	--	--	--	N	N/A	N/A		NUT
7440-47-3	Chromium	0.000817		0.106		mg/L	MW-23 (Shallow; 08/20/03)	10/14	0.01	0.106	0.1	55	55	0.1	N	N/A	N/A	X	ASC
18540-29-9	Chromium VI (Hexavalent)	0.008	J	0.09		mg/L	MW-23 (Shallow; 08/20/03)	3/14	0.01	0.09	--	0.11	0.11	0.11	N	N/A	N/A		BSC
7440-48-4	Cobalt	0.000855	J	0.00135	J	mg/L	MW-15 (Shallow; 08/15/03)	4/14	0.02	0.00135	--	0.73	0.73	0.73	C	N/A	N/A		BSC
7440-50-8	Copper	0.00344		0.0102	J	mg/L	MW-15 (Shallow; 08/15/03)	2/14	0.02	0.0102	1.3	1.5	1.5	1.3	N	N/A	N/A		BSC
57-12-5	Cyanide	0.00219		0.00436	J	mg/L	MW-27 (Shallow; 10/03/03)	3/11	0.01	0.00436	0.2	0.73	0.73	0.2	N	N/A	N/A		BSC
7439-89-6	Iron	0.495		3.92		mg/L	MW-104A (Deep; 10/03/03)	8/14	0.2	3.92	0.3	11	11	0.3	N	N/A	N/A	X	ASC
7439-92-1	Lead	0.00467	J	0.00751		mg/L	MW-15 (Shallow; 08/15/03)	3/14	0.005	0.00751	0.015	--	--	0.015	C	N/A	N/A		BSC
7439-95-4	Magnesium	13		81.7		mg/L	MW-103A (Deep; 10/06/03)	7/14	1.5	81.7	--	--	--	--	N	N/A	N/A		NUT
7439-96-5	Manganese	0.00316	J	0.858		mg/L	MW-104A (Deep; 08/25/03)	9/14	0.01	0.858	0.3	0.73	0.88	0.3	N	N/A	N/A	X	ASC
7440-02-0	Nickel	0.00176	J	0.00714	J	mg/L	MW-20 (Shallow; 10/01/03)	6/14	0.02	0.00714	--	0.73	0.73	0.73	N	N/A	N/A		BSC
7440-09-7	Potassium	0.852	J	8.38		mg/L	MW-27 (Shallow; 08/18/03)	14/14	--	8.38	--	--	--	--	N	N/A	N/A		NUT
7782-49-2	Selenium	0.00725	J	0.0547		mg/L	MW-103A (Deep; 10/06/03)	9/14	0.02	0.0547	0.05	0.18	0.18	0.05	N	N/A	N/A	X	ASC
7440-23-5	Sodium	30.1		192		mg/L	MW-27 (Shallow; 08/18/03)	14/14	--	192	--	--	--	--	N	N/A	N/A		NUT
7440-62-2	Vanadium	0.00378	J	0.0131	J	mg/L	MW-103A (Deep; 10/06/03)	4/14	0.02	0.0131	--	0.037	0.036	0.036	N	N/A	N/A		BSC
7440-66-6	Zinc	0.00494	J	0.0263		mg/L	MW-104A (Deep; 08/25/03)	4/14	0.01	0.0263	5.0	0.011	0.011	0.011	N	N/A	N/A	X	ASC
	Total Metals																		
7429-90-5	Aluminum	0.0601		64.3		mg/L	MW-19 (Shallow; 08/15/03)	32/37	0.2	64.3	--	37	36	36	N	N/A	N/A	X	ASC
7440-36-0	Antimony	0.00683	J	0.0194		mg/L	MW-23 (Shallow; 10/22/03)	11/37	0.01	0.0194	0.006	0.015	0.015	0.006	N	N/A	N/A	X	ASC
7440-38-2	Arsenic	0.0104	J	0.0437		mg/L	MW-19 (Shallow; 08/15/03)	24/37	0.025	0.0437	0.05	0.000045	0.000045	0.000045	C	N/A	N/A	X	ASC
7440-39-3	Barium	0.0226		1.12		mg/L	MW-24 (Shallow; 10/22/03)	37/37	--	1.12	2.0	2.6	2.6	2.0	N	N/A	N/A		BSC
7440-41-7	Beryllium	0.000467	J	0.00219	J	mg/L	MW-17 (Shallow; 08/28/03)	7/37	0.005	0.00219	0.004	0.073	0.073	0.004	C	N/A	N/A		BSC
7440-43-9	Cadmium	0.000891	J	0.00395	J	mg/L	MW-17 (Shallow; 10/06/03)	4/37	0.005	0.00395	0.005	0.018	0.018	0.005	N	N/A	N/A		BSC
7440-70-2	Calcium	57.2		751		mg/L	MW-23 (Shallow; 08/20/03)	37/37	--	751	--	--	--	--	N	N/A	N/A		NUT
7440-47-3	Chromium	0.00106	J	0.655		mg/L	MW-19 (Shallow; 08/15/03)	31/37	0.01	0.655	0.1	55	55	0.1	N	N/A	N/A	X	ASC
18540-29-9	Chromium VI (Hexavalent)	0.005	J	0.181		mg/L	MW-18 (Shallow; 08/28/03)	15/37	0.01	0.181	--	0.11	0.11	0.11	N	N/A	N/A	X	ASC
7440-48-4	Cobalt	0.00122	J	0.0303		mg/L	MW-17 (Shallow; 08/28/03)	15/37	0.02	0.0303	--	0.73	0.73	0.73	C	N/A	N/A		BSC
7440-50-8	Copper	0.00628		0.105		mg/L	MW-19 (Shallow; 08/15/03)	18/37	0.02	0.105	1.3	1.5	1.5	1.3	N	N/A	N/A		BSC
57-12-5	Cyanide	0.00195		0.00385	J	mg/L	MW-27 (Shallow; 10/03/03)	5/37	0.01	0.00385	0.2	0.73	0.73	0.2	N	N/A	N/A		BSC
7439-89-6	Iron	0.128	J	85.5		mg/L	MW-19 (Shallow; 08/15/03)	29/37	0.2	85.5	0.3	11	11	0.3	N	N/A	N/A	X	ASC
7439-92-1	Lead	0.00539		0.379		mg/L	MW-17 (Shallow; 10/06/03)	18/37	0.005	0.379	0.015	--	--	0.015	C	N/A	N/A	X	ASC
7439-95-4	Magnesium	0.0382	J	157		mg/L	MW-107A (Deep; 08/28/03)	35/37	1.5	157	--	--	--	--	N	N/A	N/A		NUT
7439-96-5	Manganese	0.00203	J	2.47		mg/L	MW-17 (Shallow; 10/06/03)	36/37	0.01	2.47	0.3	0.73	0.88	0.3	N	N/A	N/A	X	ASC
7439-97-6	Mercury	0.0000718	J	0.000291	J	mg/L	MW-17 (Shallow; 08/28/03)	5/37	0.0004	0.000291	0.002	0.0037	0.0036	0.002	N	N/A	N/A		BSC
7440-02-0	Nickel	0.00172	J	0.0769		mg/L	MW-19 (Shallow; 08/15/03)	23/37	0.02	0.0769	--	0.73	0.73	0.73	N	N/A	N/A		BSC
7440-09-7	Potassium	0.896	J	22.8		mg/L	MW-21 (Shallow; 08/28/03)	37/37	--	22.8	--	--	--	--	N	N/A	N/A		NUT
7782-49-2	Selenium	0.00669	J	0.0739		mg/L	MW-17 (Shallow; 10/06/03)	31/37	0.02	0.0739	0.05	0.18	0.18	0.05	N	N/A	N/A	X	ASC
7440-23-5	Sodium	7.18		191		mg/L	MW-27 (Shallow; 08/18/03)	37/37	--	191	--	--	--	--	N	N/A	N/A		NUT
7440-28-0	Thallium	0.00941	J	0.0158	J	mg/L	MW-23 (Shallow; 10/22/03)	2/37	0.02 - 0.04	0.0158	0.002	0.0026	0.0024	0.002	N	N/A	N/A	X	ASC
7440-62-2	Vanadium	0.00312	J	0.161		mg/L	MW-19 (Shallow; 08/15/03)	30/37	0.02	0.161	--	0.037	0.036	0.036	N	N/A	N/A	X	ASC
7440-66-6	Zinc	0.00315	J	1.79		mg/L	MW-17 (Shallow; 10/06/03)	30/37	0.01 - 0.02	1.79	5.0	0.011	0.011	0.011	N	N/A	N/A	X	ASC

Notes:

(1) Minimum/maximum detected concentration.

(2) Based on data collected during 2003 - 2004 from sampling locations: MW-15, MW-16, MW-17, MW-18, MW-19, MW-20, MW-21, MW-22, MW-23, MW-24, MW-25, MW-26, MW-27, MW-28, MW-103A, MW-104A, MW-105A, MW-106A, MW-107A.

(3) NYCRR Title 10, Part 5-Drinking Water Supplies, Subpart 5-1 Public Water Systems; Maximum Contaminant Levels (MCLs), NYSDOH, May 26, 2004.

(4) Region III Risk-Based Concentration (R3-RBC) Table, Tap Water, October 8, 2004.

(5) Region IX Preliminary Remediation Goals (R9-PRG) Table, Tap Water, October 20, 2004.

(6) Screening criterion is the lower of the NYSDOH MCLs, R3-RBC Tap Water or T9-PRG Tap Water value.

(7) Rationale Codes
Selection Reason: Maximum detected above Screening Criterion (ASC)
Deletion Reason: Maximum detected below Screening Criterion (BSC)
Essential Nutrient (NUT)

Definitions:
C = Carcinogenic
N = Non-Carcinogenic
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
-- = Not Available
N/A = Not Applicable
J = Associated value is estimated

TABLE 2.9

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN IN SURFACE WATER - CURRENT/FUTURE RECEPTORS
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/ Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Ingestion and Dermal

CAS Number	Chemical	Minimum (1,2) Concentration	Minimum Qualifier	Maximum (1,2) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency (2)	Range of Detection Limits (2)	Concentration Used for Screening (2)	NYSDEC TOGS 1.1.1 (3)	R3-RBC Tap Water (4)	R9-PRG Tap Water (5)	Screening (6) Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (7) Contaminant Deletion or Selection
	Metals																		
7429-90-5	Aluminum	0.0258	J	66.7		mg/L	SW-11 (10/07/03)	42/46	0.2	66.7	--	37	36	36	N	N/A	N/A	X	ASC
7440-36-0	Antimony	0.00744	J	0.0169		mg/L	SW-13 (08/21/03)	4/46	0.01 - 0.05	0.0169	--	0.015	0.015	0.015	N	N/A	N/A	X	ASC
7440-38-2	Arsenic	0.00722	J	0.0648		mg/L	SW-11 (10/07/03)	41/46	0.025	0.0648	0.05	0.000045	0.000045	0.000045	C	N/A	N/A	X	ASC
7440-39-3	Barium	0.0236		2.53		mg/L	SW-11 (10/07/03)	46/46	--	2.53	1.0	2.6	2.6	1.0	N	N/A	N/A	X	ASC
7440-41-7	Beryllium	0.000156	J	0.00304	J	mg/L	SW-11 (10/07/03)	4/46	0.005	0.00304	0.003	0.073	0.073	0.003	C	N/A	N/A	X	ASC
7440-43-9	Cadmium	0.00463	J	0.00463	J	mg/L	SW-11 (10/07/03)	1/46	0.005	0.00463	0.005	0.018	0.018	0.005	N	N/A	N/A		BSC
7440-70-2	Calcium	22.2		675		mg/L	SW-13 (08/21/03)	46/46	--	675	--	--	--	--	N	N/A	N/A		NUT
7440-47-3	Chromium	0.000768	J	6.39		mg/L	SW-11 (10/07/03)	46/46	--	6.39	0.05	55	55	0.05	N	N/A	N/A	X	ASC
18540-29-9	Chromium VI (Hexavalent)	0.004	J	0.571		mg/L	SW-14 (10/07/03)	27/46	0.01	0.571	--	0.11	0.11	0.11	N	N/A	N/A	X	ASC
7440-48-4	Cobalt	0.000612	J	0.0753		mg/L	SW-11 (10/07/03)	16/46	0.02	0.0753	--	0.73	0.73	0.73	C	N/A	N/A		BSC
7440-50-8	Copper	0.00343	J	1.09		mg/L	SW-11 (10/07/03)	28/46	0.02	1.09	0.2	1.5	1.5	0.2	N	N/A	N/A	X	ASC
57-12-5	Cyanide	0.00216	J	0.00869	J	mg/L	SW-14 (08/21/03)	10/46	0.01	0.00869	0.2	0.73	0.73	0.2	N	N/A	N/A		BSC
7439-89-6	Iron	0.0533	J	151		mg/L	SW-11 (10/07/03)	35/46	0.2	151	0.3	11	11	0.3	N	N/A	N/A	X	ASC
7439-92-1	Lead	0.0051		0.865		mg/L	SW-11 (10/07/03)	25/46	0.005	0.865	0.05	--	--	0.05	C	N/A	N/A	X	ASC
7439-95-4	Magnesium	0.0581	J	103		mg/L	SW-11 (10/07/03)	45/46	1.5	103	35	--	--	35	N	N/A	N/A		NUT
7439-96-5	Manganese	0.00165	J	19.2		mg/L	SW-11 (10/07/03)	44/46	0.01	19.2	0.3	0.73	0.88	0.3	N	N/A	N/A	X	ASC
7439-97-6	Mercury	0.0013		0.0013		mg/L	SW-11 (10/07/03)	1/46	0.0002 - 0.0004	0.0013	0.0007	0.0037	0.0036	0.0007	N	N/A	N/A	X	ASC
7440-02-0	Nickel	0.00177	J	0.544		mg/L	SW-11 (10/07/03)	26/46	0.02	0.544	0.1	0.73	0.73	0.1	N	N/A	N/A	X	ASC
7440-09-7	Potassium	0.327	J	72.3		mg/L	SW-13 (10/07/03)	46/46	--	72.3	--	--	--	--	N	N/A	N/A		NUT
7782-49-2	Selenium	0.00775	J	0.0957		mg/L	SW-11 (10/07/03)	14/46	0.02 - 0.04	0.0957	0.01	0.18	0.18	0.01	N	N/A	N/A	X	ASC
7440-22-4	Silver	0.0016	J	0.00203	J	mg/L	SW-23 (08/21/03)	2/46	0.01	0.00203	0.05	0.18	0.18	0.05	N	N/A	N/A		BSC
7440-23-5	Sodium	1.47	J	112		mg/L	SW-23 (05/12/04)	46/46	--	112	--	--	--	--	N	N/A	N/A		NUT
7440-28-0	Thallium	0.00776	J	0.0936		mg/L	SW-20 (08/21/03)	12/46	0.02 - 0.03	0.0936	0.0005	0.0026	0.0024	0.0005	N	N/A	N/A	X	ASC
7440-62-2	Vanadium	0.00334	J	0.231		mg/L	SW-11 (10/07/03)	19/46	0.02	0.231	--	0.037	0.036	0.036	N	N/A	N/A	X	ASC
7440-66-6	Zinc	0.00218	J	2.84		mg/L	SW-11 (10/07/03)	45/46	0.01	2.84	2.0	0.011	0.011	0.011	N	N/A	N/A	X	ASC

Notes:

(1) Minimum/maximum detected concentration.

(2) Based on data collected during 2003 - 2004 from sampling locations: SW-11, SW-12, SW-13, SW-14, SW-15, SW-16, SW-17, SW-18, SW-19, SW-20, SW-21, SW-22, SW-23, SW-24.

(3) Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, Division of Water Technical and Operation Guidance Series (1.1.1), NYSDEC, June 1998. Including addenda from 1999, 2000, and 2004.

(4) Region III Risk-Based Concentration (R3-RBC) Table, Tap Water, October 8, 2004.

(5) Region IX Preliminary Remediation Goals (R9-PRG) Table, Tap Water, October 20, 2004.

(6) Screening criterion is the lower of the NYSDEC TOGS 1.1.1, R3-RBC Tap Water or T9-PRG Tap Water value.

(7) Rationale Codes
Selection Reason: Maximum detected above Screening Criterion (ASC)
Deletion Reason: Maximum detected below Screening Criterion (BSC)
Essential Nutrient (NUT)

Definitions:
C = Carcinogenic
N = Non-Carcinogenic
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
-- = Not Available
N/A = Not Applicable
J = Associated value is estimated

TABLE 2.10

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN IN SEDIMENT - FUTURE RECEPTORS
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Ingestion and Dermal

CAS Number	Chemical	Minimum (1,2) Concentration	Minimum Qualifier	Maximum (1,2) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency (2)	Range of Detection Limits (2)	Concentration Used for Screening (2)	NYSDEC TAGM 4046 (3)	R3-RBC Soil Industrial (4)	R9-PRG Soil Industrial (5)	Screening (6) Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (7) Contaminant Deletion or Selection
	Metals																		
7429-90-5	Aluminum	334		25000		mg/kg	SW-11 (08/21/03)	20/20	--	25000	--	1000000	100000	100000	N	N/A	N/A		BSC
7440-36-0	Antimony	0.971	J	56.5		mg/kg	SB-2 Pond (11/07/96)	10/20	1.08 - 12	56.5	--	410	410	410	N	N/A	N/A		BSC
7440-38-2	Arsenic	4.2	J	27.9		mg/kg	SW-11 (08/21/03)	14/20	1.3 - 17.2	27.9	7.5	1.9	1.6	1.6	C	N/A	N/A	X	ASC
7440-39-3	Barium	98.9		666		mg/kg	SW-11 (08/21/03)	20/20	--	666	300	72000	67000	300	N	N/A	N/A	X	ASC
7440-41-7	Beryllium	0.0558	J	1.09		mg/kg	SW-24 (08/21/03)	17/20	0.623 - 1.0	1.09	0.16	2000	1900	0.16	C	N/A	N/A	X	ASC
7440-43-9	Cadmium	0.0526	J	2.1		mg/kg	SB-2 Pond (11/07/96)	7/20	0.623 - 1.0	2.1	1.0	510	450	1.0	N	N/A	N/A	X	ASC
7440-70-2	Calcium	4870		353000		mg/kg	SW-16 (05/12/04)	19/19	--	353000	--	--	--	--	N	N/A	N/A		NUT
7440-47-3	Chromium	7.17		2380	N*	mg/kg	SB-2 Pond (11/07/96)	20/20	--	2380	10	1500000	450	10	N	N/A	N/A	X	ASC
18540-29-9	Chromium VI (Hexavalent)	0.45	E*	6.83	J	mg/kg	SD-105 (01/01/98)	5/20	5.1 - 15	6.83	--	3100	64	64	N	N/A	N/A		BSC
7440-48-4	Cobalt	0.183		27.8		mg/kg	SW-11 (08/21/03)	18/20	2.49 - 2.75	27.8	30	20000	1900	30	C	N/A	N/A		BSC
7440-50-8	Copper	2.65	J	307		mg/kg	SW-11 (08/21/03)	18/20	2.8 - 4.99	307	25	41000	41000	25	N	N/A	N/A	X	ASC
57-12-5	Cyanide	0.242		1.16		mg/kg	SW-23 (08/21/03)	4/17		1.16	--	20000	12000	12000	N	N/A	N/A		BSC
7439-89-6	Iron	417		42600		mg/kg	SW-11 (08/21/03)	20/20	--	42600	2000	310000	100000	2000	N	N/A	N/A	X	ASC
7439-92-1	Lead	8.55		240		mg/kg	SW-11 (08/21/03)	20/20	--	240	--	--	800 (8)	800	C	N/A	N/A		BSC
7439-95-4	Magnesium	385		46100		mg/kg	SB-2 Pond (11/07/96)	20/20	--	46100	--	--	--	--	N	N/A	N/A		NUT
7439-96-5	Manganese	20.4		6330	J	mg/kg	SW-11 (08/21/03)	20/20	--	6330	--	20000	19000	19000	N	N/A	N/A		BSC
7439-97-6	Mercury	0.00865	J	0.42		mg/kg	SD-103 (01/01/89)	13/20	0.04 - 0.07	0.42	0.1	100	62	0.1	N	N/A	N/A	X	ASC
7440-02-0	Nickel	1.63		216		mg/kg	SB-2 Pond (11/07/96)	18/20	2.75 - 4.99	216	13	20000	20000	13	N	N/A	N/A	X	ASC
7440-09-7	Potassium	73.3	J	4580	J	mg/kg	SW-19 (08/21/03)	19/20	45.6	4580	--	--	--	--	N	N/A	N/A		NUT
7782-49-2	Selenium	2.2		25.1		mg/kg	SW-11 (08/21/03)	15/18	2.66 - 5.49	25.1	2.0	5100	5100	2.0	N	N/A	N/A	X	ASC
7440-22-4	Silver	1.8	J	3.36	J	mg/kg	SW-11 (08/21/03)	3/18	0.31 - 2.09	3.36	--	5100	5100	5100	N	N/A	N/A		BSC
7440-23-5	Sodium	22.5		399		mg/kg	SW-20 (08/21/03)	17/20	36.8 - 1000	399	--	--	--	--	N	N/A	N/A		NUT
7440-28-0	Thallium	1.42	J	3.26		mg/kg	SW-16 (08/14/03)	3/18	0.88 - 13.7	3.26	--	72	67	67	N	N/A	N/A		BSC
7440-62-2	Vanadium	1.72	J	88.6		mg/kg	SW-11 (08/21/03)	20/20	--	88.6	150	1000	1000	150	N	N/A	N/A		BSC
7440-66-6	Zinc	16.5	J	798		mg/kg	SW-11 (08/21/03)	20/20	--	798	20	310000	100000	20	N	N/A	N/A	X	ASC

Notes:

(1) Minimum/maximum detected concentration.

(2) Based on data collected from sampling locations: SB-02 Pond, SD-103, SD-104, SW-10, SW-11, SW-12, SW-13, SW-14, SW-15, SW-16, SW-17, SW-18, SW-19, SW-20, SW-21, SW-22, SW-23, SW-24.

(3) Technical and Administrative Guidance Memorandum #4046, Determination of Soil Cleanup Objectives and Cleanup Levels, NYSDEC, January 24, 1994.

(4) Region III Risk-Based Concentration (R3-RBC) Table, Soil Industrial, October 8, 2004.

(5) Region IX Preliminary Remediation Goals (R9-PRG) Table, Soil Industrial, October 20, 2004.

(6) Screening criterion is the lower of the NYSDEC TAGM 4046, R3-RBC Soil Industrial or R9-PRG Soil Industrial value.

(7) Rationale Codes
Selection Reason: Maximum detected above Screening Criterion (ASC)
Deletion Reason: Maximum detected below Screening Criterion (BSC)
Essential Nutrient (NUT)

(8) Value derived using USEPA IUEBK pharmacokinetic model.

Definitions:

C = Carcinogenic
N = Non-Carcinogenic
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
-- = Not Available
N/A = Not Applicable
J = Associated value is estimated.
E = Estimated above quantification limit.
N = Spike sample recovery not within control limits.
* = Duplicate analysis not within control limits.

TABLE 3.1

EXPOSURE POINT CONCENTRATION (EPC) SUMMARY FOR CHEMICALS OF POTENTIAL CONCERN IN SURFACE SOIL AND SLAG

OPERABLE UNIT 3

VANADIUM CORPORATION OF AMERICA

NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/ Future
Medium: Surface Soil and Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion and Dermal

Chemical of Potential Concern	*Units*	*Arithmetic Mean*	*95% UCL of Normal Data*	*Maximum Detected Concentration*	*Maximum Qualifier*	*EPC Units*	*Reasonable Maximum Exposure*			*Central Tendency*		
							Medium EPC Value	*Medium EPC Statistic*	*Medium EPC Rationale*	*Medium EPC Value*	*Medium EPC Statistic*	*Medium EPC Rationale*
Metals												
Aluminum	mg/kg	1.88E+04	(1)	1.13E+05		mg/kg	3.69E+04	95% UCL-NP	W-Test (2)	1.87E+04	Mean-NP	W-Test (2)
Antimony	mg/kg	2.29E+01	(1)	3.39E+02		mg/kg	3.82E+01	95% UCL-NP	W-Test (2)	2.32E+01	Mean-NP	W-Test (2)
Arsenic	mg/kg	6.33E+00	(1)	4.53E+01		mg/kg	1.81E+01	95% UCL-NP	W-Test (2)	6.43E+00	Mean-NP	W-Test (2)
Barium	mg/kg	1.67E+02	(1)	1.41E+03	*	mg/kg	3.77E+02	95% UCL-NP	W-Test (2)	1.66E+02	Mean-NP	W-Test (2)
Beryllium	mg/kg	5.54E-01	(1)	3.50E+00		mg/kg	1.21E+00	95% UCL-NP	W-Test (2)	5.85E-01	Mean-NP	W-Test (2)
Cadmium	mg/kg	3.33E+00	(1)	1.41E+02		mg/kg	2.62E+01	95% UCL-NP	W-Test (2)	3.35E+00	Mean-NP	W-Test (2)
Chromium Total	mg/kg	1.26E+03	(1)	1.18E+04		mg/kg	1.97E+03	95% UCL-NP	W-Test (2)	1.24E+03	Mean-NP	W-Test (2)
Chromium VI (Hexavalent)	mg/kg	5.88E+00	(1)	9.16E+01		mg/kg	9.95E+00	95% UCL-NP	W-Test (2)	6.80E+00	Mean-NP	W-Test (2)
Cobalt	mg/kg	2.28E+01	(1)	5.36E+02	B	mg/kg	9.15E+01	95% UCL-NP	W-Test (2)	2.24E+01	Mean-NP	W-Test (2)
Copper	mg/kg	1.69E+02	(1)	5.42E+03	E	mg/kg	1.27E+03	95% UCL-NP	W-Test (2)	1.65E+02	Mean-NP	W-Test (2)
Iron	mg/kg	1.92E+04	(1)	5.13E+04		mg/kg	2.16E+04	95% UCL-NP	W-Test (2)	1.92E+04	Mean-NP	W-Test (2)
Lead	mg/kg	7.36E+01	(1)	1.76E+03		mg/kg	3.09E+02	95% UCL-NP	W-Test (2)	7.23E+01	Mean-NP	W-Test (2)
Manganese	mg/kg	1.78E+03	(1)	2.44E+04	E*	mg/kg	5.39E+03	95% UCL-NP	W-Test (2)	1.76E+03	Mean-NP	W-Test (2)
Mercury	mg/kg	2.99E-01	(1)	1.18E+01		mg/kg	2.49E+00	95% UCL-NP	W-Test (2)	3.00E-01	Mean-NP	W-Test (2)
Nickel	mg/kg	2.58E+02	(1)	5.16E+03		mg/kg	1.04E+03	95% UCL-NP	W-Test (2)	2.54E+02	Mean-NP	W-Test (2)
Selenium	mg/kg	4.38E+00	(1)	2.63E+01		mg/kg	6.61E+00	95% UCL-NP	W-Test (2)	4.87E+00	Mean-NP	W-Test (2)
Thallium	mg/kg	2.35E+00	(1)	3.12E+01		mg/kg	3.89E+00	95% UCL-NP	W-Test (2)	2.62E+00	Mean-NP	W-Test (2)
Vanadium	mg/kg	5.25E+01	(1)	2.63E+02		mg/kg	6.60E+01	95% UCL-NP	W-Test (2)	5.22E+01	Mean-NP	W-Test (2)
Zinc	mg/kg	1.76E+02	(1)	1.40E+03		mg/kg	4.17E+02	95% UCL-NP	W-Test (2)	1.74E+02	Mean-NP	W-Test (2)

Notes:

For non-detects, 1/2 laboratory detection limit was used as a proxy concentration.

W-Test : Developed by Shapiro and Wilk for data sets with under 50 samples.

W-Test : Developed by Shapiro and Francia for data sets with greater than 50 but less than 99 samples.

Statistics: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-T); Non-parametric Method used to Determine 95% UCL (95% UC
Mean of Log-transformed Data (Mean-T); Mean of Normal Data (Mean-N); Non-parametric Method used to Determine Mean (Mean-NP).

E = Estimated above quantification limit.

B = Value greater or equal to the instrument detection limit but less than the contract required detection limit.

* = Duplicate analysis not within control limits.

(1) Data set is neither normally or lognormally distributed.

(2) Shapiro-Wilk W Test was used for data sets where n<=50. Shapiro-Francia W Test was used for data sets where : 50<n>100.

TABLE 3.2

EXPOSURE POINT CONCENTRATION (EPC) SUMMARY FOR CHEMICALS OF POTENTIAL CONCERN IN SURFACE SOIL

OPERABLE UNIT 3

VANADIUM CORPORATION OF AMERICA

NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/ Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Ingestion and Dermal

Chemical of Potential Concern	*Units*	*Arithmetic Mean*	*95% UCL of Normal Data*	*Maximum Detected Concentration*	*Maximum Qualifier*	*EPC Units*	*Reasonable Maximum Exposure*			*Central Tendency*		
							Medium EPC Value	*Medium EPC Statistic*	*Medium EPC Rationale*	*Medium EPC Value*	*Medium EPC Statistic*	*Medium EPC Rationale*
Metals												
Antimony	mg/kg	1.01E+01	(1)	6.49E+01		mg/kg	1.54E+01	95% UCL-NP	W-Test (3)	1.06E+01	Mean-NP	W-Test (3)
Arsenic	mg/kg	6.29E+00	(1)	2.19E+01	*	mg/kg	7.90E+00	95% UCL-NP	W-Test (3)	6.27E+00	Mean-NP	W-Test (3)
Barium	mg/kg	1.66E+02	(1)	1.41E+03	*	mg/kg	5.40E+02	95% UCL-NP	W-Test (3)	1.65E+02	Mean-NP	W-Test (3)
Beryllium	mg/kg	6.09E-01	(1)	3.50E+00		mg/kg	8.12E-01	95% UCL-NP	W-Test (3)	6.07E-01	Mean-NP	W-Test (3)
Cadmium	mg/kg	9.09E-01	(1)	4.00E+00		mg/kg	1.29E+00	95% UCL-NP	W-Test (3)	9.43E-01	Mean-NP	W-Test (3)
Chromium Total	mg/kg	2.93E+02	(1)	2.26E+03		mg/kg	4.66E+02	95% UCL-NP	W-Test (3)	2.90E+02	Mean-NP	W-Test (3)
Cobalt	mg/kg	2.45E+01	(1)	5.36E+02	B	mg/kg	1.75E+02	95% UCL-NP	W-Test (3)	2.43E+01	Mean-NP	W-Test (3)
Copper	mg/kg	3.08E+01	(2)	1.04E+02		mg/kg	3.86E+01	95% UCL-T	W-Test (3)	3.10E+01	Mean-T	W-Test (3)
Iron	mg/kg	1.92E+04	2.16E+04	4.82E+04	E*	mg/kg	2.16E+04	95% UCL-N	W-Test (3)	1.92E+04	Mean-N	W-Test (3)
Manganese	mg/kg	1.47E+03	(1)	2.44E+04	E*	mg/kg	8.82E+03	95% UCL-NP	W-Test (3)	1.45E+03	Mean-NP	W-Test (3)
Mercury	mg/kg	4.07E-01	(1)	1.18E+01		mg/kg	4.86E+00	95% UCL-NP	W-Test (3)	4.20E-01	Mean-NP	W-Test (3)
Nickel	mg/kg	2.46E+01	2.78E+01	5.41E+01	*	mg/kg	2.78E+01	95% UCL-N	W-Test (3)	2.46E+01	Mean-N	W-Test (3)
Selenium	mg/kg	2.07E+00	(1)	1.59E+01		mg/kg	3.85E+00	95% UCL-NP	W-Test (3)	2.76E+00	Mean-NP	W-Test (3)
Thallium	mg/kg	1.26E+00	(1)	1.88E+01		mg/kg	2.28E+00	95% UCL-NP	W-Test (3)	1.54E+00	Mean-NP	W-Test (3)
Zinc	mg/kg	1.56E+02	(1)	6.33E+02	E	mg/kg	2.03E+02	95% UCL-NP	W-Test (3)	1.55E+02	Mean-NP	W-Test (3)

Notes:

For non-detects, 1/2 laboratory detection limit was used as a proxy concentration.

W-Test : Developed by Shapiro and Wilk for data sets with under 50 samples.

Statistics: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-T); Non-parametric Method used to Determine 95% UCL (95% U
Mean of Log-transformed Data (Mean-T); Mean of Normal Data (Mean-N); Non-parametric Method used to Determine Mean (Mean-NP).

E = Estimated above quantification limit.

B = Value greater or equal to the instrument detection limit but less than the contract required detection limit.

* = Duplicate analysis not within control limits.

(1) Data set is neither normally or lognormally distributed.

(2) Data set is lognormally distributed.

(3) Shapiro-Wilk W Test was used for data sets where n<=50.

TABLE 3.3

EXPOSURE POINT CONCENTRATION (EPC) SUMMARY FOR CHEMICALS OF POTENTIAL CONCERN IN SLAG

OPERABLE UNIT 3

VANADIUM CORPORATION OF AMERICA

NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/ Future
Medium: Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion and Dermal

Chemical of Potential Concern	*Units*	*Arithmetic Mean*	*95% UCL of Normal Data*	*Maximum Detected Concentration*	*Maximum Qualifier*	*EPC Units*	*Reasonable Maximum Exposure*			*Central Tendency*		
							Medium EPC Value	*Medium EPC Statistic*	*Medium EPC Rationale*	*Medium EPC Value*	*Medium EPC Statistic*	*Medium EPC Rationale*
Metals												
Aluminum	mg/kg	2.07E+04	(1)	1.13E+05		mg/kg	7.70E+04	95% UCL-NP	W-Test (3)	2.07E+04	Mean-NP	W-Test (3)
Antimony	mg/kg	7.11E+01	(2)	3.39E+02		mg/kg	3.39E+02	Max	(4)	9.77E+01	Mean-T	W-Test (3)
Arsenic	mg/kg	6.42E+00	(2)	4.53E+01		mg/kg	1.39E+01	95% UCL-T	W-Test (3)	4.60E+00	Mean-T	W-Test (3)
Barium	mg/kg	1.70E+02	(2)	6.75E+02		mg/kg	2.73E+02	95% UCL-T	W-Test (3)	1.75E+02	Mean-T	W-Test (3)
Beryllium	mg/kg	4.36E-01	5.48E-01	1.10E+00		mg/kg	5.48E-01	95% UCL-N	W-Test (3)	4.36E-01	Mean-N	W-Test (3)
Cadmium	mg/kg	8.59E+00	(1)	1.41E+02		mg/kg	2.11E+01	95% UCL-NP	W-Test (3)	8.90E+00	Mean-NP	W-Test (3)
Chromium Total	mg/kg	3.60E+03	(2)	1.18E+04		mg/kg	8.38E+03	95% UCL-T	W-Test (3)	3.86E+03	Mean-T	W-Test (3)
Chromium VI (Hexavalent)	mg/kg	1.34E+01	(1)	9.16E+01		mg/kg	7.93E+01	95% UCL-NP	W-Test (3)	1.40E+01	Mean-NP	W-Test (3)
Cobalt	mg/kg	1.89E+01	(2)	7.23E+01		mg/kg	3.65E+01	95% UCL-T	W-Test (3)	2.02E+01	Mean-T	W-Test (3)
Copper	mg/kg	4.68E+02	(2)	5.42E+03	E	mg/kg	1.70E+03	95% UCL-T	W-Test (3)	3.44E+02	Mean-T	W-Test (3)
Iron	mg/kg	1.93E+04	2.43E+04	5.13E+04		mg/kg	2.43E+04	95% UCL-N	W-Test (3)	1.93E+04	Mean-N	W-Test (3)
Lead	mg/kg	1.35E+02	(1)	1.76E+03		mg/kg	1.22E+03	95% UCL-NP	W-Test (3)	1.35E+02	Mean-NP	W-Test (3)
Manganese	mg/kg	2.48E+03	(2)	8.99E+03		mg/kg	5.68E+03	95% UCL-T	W-Test (3)	2.68E+03	Mean-T	W-Test (3)
Mercury	mg/kg	6.48E-02	(1)	3.75E-01		mg/kg	3.75E-01	Max	(4)	7.20E-02	Mean-NP	W-Test (3)
Nickel	mg/kg	7.65E+02	(2)	5.16E+03		mg/kg	5.16E+03	Max	(4)	1.41E+03	Mean-T	W-Test (3)
Selenium	mg/kg	1.00E+01	(2)	2.63E+01		mg/kg	2.63E+01	Max	(4)	1.29E+01	Mean-T	W-Test (3)
Thallium	mg/kg	5.65E+00	(1)	3.12E+01		mg/kg	1.01E+01	95% UCL-NP	W-Test (3)	5.88E+00	Mean-NP	W-Test (3)
Vanadium	mg/kg	9.15E+01	(2)	2.63E+02		mg/kg	1.87E+02	95% UCL-T	W-Test (3)	1.00E+02	Mean-T	W-Test (3)
Zinc	mg/kg	2.25E+02	(1)	1.40E+03		mg/kg	9.94E+02	95% UCL-NP	W-Test (3)	2.24E+02	Mean-NP	W-Test (3)

Notes:

For non-detects, 1/2 laboratory detection limit was used as a proxy concentration.

W-Test : Developed by Shapiro and Wilk for data sets with under 50 samples.

Statistics: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-T); Non-parametric Method used to Determine 95% UCL (95% UC
Mean of Log-transformed Data (Mean-T); Mean of Normal Data (Mean-N); Non-parametric Method used to Determine Mean (Mean-NP).

E = Estimated above quantification limit.

(1) Data set is neither normally or lognormally distributed.

(2) Data set is lognormally distributed.

(3) Shapiro-Wilk W Test was used for data sets where n<=50.

(4) The exposure point concentration (EPC) calculated is greater than maximum detected concentration; therefore maximum detected concentration is the EPC.

TABLE 3.4

EXPOSURE POINT CONCENTRATION (EPC) SUMMARY FOR CHEMICALS OF POTENTIAL CONCERN IN SOIL AND SLAG

OPERABLE UNIT 3

VANADIUM CORPORATION OF AMERICA

NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Soil and Slag (0-10 ftbgs)
Exposure Medium: Soil
Exposure Point: Ingestion and Dermal

Chemical of Potential Concern	*Units*	*Arithmetic Mean*	*95% UCL of Normal Data*	*Maximum Detected Concentration*	*Maximum Qualifier*	*EPC Units*	*Reasonable Maximum Exposure*			*Central Tendency*		
							Medium EPC Value	*Medium EPC Statistic*	*Medium EPC Rationale*	*Medium EPC Value*	*Medium EPC Statistic*	*Medium EPC Rationale*
Metals												
Aluminum	mg/kg	1.79E+04	(1)	1.13E+05		mg/kg	2.89E+04	95% UCL-NP	W-Test (3)	1.80E+04	Mean-NP	W-Test (3)
Arsenic	mg/kg	6.85E+00	(1)	7.00E+01		mg/kg	9.68E+00	95% UCL-NP	W-Test (3)	6.94E+00	Mean-NP	W-Test (3)
Barium	mg/kg	1.47E+02	(2)	1.41E+03	*	mg/kg	1.70E+02	95% UCL-T	W-Test (3)	1.45E+02	Mean-T	W-Test (3)
Beryllium	mg/kg	6.39E-01	(2)	3.50E+00		mg/kg	9.71E-01	95% UCL-T	W-Test (3)	7.66E-01	Mean-T	W-Test (3)
Cadmium	mg/kg	2.27E+00	(1)	1.41E+02		mg/kg	1.34E+01	95% UCL-NP	W-Test (3)	2.41E+00	Mean-NP	W-Test (3)
Chromium Total	mg/kg	1.24E+03	1.59E+03	1.18E+04		mg/kg	1.59E+03	95% UCL-N	W-Test (3)	1.24E+03	Mean-N	W-Test (3)
Chromium VI (Hexavalent)	mg/kg	1.69E+01	(1)	4.30E+02		mg/kg	5.82E+01	95% UCL-NP	W-Test (3)	1.70E+01	Mean-NP	W-Test (3)
Cobalt	mg/kg	1.78E+01	(1)	5.36E+02	B	mg/kg	5.70E+01	95% UCL-NP	W-Test (3)	1.78E+01	Mean-NP	W-Test (3)
Copper	mg/kg	1.16E+02	(1)	5.42E+03	E	mg/kg	5.37E+02	95% UCL-NP	W-Test (3)	1.16E+02	Mean-NP	W-Test (3)
Iron	mg/kg	2.01E+04	(2)	1.23E+05	E*	mg/kg	2.83E+04	95% UCL-T	W-Test (3)	2.29E+04	Mean-T	W-Test (3)
Lead	mg/kg	7.00E+01	(2)	1.87E+03		mg/kg	8.16E+01	95% UCL-T	W-Test (3)	5.67E+01	Mean-T	W-Test (3)
Manganese	mg/kg	2.51E+03	(2)	7.83E+04	E*	mg/kg	1.81E+03	95% UCL-T	W-Test (3)	1.43E+03	Mean-T	W-Test (3)
Mercury	mg/kg	3.50E-01	(1)	1.68E+01		mg/kg	3.56E+00	95% UCL-NP	W-Test (3)	3.60E-01	Mean-NP	W-Test (3)
Nickel	mg/kg	1.72E+02	(1)	5.16E+03		mg/kg	6.17E+02	95% UCL-NP	W-Test (3)	1.74E+02	Mean-NP	W-Test (3)
Selenium	mg/kg	3.62E+00	(1)	4.04E+01		mg/kg	5.41E+00	95% UCL-NP	W-Test (3)	4.30E+00	Mean-NP	W-Test (3)
Thallium	mg/kg	3.03E+00	(2)	8.96E+01		mg/kg	5.40E+00	95% UCL-NP	W-Test (3)	3.75E+00	Mean-NP	W-Test (3)
Vanadium	mg/kg	5.07E+01	5.84E+01	2.78E+02		mg/kg	5.84E+01	95% UCL-N	W-Test (3)	5.07E+01	Mean-N	W-Test (3)
Zinc	mg/kg	1.70E+02	2.08E+02	1.40E+03		mg/kg	2.08E+02	95% UCL-N	W-Test (3)	1.70E+02	Mean-N	W-Test (3)

Notes:

For non-detects, 1/2 laboratory detection limit was used as a proxy concentration.

W-Test : Developed by Shapiro and Francia for data sets with greater than 50 but less than 99 samples.

W-Test : Studentized Range for data sets with greater than 99 samples.

Statistics: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-T); Non-parametric Method used to Determine 95% UCL (95% UC
Mean of Log-transformed Data (Mean-T); Mean of Normal Data (Mean-N); Non-parametric Method used to Determine Mean (Mean-NP).

E = Estimated above quantification limit.

B = Value greater or equal to the instrument detection limit but less than the contract required detection limit.

* = Duplicate analysis not within control limits.

(1) Data set is neither normally or lognormally distributed.

(2) Data set is lognormally distributed.

(3) Shapiro-Francia W Test was used for data sets where : 50<n<100 and Studentized Range W Test was used for data sets where : n > 100.

TABLE 3.5

EXPOSURE POINT CONCENTRATION (EPC) SUMMARY FOR CHEMICALS OF POTENTIAL CONCERN IN SOIL

OPERABLE UNIT 3

VANADIUM CORPORATION OF AMERICA

NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Ingestion and Dermal

Chemical of Potential Concern	*Units*	*Arithmetic Mean*	*95% UCL of Normal Data*	*Maximum Detected Concentration*	*Maximum Qualifier*	*EPC Units*	*Reasonable Maximum Exposure*			*Central Tendency*		
							Medium EPC Value	*Medium EPC Statistic*	*Medium EPC Rationale*	*Medium EPC Value*	*Medium EPC Statistic*	*Medium EPC Rationale*
Metals												
Arsenic	mg/kg	6.18E+00	(1)	2.19E+01	*	mg/kg	7.06E+00	95% UCL-NP	W-Test (2)	6.16E+00	Mean-NP	W-Test (2)
Barium	mg/kg	1.49E+02	(1)	1.41E+03	*	mg/kg	3.36E+02	95% UCL-NP	W-Test (2)	1.48E+02	Mean-NP	W-Test (2)
Beryllium	mg/kg	6.91E-01	(1)	3.50E+00		mg/kg	7.90E-01	95% UCL-NP	W-Test (2)	6.90E-01	Mean-NP	W-Test (2)
Cadmium	mg/kg	1.15E+00	(1)	5.40E+00		mg/kg	1.52E+00	95% UCL-NP	W-Test (2)	1.22E+00	Mean-NP	W-Test (2)
Chromium Total	mg/kg	1.67E+02	(1)	2.26E+03		mg/kg	2.58E+02	95% UCL-NP	W-Test (2)	1.65E+02	Mean-NP	W-Test (2)
Cobalt	mg/kg	1.81E+01	(1)	5.36E+02	B	mg/kg	8.89E+01	95% UCL-NP	W-Test (2)	1.79E+01	Mean-NP	W-Test (2)
Copper	mg/kg	3.36E+01	(1)	2.57E+02		mg/kg	4.68E+01	95% UCL-NP	W-Test (2)	3.34E+01	Mean-NP	W-Test (2)
Iron	mg/kg	2.43E+04	(1)	1.23E+05	E*	mg/kg	3.85E+04	95% UCL-NP	W-Test (2)	2.42E+04	Mean-NP	W-Test (2)
Lead	mg/kg	5.47E+01	(1)	1.87E+03		mg/kg	2.26E+02	95% UCL-NP	W-Test (2)	5.41E+01	Mean-NP	W-Test (2)
Manganese	mg/kg	1.06E+03	(1)	2.44E+04	E*	mg/kg	4.49E+03	95% UCL-NP	W-Test (2)	1.05E+03	Mean-NP	W-Test (2)
Mercury	mg/kg	4.30E-01	(1)	1.68E+01		mg/kg	8.44E-01	95% UCL-NP	W-Test (2)	4.40E-01	Mean-NP	W-Test (2)
Nickel	mg/kg	2.62E+01	(1)	5.41E+01	*	mg/kg	2.82E+01	95% UCL-NP	W-Test (2)	2.62E+01	Mean-NP	W-Test (2)
Selenium	mg/kg	1.84E+00	(1)	1.59E+01		mg/kg	2.88E+00	95% UCL-NP	W-Test (2)	2.35E+00	Mean-NP	W-Test (2)
Zinc	mg/kg	1.65E+02	(1)	1.09E+03	E	mg/kg	2.08E+02	95% UCL-NP	W-Test (2)	1.64E+02	Mean-NP	W-Test (2)

Notes:

For non-detects, 1/2 laboratory detection limit was used as a proxy concentration.

W-Test : Developed by Shapiro and Francia for data sets with greater than 50 but less than 99 samples.

Statistics: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-T); Non-parametric Method used to Determine 95% UCL (95% U
Mean of Log-transformed Data (Mean-T); Mean of Normal Data (Mean-N); Non-parametric Method used to Determine Mean (Mean-NP).

E = Estimated above quantification limit.

B = Value greater or equal to the instrument detection limit but less than the contract required detection limit.

* = Duplicate analysis not within control limits.

(1) Data set is neither normally or lognormally distributed.

(2) Shapiro-Francia W Test was used for data sets where : 50<n<100.

TABLE 3.6

EXPOSURE POINT CONCENTRATION (EPC) SUMMARY FOR CHEMICALS OF POTENTIAL CONCERN IN SLAG

OPERABLE UNIT 3

VANADIUM CORPORATION OF AMERICA

NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Slag
Exposure Medium: Soil
Exposure Point: Ingestion and Dermal

Chemical of Potential Concern	*Units*	*Arithmetic Mean*	*95% UCL of Normal Data*	*Maximum Detected Concentration*	*Maximum Qualifier*	*EPC Units*	*Reasonable Maximum Exposure*			*Central Tendency*		
							Medium EPC Value	*Medium EPC Statistic*	*Medium EPC Rationale*	*Medium EPC Value*	*Medium EPC Statistic*	*Medium EPC Rationale*
Metals												
Aluminum	mg/kg	1.82E+04	(1)	1.13E+05		mg/kg	3.45E+04	95% UCL-NP	W-Test (3)	1.81E+04	Mean-NP	W-Test (3)
Arsenic	mg/kg	6.24E+00	(1)	7.00E+01		mg/kg	1.08E+01	95% UCL-NP	W-Test (3)	6.38E+00	Mean-NP	W-Test (3)
Barium	mg/kg	1.23E+02	(2)	6.75E+02		mg/kg	1.72E+02	95% UCL-T	W-Test (3)	1.29E+02	Mean-T	W-Test (3)
Beryllium	mg/kg	5.38E-01	(2)	3.04E+00		mg/kg	8.09E-01	95% UCL-NP	W-Test (3)	6.07E-01	Mean-NP	W-Test (3)
Cadmium	mg/kg	3.27E+00	(1)	1.41E+02		mg/kg	7.37E+00	95% UCL-NP	W-Test (3)	3.40E+00	Mean-NP	W-Test (3)
Chromium Total	mg/kg	2.31E+03	(1)	1.18E+04		mg/kg	3.02E+03	95% UCL-NP	W-Test (3)	2.30E+03	Mean-NP	W-Test (3)
Chromium VI (Hexavalent)	mg/kg	3.15E+01	(1)	4.30E+02		mg/kg	1.07E+02	95% UCL-NP	W-Test (3)	3.15E+01	Mean-NP	W-Test (3)
Cobalt	mg/kg	1.31E+01	(2)	1.32E+02		mg/kg	1.90E+01	95% UCL-T	W-Test (3)	1.29E+01	Mean-T	W-Test (3)
Copper	mg/kg	1.80E+02	(1)	5.42E+03	E	mg/kg	9.75E+02	95% UCL-NP	W-Test (3)	1.76E+02	Mean-NP	W-Test (3)
Iron	mg/kg	1.39E+04	(2)	6.55E+04		mg/kg	2.54E+04	95% UCL-T	W-Test (3)	1.64E+04	Mean-T	W-Test (3)
Lead	mg/kg	5.69E+01	(2)	1.76E+03		mg/kg	1.33E+02	95% UCL-T	W-Test (3)	5.67E+01	Mean-T	W-Test (3)
Manganese	mg/kg	3.52E+03	(1)	7.83E+04	E*	mg/kg	1.85E+04	95% UCL-NP	W-Test (3)	3.45E+03	Mean-NP	W-Test (3)
Mercury	mg/kg	5.71E-02	(1)	3.75E-01		mg/kg	9.32E-02	95% UCL-NP	W-Test (3)	7.90E-02	Mean-NP	W-Test (3)
Nickel	mg/kg	2.97E+02	(2)	5.16E+03		mg/kg	1.10E+03	95% UCL-T	W-Test (3)	4.30E+02	Mean-T	W-Test (3)
Selenium	mg/kg	5.20E+00	(1)	4.04E+01		mg/kg	8.39E+00	95% UCL-NP	W-Test (3)	5.80E+00	Mean-NP	W-Test (3)
Thallium	mg/kg	4.76E+00	(1)	8.96E+01		mg/kg	8.76E+00	95% UCL-NP	W-Test (3)	5.71E+00	Mean-NP	W-Test (3)
Vanadium	mg/kg	6.60E+01	(1)	2.78E+02		mg/kg	8.16E+01	95% UCL-NP	W-Test (3)	6.57E+01	Mean-NP	W-Test (3)
Zinc	mg/kg	1.24E+02	(2)	1.40E+03		mg/kg	2.15E+02	95% UCL-T	W-Test (3)	1.29E+02	Mean-T	W-Test (3)

Notes:

For non-detects, 1/2 laboratory detection limit was used as a proxy concentration.

W-Test : Developed by Shapiro and Francia for data sets with greater than 50 but less than 99 samples.

Statistics: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-T); Non-parametric Method used to Determine 95% UCL (95% UC Mean of Log-transformed Data (Mean-T); Mean of Normal Data (Mean-N); Non-parametric Method used to Determine Mean (Mean-NP).

E = Estimated above quantification limit.

* = Duplicate analysis not within control limits.

(1) Data set is neither normally or lognormally distributed.

(2) Data set is lognormally distributed.

(3) Shapiro-Francia W Test was used for data sets where : 50<n<100.

TABLE 3.7

EXPOSURE POINT CONCENTRATION (EPC) SUMMARY FOR CHEMICALS OF POTENTIAL CONCERN IN GROUNDWATER

OPERABLE UNIT 3

VANADIUM CORPORATION OF AMERICA

NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/ Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Ingestion and Dermal

Chemical of Potential Concern	*Units*	*Arithmetic Mean*	*95% UCL of Normal Data*	*Maximum Detected Concentration*	*Maximum Qualifier*	*EPC Units*	*Reasonable Maximum Exposure*			*Central Tendency*		
							Medium EPC Value	*Medium EPC Statistic*	*Medium EPC Rationale*	*Medium EPC Value*	*Medium EPC Statistic*	*Medium EPC Rationale*
Dissolved Metals												
Antimony	mg/L	5.52E-03	(1)	9.15E-03	J	mg/L	9.15E-03	Max	(4)	9.15E-03	Max	(4)
Arsenic	mg/L	1.56E-02	(1)	2.32E-02	J	mg/L	2.32E-02	Max	(4)	2.09E-02	Mean-NP	W-Test (3)
Chromium	mg/L	1.88E-02	(1)	1.06E-01		mg/L	3.29E-02	95% UCL-NP	W-Test (3)	2.20E-02	Mean-NP	W-Test (3)
Iron	mg/L	9.29E-01	(1)	3.92E+00		mg/L	1.81E+00	95% UCL-NP	W-Test (3)	9.70E-01	Mean-NP	W-Test (3)
Manganese	mg/L	1.86E-01	(1)	8.58E-01		mg/L	3.38E-01	95% UCL-NP	W-Test (3)	1.90E-01	Mean-NP	W-Test (3)
Selenium	mg/L	1.54E-02	(1)	5.47E-02		mg/L	2.70E-02	95% UCL-NP	W-Test (3)	2.30E-02	Mean-NP	W-Test (3)
Zinc	mg/L	7.29E-03	(1)	2.63E-02		mg/L	1.28E-02	95% UCL-NP	W-Test (3)	1.10E-02	Mean-NP	W-Test (3)
Total Metals												
Aluminum	mg/L	7.12E+00	(2)	6.43E+01		mg/L	2.33E+01	95% UCL-T	W-Test (3)	9.21E+00	Mean-T	W-Test (3)
Antimony	mg/L	6.59E-03	(1)	1.94E-02		mg/L	1.07E-02	95% UCL-NP	W-Test (3)	1.00E-02	Mean-NP	W-Test (3)
Arsenic	mg/L	1.77E-02	(1)	4.37E-02		mg/L	2.57E-02	95% UCL-NP	W-Test (3)	2.21E-02	Mean-NP	W-Test (3)
Chromium	mg/L	6.27E-02	(2)	6.55E-01		mg/L	1.53E-01	95% UCL-T	W-Test (3)	5.10E-02	Mean-T	W-Test (3)
Chromium VI (Hexavalent)	mg/L	2.23E-02	(1)	1.81E-01		mg/L	3.52E-02	95% UCL-NP	W-Test (3)	2.50E-02	Mean-NP	W-Test (3)
Iron	mg/L	9.57E+00	(1)	8.55E+01		mg/L	1.58E+01	95% UCL-NP	W-Test (3)	9.50E+00	Mean-NP	W-Test (3)
Lead	mg/L	3.75E-02	(1)	3.79E-01		mg/L	6.12E-02	95% UCL-NP	W-Test (3)	3.90E-02	Mean-NP	W-Test (3)
Manganese	mg/L	4.79E-01	(1)	2.47E+00		mg/L	7.06E-01	95% UCL-NP	W-Test (3)	4.76E-01	Mean-NP	W-Test (3)
Selenium	mg/L	2.62E-02	(1)	7.39E-02		mg/L	3.33E-02	95% UCL-NP	W-Test (3)	2.77E-02	Mean-NP	W-Test (3)
Thallium	mg/L	1.04E-02	(1)	1.58E-02	J	mg/L	1.58E-02	Max	(4)	1.58E-02	Mean-NP	(4)
Vanadium	mg/L	2.13E-02	(1)	1.61E-01		mg/L	6.44E-02	95% UCL-NP	W-Test (3)	2.31E-02	Mean-NP	W-Test (3)
Zinc	mg/L	2.14E-01	(1)	1.79E+00		mg/L	3.45E-01	95% UCL-NP	W-Test (3)	2.14E-01	Mean-NP	W-Test (3)

Notes:

For non-detects, 1/2 laboratory detection limit was used as a proxy concentration.

W-Test : Developed by Shapiro and Wilk for data sets with under 50 samples.

Statistics: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-T); Non-parametric Method used to Determine 95% UCL (95% Mean of Log-transformed Data (Mean-T); Mean of Normal Data (Mean-N); Non-parametric Method used to Determine Mean (Mean-NP).

J = Associated value is estimated.

(1) Data set is neither normally or lognormally distributed.

(2) Data set is log-normally distributed.

(3) Shapiro-Wilk W Test was used for data sets where n<=50.

(4) The exposure point concentration (EPC) calculated is greater than maximum detected concentration; therefore maximum detected concentration is the EPC.

TABLE 3.8

EXPOSURE POINT CONCENTRATION (EPC) SUMMARY FOR CHEMICALS OF POTENTIAL CONCERN IN SURFACE WATER

OPERABLE UNIT 3

VANADIUM CORPORATION OF AMERICA

NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/ Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Ingestion and Dermal

Chemical of Potential Concern	*Units*	*Arithmetic Mean*	*95% UCL of Normal Data*	*Maximum Detected Concentration*	*Maximum Qualifier*	*EPC Units*	*Reasonable Maximum Exposure*			*Central Tendency*		
							Medium EPC Value	*Medium EPC Statistic*	*Medium EPC Rationale*	*Medium EPC Value*	*Medium EPC Statistic*	*Medium EPC Rationale*
Metals												
Aluminum	mg/L	3.02E+00	(1)	6.67E+01		mg/L	5.74E+00	95% UCL-T	W-Test (3)	2.39E+00	Mean-T	W-Test (3)
Antimony	mg/L	8.14E-03	(2)	1.69E-02		mg/L	1.69E-02	Max	(4)	1.50E-02	Mean-NP	W-Test (3)
Arsenic	mg/L	1.96E-02	(1)	6.48E-02		mg/L	2.26E-02	95% UCL-T	W-Test (3)	1.96E-02	Mean-T	W-Test (3)
Barium	mg/L	1.92E-01	(2)	2.53E+00		mg/L	3.37E-01	95% UCL-NP	W-Test (3)	1.90E-01	Mean-NP	W-Test (3)
Beryllium	mg/L	2.38E-03	(2)	3.04E-03	J	mg/L	3.04E-03	Max	(4)	3.04E-03	Max	(4)
Chromium	mg/L	2.63E-01	(1)	6.39E+00		mg/L	6.84E-01	95% UCL-T	W-Test (3)	2.80E-01	Mean-T	W-Test (3)
Chromium VI (Hexavalent)	mg/L	6.12E-02	(2)	5.71E-01		mg/L	1.02E-01	95% UCL-NP	W-Test (3)	6.30E-02	Mean-NP	W-Test (3)
Copper	mg/L	3.86E-02	(2)	1.09E+00		mg/L	2.66E-01	95% UCL-NP	W-Test (3)	4.20E-02	Mean-NP	W-Test (3)
Iron	mg/L	5.43E+00	(2)	1.51E+02		mg/L	3.15E+01	95% UCL-NP	W-Test (3)	5.30E+00	Mean-NP	W-Test (3)
Lead	mg/L	2.95E-02	(2)	8.65E-01		mg/L	1.84E-01	95% UCL-NP	W-Test (3)	3.00E-02	Mean-NP	W-Test (3)
Manganese	mg/L	7.68E-01	(1)	1.92E+01		mg/L	1.91E+00	95% UCL-T	W-Test (3)	7.19E-01	Mean-T	W-Test (3)
Mercury	mg/L	1.93E-04	(2)	1.30E-03		mg/L	4.00E-04	95% UCL-NP	W-Test (3)	3.60E-04	Mean-NP	W-Test (3)
Nickel	mg/L	2.00E-02	(2)	5.44E-01		mg/L	1.44E-01	95% UCL-NP	W-Test (3)	2.40E-02	Mean-NP	W-Test (3)
Selenium	mg/L	1.54E-02	(2)	9.57E-02		mg/L	2.58E-02	95% UCL-NP	W-Test (3)	2.30E-02	Mean-NP	W-Test (3)
Thallium	mg/L	2.13E-02	(2)	9.36E-02		mg/L	3.42E-02	95% UCL-NP	W-Test (3)	2.90E-02	Mean-NP	W-Test (3)
Vanadium	mg/L	1.51E-02	(2)	2.31E-01		mg/L	2.84E-02	95% UCL-NP	W-Test (3)	2.10E-02	Mean-NP	W-Test (3)
Zinc	mg/L	1.01E-01	(2)	2.84E+00		mg/L	2.66E-01	95% UCL-NP	W-Test (3)	9.93E-02	Mean-NP	W-Test (3)

Notes:

For non-detects, 1/2 laboratory detection limit was used as a proxy concentration.

W-Test : Developed by Shapiro and Wilk for data sets with under 50 samples.

Statistics: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-T); Non-parametric Method used to Determine 95% UCL (95% U
Mean of Log-transformed Data (Mean-T); Mean of Normal Data (Mean-N); Non-parametric Method used to Determine Mean (Mean-NP).

J = Associated value is estimated.

(1) Data set is log-normally distributed.

(2) Data set is neither normally or lognormally distributed.

(3) Shapiro-Wilk W Test was used for data sets where n<=50.

(4) The exposure point concentration (EPC) calculated is greater than maximum detected concentration; therefore maximum detected concentration is the EPC.

TABLE 3.9

EXPOSURE POINT CONCENTRATION (EPC) SUMMARY FOR CHEMICALS OF POTENTIAL CONCERN IN SEDIMENT

OPERABLE UNIT 3

VANADIUM CORPORATION OF AMERICA

NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Ingestion and Dermal

Chemical of Potential Concern	*Units*	*Arithmetic Mean*	*95% UCL of Normal Data*	*Maximum Detected Concentration*	*Maximum Qualifier*	*EPC Units*	*Reasonable Maximum Exposure*			*Central Tendency*		
							Medium EPC Value	*Medium EPC Statistic*	*Medium EPC Rationale*	*Medium EPC Value*	*Medium EPC Statistic*	*Medium EPC Rationale*
Metals												
Arsenic	mg/kg	6.99E+00	(1)	2.79E+01		mg/kg	1.34E+01	95% UCL-NP	W-Test (3)	7.94E+00	Mean-NP	W-Test (3)
Barium	mg/kg	1.93E+02	(1)	6.66E+02		mg/kg	4.89E+02	95% UCL-NP	W-Test (3)	1.92E+02	Mean-NP	W-Test (3)
Beryllium	mg/kg	5.06E-01	6.30E-01	1.09E+00		mg/kg	6.30E-01	95% UCL-N	W-Test (3)	5.06E-01	Mean-N	W-Test (3)
Cadmium	mg/kg	4.83E-01	(1)	2.10E+00		mg/kg	9.08E-01	95% UCL-NP	W-Test (3)	7.52E-01	Mean-NP	W-Test (3)
Chromium	mg/kg	3.81E+02	(2)	2.38E+03	N*	mg/kg	1.02E+03	95% UCL-T	W-Test (3)	4.09E+02	Mean-T	W-Test (3)
Copper	mg/kg	4.81E+01	(2)	3.07E+02		mg/kg	1.28E+02	95% UCL-T	W-Test (3)	5.42E+01	Mean-T	W-Test (3)
Iron	mg/kg	1.88E+04	2.39E+04	4.26E+04		mg/kg	2.39E+04	95% UCL-N	W-Test (3)	1.88E+04	Mean-N	W-Test (3)
Mercury	mg/kg	8.58E-02	(2)	4.20E-01		mg/kg	1.59E-01	95% UCL-NP	W-Test (3)	9.75E-02	Mean-NP	W-Test (3)
Nickel	mg/kg	4.56E+01	(2)	2.16E+02		mg/kg	1.41E+02	95% UCL-T	W-Test (3)	5.81E+01	Mean-T	W-Test (3)
Selenium	mg/kg	1.02E+01	1.28E+01	2.51E+01		mg/kg	1.28E+01	95% UCL-N	W-Test (3)	1.01E+01	Mean-N	W-Test (3)
Zinc	mg/kg	1.88E+02	(2)	7.98E+02		mg/kg	3.48E+02	95% UCL-T	W-Test (3)	1.95E+02	Mean-T	W-Test (3)

Notes:

For non-detects, 1/2 laboratory detection limit was used as a proxy concentration.

W-Test : Developed by Shapiro and Wilk for data sets with under 50 samples.

Statistics: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-T); Non-parametric Method used to Determine 95% UCL (95% UC
Mean of Log-transformed Data (Mean-T); Mean of Normal Data (Mean-N); Non-parametric Method used to Determine Mean (Mean-NP).

J = Associated value is estimated.

N = Spike sample recovery not within control limits.

* = Duplicate analysis not within control limits.

(1) Data set is neither normally or lognormally distributed.

(2) Data set is log-normally distributed.

(3) Shapiro-Wilk W Test was used for data sets where n<=50.

TABLE 3.10

VALUES USED FOR DAILY INTAKE CALCULATIONS FOR SOIL AND SLAG - CURRENT MAINTENANCE WORKER
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Medium: Surface Soil and Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Maintenance Worker
Receptor Age: Adults

Exposure Route	*Parameter Code*	*Parameter Definition*	*Units*	*RME Value*	*RME Rationale/ Reference*	*CT Value*	*CT Rationale/ Reference*	*Intake Equation/ Model Name*
Ingestion	CS	Chemical Concentration in Soil	mg/kg	(1)	(1)	(1)	(1)	Chronic Daily Intake (CDI) (mg/kg-day) =
	IR	Ingestion Rate of Soil	mg/day	100	USEPA, 2002	100	USEPA, 2002	CS x IR x ABS x CF x EF x ED x 1/BW x 1/AT
	CF	Conversion Factor	kg/mg	1.00E-06	--	1.00E-06	--	
	EF	Exposure Frequency	days/year	16	Professional Judgement (2)	8	Professional Judgement (2)	
	ED	Exposure Duration	years	25	USEPA, 2004	9	USEPA, 2004	
	BW	Body Weight	kg	70	USEPA, 2002	70	USEPA, 2002	
	AT-C	Averaging Time (cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (non-cancer)	days	9,125	USEPA, 1989	3,285	USEPA, 1989	
	ABS	Absorption Factor	%/100	1	Professional Judgement (3)	1	Professional Judgement (3)	
Dermal	CS	Chemical Concentration in Soil	mg/kg	(1)	(1)	(1)	(1)	CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	3,300	USEPA, 2004	3,300	USEPA, 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
	CF	Conversion Factor	kg/mg	1.00E-06	--	1.00E-06	--	
	EF	Exposure Frequency	days/year	16	Professional Judgement (2)	8	Professional Judgement (2)	
	ED	Exposure Duration	years	25	USEPA, 2004	9	USEPA, 2004	
	BW	Body Weight	kg	70	USEPA, 2002	70	USEPA, 2002	
	AT-C	Averaging Time (cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (non-cancer)	days	9,125	USEPA, 1989	3,285	USEPA, 1989	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	USEPA, 2004	0.02	USEPA, 2004	
	ABS	Absorption Factor	%/100	chemical-specific	USEPA, 2004 (4)	chemical-specific	USEPA, 2004 (4)	
Inhalation	CS	Chemical Concentration in Soil	mg/kg	(1)	(1)	(1)	(1)	CDI (mg/kg-day) =
	INR	Inhalation Rate	m^3/hr	0.83	USEPA, 2002	0.83	USEPA, 2002	CS x INR x ET x EF x ED x 1/PEF x 1/BW x 1/AT
	ET	Exposure Time	hrs/day	8	Professional Judgement (5)	8	Professional Judgement (5)	
	EF	Exposure Frequency	days/year	16	Professional Judgement (2)	8	Professional Judgement (2)	
	ED	Exposure Duration	years	25	USEPA, 2004	9	USEPA, 2004	
	BW	Body Weight	kg	70	USEPA, 2002	70	USEPA, 2002	
	AT-C	Averaging Time (cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (non-cancer)	days	9,125	USEPA, 1989	3,285	USEPA, 1989	
	PEF	Particulate Emission Factor	m^3/kg	1.36E+09	USEPA, 2002	1.36E+09	USEPA, 2002	

Notes:

(1) For surface soil concentrations including slag, see Table 3.1. For surface soil concentrations only, see Table 3.2. For slag concentrations only, see Table 3.3.

(2) Professional Judgement; commercial worker will do maintenance for 2 days/month from April to November or 16 days (RME) and 1 day/month from April to November or 1 days (CT).

(3) Professional Judgment; assumed 100% absorption for conservatism.

(4) Published numbers include: Arsenic (3%), Cadmium (0.1%), Metals (1%).

(5) Professional Judgment; assumed 8 hour work day.

Sources :

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part A OERR. EPA/540-1-89-002.

USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, OSWER 9355.4-24, December 2002.

USEPA, 2004: RAGs Volume 1, Human Health Evaluation Manual, Part E: Supplemental Guidance for Dermal Risk Assessment, EPA/540/R/99/005, July 2004.

TABLE 3.11

VALUES USED FOR DAILY INTAKE CALCULATIONS FOR SURFACE SOIL AND SLAG - CURRENT/FUTURE TRESPASSER
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Medium: Surface Soil and Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Trespasser
Receptor Age: Adolescent

Exposure Route	*Parameter Code*	*Parameter Definition*	*Units*	*RME Value*	*RME Rationale/ Reference*	*CT Value*	*CT Rationale/ Reference*	*Intake Equation/ Model Name*
Ingestion	CS	Chemical Concentration in Soil	mg/kg	(1)	(1)	(1)	(1)	Chronic Daily Intake (CDI) (mg/kg-day) =
	IR	Ingestion Rate of Soil	mg/day	100	USEPA, 1997	100	USEPA, 1997	CS x IR x ABS x CF x EF x ED x 1/BW x 1/AT
	CF	Conversion Factor	kg/mg	1.00E-06	–	1.00E-06	–	
	EF	Exposure Frequency	days/year	128	Professional Judgement (2)	64	Professional Judgement (2)	
	ED	Exposure Duration	years	12	Professional Judgement (3)	12	Professional Judgement (3)	
	BW	Body Weight	kg	50	USEPA, 1997 (4)	50	USEPA, 1997 (4)	
	AT-C	Averaging Time (cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (non-cancer)	days	4,380	USEPA, 1989	4,380	USEPA, 1989	
	ABS	Absorption Factor	%/100	1	Professional Judgement (5)	1	Professional Judgement (5)	
Dermal	CS	Chemical Concentration in Soil	mg/kg	(1)	(1)	(1)	(1)	CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	4,400	USEPA, 1997 (6)	4,400	USEPA, 1997 (6)	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
	CF	Conversion Factor	kg/mg	1.00E-06	–	1.00E-06	–	
	EF	Exposure Frequency	days/year	128	Professional Judgement (2)	64	Professional Judgement (2)	
	ED	Exposure Duration	years	12	Professional Judgement (3)	12	Professional Judgement (3)	
	BW	Body Weight	kg	50	USEPA, 1997 (4)	50	USEPA, 1997 (4)	
	AT-C	Averaging Time (cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (non-cancer)	days	4,380	USEPA, 1989	4,380	USEPA, 1989	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	USEPA, 2004	0.04	USEPA, 2004	
	ABS	Absorption Factor	%/100	chemical-specific	USEPA, 2004 (7)	chemical-specific	USEPA, 2004 (7)	
Inhalation	CS	Chemical Concentration in Surface Soil	mg/kg	(1)	(1)	(1)	(1)	CDI (mg/kg-day) =
	INR	Inhalation Rate	m^3/hr	1.2	USEPA, 1997 (8)	1.2	USEPA, 1997 (8)	CS x INR x ET x EF x ED x 1/PEF x 1/BW x 1/AT
	ET	Exposure Time	hrs/day	4	Professional Judgement (9)	2	Professional Judgement (9)	
	EF	Exposure Frequency	days/year	128	Professional Judgement (2)	64	Professional Judgement (2)	
	ED	Exposure Duration	years	12	Professional Judgement (3)	12	Professional Judgement (3)	
	BW	Body Weight	kg	50	USEPA, 1997 (4)	50	USEPA, 1997 (4)	
	AT-C	Averaging Time (cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (non-cancer)	days	4,380	USEPA, 1989	4,380	USEPA, 1989	
	PEF	Particulate Emission Factor	m^3/kg	1.36E+09	USEPA, 2002	1.36E+09	USEPA, 2002	

Notes:

(1) For surface soil concentrations including slag, see Table 3.1. For surface soil concentrations only, see Table 3.2. For slag concentrations only, see Table 3.3.
(2) Professional Judgement; adolescent will trespass for 16 days/month from April to November or 128 days (RME) and 8 days/month from April to November or 64 days (CT).
(3) Trespasser is an 7 through 18 year old therefore the exposure duration is 12 years.
(4) Body weight is the average of 13 yr old mean body weights, Table 7-3 of Exposure Factor Handbook, Volume 1.
(5) Professional Judgement; assumed 100% absorption for conservatism.
(6) Skin surface area for youths aged 12-13 yrs old; assuming 25% of the total body surface area is exposed.
(7) Published numbers include: Arsenic (3%), Cadmium (0.1%), Metals (1%).
(8) Recommended short-term exposure inhalation rate for children performing moderate activities, Table 5-23 of Exposure Factor Handbook, Volume 1.
(9) Professional Judgement; adolescent will trespass for 2 hours (CT) and 4 hours (RME).

Sources :

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part A OERR. EPA/540-1-89-002.
USEPA, 1997: Exposure Factors Handbook. Volume. 1: General Factors. EPA/600/P-95/002Fa. August 1997.
USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, OSWER 9355.4-24, December 2002.
USEPA, 2004: RAGs Volume 1, Human Health Evaluation Manual, Part E: Supplemental Guidance for Dermal Risk Assessment, EPA/540/R/99/005, July 2004.

TABLE 3.12

VALUES USED FOR DAILY INTAKE CALCULATIONS FOR SOIL AND SLAG - FUTURE INDUSTRIAL/ COMMERCIAL WORKER
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Soil and Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Industrial/ Commercial Worker
Receptor Age: Adults

Exposure Route	*Parameter Code*	*Parameter Definition*	*Units*	*RME Value*	*RME Rationale/ Reference*	*CT Value*	*CT Rationale/ Reference*	*Intake Equation/ Model Name*
Ingestion	CS	Chemical Concentration in Soil	mg/kg	(1)	(1)	(1)	(1)	Chronic Daily Intake (CDI) (mg/kg-day) =
	IR	Ingestion Rate of Soil	mg/day	100	USEPA, 2002	100	USEPA, 2002	CS x IR x ABS x CF x EF x ED x 1/BW x 1/AT
	CF	Conversion Factor	kg/mg	1.00E-06	–	1.00E-06	–	
	EF	Exposure Frequency	days/year	250	USEPA, 2004	219	USEPA, 2004	
	ED	Exposure Duration	years	25	USEPA, 2004	9	USEPA, 2004	
	BW	Body Weight	kg	70	USEPA, 2002	70	USEPA, 2002	
	AT-C	Averaging Time (cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (non-cancer)	days	9,125	USEPA, 1989	3,285	USEPA, 1989	
	ABS	Absorption Factor	%/100	1	Professional Judgement (2)	1	Professional Judgement (2)	
Dermal	CS	Chemical Concentration in Soil	mg/kg	(1)	(1)	(1)	(1)	CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	3,300	USEPA, 2004	3,300	USEPA, 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
	CF	Conversion Factor	kg/mg	1.00E-06	–	1.00E-06	–	
	EF	Exposure Frequency	days/year	250	USEPA, 2004	219	USEPA, 2004	
	ED	Exposure Duration	years	25	USEPA, 2004	9	USEPA, 2004	
	BW	Body Weight	kg	70	USEPA, 2002	70	USEPA, 2002	
	AT-C	Averaging Time (cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (non-cancer)	days	9,125	USEPA, 1989	3,285	USEPA, 1989	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	USEPA, 2004	0.02	USEPA, 2004	
	ABS	Absorption Factor	%/100	chemical-specific	USEPA, 2004 (3)	chemical-specific	USEPA, 2004 (3)	
Inhalation	CS	Chemical Concentration in Soil	mg/kg	(1)	(1)	(1)	(1)	CDI (mg/kg-day) =
	INR	Inhalation Rate	m^3/hr	0.83	USEPA, 2002	0.83	USEPA, 2002	CS x INR x ET x EF x ED x 1/PEF x 1/BW x 1/AT
	ET	Exposure Time	hrs/day	8	Professional Judgement (4)	8	Professional Judgement (4)	
	EF	Exposure Frequency	days/year	250	USEPA, 2004	219	USEPA, 2004	
	ED	Exposure Duration	years	25	USEPA, 2004	9	USEPA, 2004	
	BW	Body Weight	kg	70	USEPA, 2002	70	USEPA, 2002	
	AT-C	Averaging Time (cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (non-cancer)	days	9,125	USEPA, 1989	3,285	USEPA, 1989	
	PEF	Particulate Emission Factor	m^3/kg	1.36E+09	USEPA, 2002	1.36E+09	USEPA, 2002	

Notes:
(1) For soil concentrations including slag, see Table 3.4. For soil concentrations only, see Table 3.5. For slag concentrations only, see Table 3.6.
(2) Professional Judgment; assumed 100% absorption for conservatism.
(3) Published numbers include: Arsenic (3%), Cadmium (0.1%), Metals (1%).
(4) Professional Judgment; assumed 8 hour work day.

Sources :
USEPA, 1989: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part A OERR. EPA/540-1-89-002.
USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, OSWER 9355.4-24, December 2002.
USEPA, 2004: RAGs Volume 1, Human Health Evaluation Manual, Part E: Supplemental Guidance for Dermal Risk Assessment, EPA/540/R/99/005, July 2004.

TABLE 3.13

VALUES USED FOR DAILY INTAKE CALCULATIONS FOR SOIL AND SLAG - FUTURE CONSTRUCTION/ UTILITY WORKER
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Soil and Slag
Exposure Medium: Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Construction/ Utility Worker
Receptor Age: Adults

Exposure Route	*Parameter Code*	*Parameter Definition*	*Units*	*RME Value*	*RME Rationale/ Reference*	*CT Value*	*CT Rationale/ Reference*	*Intake Equation/ Model Name*
Ingestion	CS	Chemical Concentration in Soil	mg/kg	(1)	(1)	(1)	(1)	Chronic Daily Intake (CDI) (mg/kg-day) =
	IR	Ingestion Rate of Soil	mg/day	330	USEPA, 2002	330	USEPA, 2002	CS x IR x ABS x CF x EF x ED x 1/BW x 1/AT
	CF	Conversion Factor	kg/mg	1.00E-06	--	1.00E-06	--	
	EF	Exposure Frequency	days/year	20	Professional Judgement (2)	10	Professional Judgement (2)	
	ED	Exposure Duration	years	1	Professional Judgement	1	Professional Judgement	
	BW	Body Weight	kg	70	USEPA, 2002	70	USEPA, 2002	
	AT-C	Averaging Time (cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (non-cancer)	days	365	USEPA, 1989	365	USEPA, 1989	
	ABS	Absorption Factor	%/100	1	Professional Judgement (3)	1	Professional Judgement (3)	
Dermal	CS	Chemical Concentration in Soil	mg/kg	(1)	(1)	(1)	(1)	CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	3,300	USEPA, 2004	3,300	USEPA, 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
	CF	Conversion Factor	kg/mg	1.00E-06	--	1.00E-06	--	
	EF	Exposure Frequency	days/year	20	Professional Judgement (2)	10	Professional Judgement (2)	
	ED	Exposure Duration	years	1	Professional Judgement	1	Professional Judgement	
	BW	Body Weight	kg	70	USEPA, 2002	70	USEPA, 2002	
	AT-C	Averaging Time (cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (non-cancer)	days	365	USEPA, 1989	365	USEPA, 1989	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.3	USEPA, 2004	0.1	USEPA, 2004	
	ABS	Absorption Factor	%/100	chemical-specific	USEPA, 2004 (4)	chemical-specific	USEPA, 2004 (4)	
Inhalation	CS	Chemical Concentration in Soil	mg/kg	(1)	(1)	(1)	(1)	CDI (mg/kg-day) =
	INR	Inhalation Rate	m^3/hr	0.83	USEPA, 2002	0.83	USEPA, 2002	CS x INR x ET x EF x ED x 1/PEF x 1/BW x 1/AT
	ET	Exposure Time	hrs/day	8	Professional Judgement (5)	8	Professional Judgement (5)	
	EF	Exposure Frequency	days/year	20	Professional Judgement (2)	10	Professional Judgement (2)	
	ED	Exposure Duration	years	1	Professional Judgement	1	Professional Judgement	
	BW	Body Weight	kg	70	USEPA, 2002	70	USEPA, 2002	
	AT-C	Averaging Time (cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (non-cancer)	days	365	USEPA, 1989	365	USEPA, 1989	
	PEF	Particulate Emission Factor	m^3/kg	4.72E+07	See Table 3.14	4.72E+07	See Table 3.14	

Notes:
(1) For soil concentrations including slag, see Table 3.4. For soil concentrations only, see Table 3.5. For slag concentrations only, see Table 3.6.
(2) Professional Judgement; assumes 2 weeks (CT) and one month (RME) excavation period during a construction campaign.
(3) Professional Judgement; assumed 100% absorption for conservatism.
(4) Published numbers include: Arsenic (3%), Cadmium (0.1%), Metals (1%).
(5) Professional Judgement; assumed 8-hour work day.

Sources :
USEPA, 1989: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part A OERR. EPA/540-1-89-002.
USEPA, 2002: USEPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, OSWER 9355.4-24, December 2002.
USEPA, 2004: RAGs Volume 1, Human Health Evaluation Manual, Part E: Supplemental Guidance for Dermal Risk Assessment, EPA/540/R/99/005, July 2004.

TABLE 3.14

DERIVATION OF PARTICULATE EMISSION FACTOR (PEF) - CONSTRUCTION/ UTILITY WORKER INHALATION EXPOSURE TO PARTICULATES
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

$$PEF_{SC} = Q/C_{sr} \times 1/F_D \times [(T \times A_R) / (556 \times ((W/3)^{0.4} \times ((365\ d/y - p) / 365\ d/y) \times VKT)]$$

$$Q/C_{sr} = A \times EXP [(\ln A_s - B)^2 / C]$$

INPUT PARAMETERS		*REFERENCE*
PEF_{sc}/ subchronic road particulate emission factor (m^3/kg) =	**4.72E+07**	Equation 5-5, USEPA, 2002
Q/C_{sr}/ inverse of ratio of the 1-h geometric mean air concentration =	13.22	Equation 5-6, USEPA, 2002
A/ constant (unitless) =	12.9351	USEPA, 2002
B/ constant (unitless) =	5.7383	USEPA, 2002
C/ constant (unitless) =	71.7711	USEPA, 2002
A_s/ areal extent of site surface soil contamination (acres) =	88.0	Site Specific
F_D/ dispersion correction factor (unitless) =	0.185	USEPA, 2002
T/ total time over which construction occurs (s) =	3.15E+07	USEPA, 2002 (site-specific, within a 1 year construction campaign)
A_R/ surface area of contaminated road segment (m^2) =	3,638	Site Specific (A_R = LR*WR*0.092903 m^2/ft^2)
LR - length of road segment (ft) =	1,958	Site Specific
WR - width of road segment (ft) =	20	USEPA, 2002
W/ mean vehicle weight (tons) =	8	USEPA, 2002, Assumes 20 two-ton cars and 10 twenty-ton trucks (W = (20*2+10*20)/30)
p/ number of days with at least 0.01 inches of precipitation (days/yr) =	150	USEPA, 2002
VKT/ sum of fleet vehicle kilometres traveled during the exposure duration (km) =	358.2	Assuming that the area is configured as a square with the unpaved construction access road segment dividing the square evenly, the road length would be equal to the square root of 356,123 m^2, 596.8 m (0.597 km). Assuming that each vehicle travels the length of the road once per day, 5 days per week for a total of 20 days, (30*0.597*20).

Reference:
USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, Office of Emergency and Remedial Response, OSWER 9355.4-24, December 2002.

TABLE 3.15

VALUES USED FOR DAILY INTAKE CALCULATIONS FOR GROUNDWATER - FUTURE CONSTRUCTION/ UTILITY WORKER
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Ingestion and Dermal
Receptor Population: Construction/ Utility Worker
Receptor Age: Adult

Exposure Route	*Parameter Code*	*Parameter Definition*	*Units*	*RME Value*	*RME Rationale/ Reference*	*CT Value*	*CT Rationale/ Reference*	*Intake Equation/ Model Name*
Ingestion	CW	Chemical Concentration in Groundwater	mg/L	(1)	(1)	(1)	(1)	CDI (mg/kg-day) =
	IR	Ingestion Rate	L/hour	0.005	USEPA, 1989 (2)	0.005	USEPA, 1989 (2)	CW x IR x ET x EF x ED x 1/BW x 1/AT
	ET	Exposure Time	hour/day	2	Professional Judgement (3)	1	Professional Judgement (3)	
	EF	Exposure Frequency	days/year	20	Professional Judgement (4)	10	Professional Judgement (4)	
	ED	Exposure Duration	years	1	Professional Judgement	1	Professional Judgement	
	BW	Body Weight	kg	70	USEPA, 2002	70	USEPA, 2002	
	AT-C	Averaging Time (cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (non-cancer)	days	365	USEPA, 1989	365	USEPA, 1989	
Dermal	CW	Chemical Concentration in Groundwater	mg/L	(1)	(1)	(1)	(1)	CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	3,300	USEPA, 2004	3,300	USEPA, 2004	CW x SA x CF x PC x ET x EF x ED x 1/BW x 1/AT
	CF	Conversion Factor	L/cm^3	0.001	--	0.001	--	
	ET	Exposure Time	hour/day	2	Professional Judgement (3)	1	Professional Judgement (3)	
	EF	Exposure Frequency	days/year	20	Professional Judgement (4)	10	Professional Judgement (4)	
	ED	Exposure Duration	years	1	Professional Judgement	1	Professional Judgement	
	BW	Body Weight	kg	70	USEPA, 2002	70	USEPA, 2002	
	AT-C	Averaging Time (cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (non-cancer)	days	365	USEPA, 1989	365	USEPA, 1989	
	PC	Permeability Constant	cm/hour	chemical-specific	USEPA, 2004	chemical-specific	USEPA, 2004	

Notes:

(1) For groundwater concentrations, see Table 3.7.

(2) The inadvertent groundwater ingestion rate is 5 ml/hour or 0.005 L/hour. The incidental ingestion rate of 50 ml/hour as specified in RAGS Part A (1989) was derived from the incidental water ingestion rate for an adult while swimming. Because the workers are not swimming in the exposed groundwater, but instead may have only occasional limited contact, a factor of 10 was applied to arrive at the reasonable incidental ingestion rate of 0.005 L/hr.

(3) Professional Judgement; assumes worker is in direct contact with groundwater for 1 hour/day (CT) and 2 hours/day (RME).

(4) Professional Judgement; assumes 2 weeks (CT) and one month (RME) excavation period during a construction campaign.

Sources :

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part A OERR. EPA/540-1-89-002.

USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, OSWER 9355.4-24, December 2002.

USEPA, 2004: RAGs Volume 1, Human Health Evaluation Manual, Part E: Supplemental Guidance for Dermal Risk Assessment, EPA/540/R/99/005, July 2004.

TABLE 3.16

VALUES USED FOR DAILY INTAKE CALCULATIONS FOR SURFACE WATER - CURRENT MAINTENANCE WORKER
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Ingestion and Dermal
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	*Parameter Code*	*Parameter Definition*	*Units*	*RME Value*	*RME Rationale/ Reference*	*CT Value*	*CT Rationale/ Reference*	*Intake Equation/ Model Name*
Ingestion	CW	Chemical Concentration in Surface Water	mg/L	(1)	(1)	(1)	(1)	CDI (mg/kg-day) =
	IR	Ingestion Rate	L/hour	0.005	USEPA, 1989 (2)	0.005	USEPA, 1989 (2)	CW x IR x ET x EF x ED x 1/BW x 1/AT
	ET	Exposure Time	hour/day	1	Professional Judgement (3)	0.5	Professional Judgement (3)	
	EF	Exposure Frequency	days/year	16	Professional Judgement (4)	8	Professional Judgement (4)	
	ED	Exposure Duration	years	25	USEPA, 2004	9	USEPA, 2004	
	BW	Body Weight	kg	70	USEPA, 2002	70	USEPA, 2002	
	AT-C	Averaging Time (cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (non-cancer)	days	9,125	USEPA, 1989	3,285	USEPA, 1989	
Dermal	CW	Chemical Concentration in Surface Water	mg/L	(1)	(1)	(1)	(1)	CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	3,300	USEPA, 2004	3,300	USEPA, 2004	CW x SA x CF x PC x ET x EF x ED x 1/BW x 1/AT
	CF	Conversion Factor	L/cm^3	0.001	–	0.001	–	
	ET	Exposure Time	hour/day	1	Professional Judgement (3)	0.5	Professional Judgement (3)	
	EF	Exposure Frequency	days/year	16	Professional Judgement (4)	8	Professional Judgement (4)	
	ED	Exposure Duration	years	25	USEPA, 2004	9	USEPA, 2004	
	BW	Body Weight	kg	70	USEPA, 2002	70	USEPA, 2002	
	AT-C	Averaging Time (cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (non-cancer)	days	9,125	USEPA, 1989	3,285	USEPA, 1989	
	PC	Permeability Constant	cm/hour	chemical-specific	USEPA, 2004	chemical-specific	USEPA, 2004	

Notes:

(1) For surface water concentrations, see Table 3.8

(2) The inadvertent surface water ingestion rate is 5 ml/hour or 0.005 L/hour. The incidental ingestion rate of 50 ml/hour as specified in USEPA (1989) was derived from the incidental water ingestion rate for an adult while swimming. Because the workers are not swimming in the surface water, but instead may have only occasional limited contact, a factor of 10 was applied to arrive at the reasonable incidental ingestion rate of 0.005 L/hr.

(3) Professional Judgment; assumes worker is in direct contact with surface water for half an hour/day (CT) and 1 hour/day (RME).

(4) Professional Judgement; commercial worker will do maintenance for 2 days/month from April to November or 16 days (RME) and 1 day/month from April to November or 1 days (CT).

Sources :

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part A OERR. EPA/540-1-89-002.

USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, OSWER 9355.4-24, December 2002.

USEPA, 2004: RAGs Volume 1, Human Health Evaluation Manual, Part E: Supplemental Guidance for Dermal Risk Assessment, EPA/540/R/99/005, July 2004.

TABLE 3.17

VALUES USED FOR DAILY INTAKE CALCULATIONS FOR SURFACE WATER - CURRENT/FUTURE TRESPASSER
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Ingestion and Dermal
Receptor Population: Trespasser
Receptor Age: Adolescent

Exposure Route	*Parameter Code*	*Parameter Definition*	*Units*	*RME Value*	*RME Rationale/ Reference*	*CT Value*	*CT Rationale/ Reference*	*Intake Equation/ Model Name*
Ingestion	CW	Chemical Concentration in Surface Water	mg/L	(1)	(1)	(1)	(1)	CDI (mg/kg-day) =
	IR	Ingestion Rate	L/hour	0.005	USEPA, 1989 (2)	0.005	USEPA, 1989 (2)	CW x IR x ET x EF x ED x 1/BW x 1/AT
	ET	Exposure Time	hour/day	4	Professional Judgement (3)	2	Professional Judgement (3)	
	EF	Exposure Frequency	days/year	128	Professional Judgement (4)	64	Professional Judgement (4)	
	ED	Exposure Duration	years	12	Professional Judgement (5)	12	Professional Judgement (5)	
	BW	Body Weight	kg	50	USEPA, 1997 (6)	50	USEPA, 1997 (6)	
	AT-C	Averaging Time (cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (non-cancer)	days	4,380	USEPA, 1989	4,380	USEPA, 1989	
Dermal	CW	Chemical Concentration in Surface Water	mg/L	(1)	(1)	(1)	(1)	CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	4,400	USEPA, 1997 (7)	4,400	USEPA, 1997 (7)	CW x SA x CF x PC x ET x EF x ED x 1/BW x 1/AT
	CF	Conversion Factor	L/cm^3	0.001	--	0.001	--	
	ET	Exposure Time	hour/day	4	Professional Judgement (3)	2	Professional Judgement (3)	
	EF	Exposure Frequency	days/year	128	Professional Judgement (4)	64	Professional Judgement (4)	
	ED	Exposure Duration	years	12	Professional Judgement (5)	12	Professional Judgement (5)	
	BW	Body Weight	kg	50	USEPA, 1997 (6)	50	USEPA, 1997 (6)	
	AT-C	Averaging Time (cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (non-cancer)	days	4,380	USEPA, 1989	4,380	USEPA, 1989	
	PC	Permeability Constant	cm/hour	chemical-specific	USEPA, 2004	chemical-specific	USEPA, 2004	

Notes:

(1) For surface water concentrations, see Table 3.8

(2) The inadvertent surface water ingestion rate is 5 ml/hour or 0.005 L/hour. The incidental ingestion rate of 50 ml/hour as specified in USEPA (1989) was derived from the incidental water ingestion rate for an adult while swimming. Because the trespassers are not swimming in the surface water, but instead may have only occasional limited contact, a factor of 10 was applied to arrive at the reasonable incidental ingestion rate of 0.005 L/hr.

(3) Professional Judgement; adolescent will trespass for 2 hours (CT) and 4 hours (RME).

(4) Professional Judgement; adolescent will trespass for 16 days/month from April to November or 128 days (RME) and 8 days/month from April to November or 64 days (CT).

(5) Trespasser is an 7 through 18 year old therefore the exposure duration is 12 years.

(6) Body weight is the average of 13 yr old mean body weights, Table 7-3 of Exposure Factor Handbook, Volume 1.

(7) Skin surface area for youths aged 12-13 yrs old; assuming 25% of the total body surface area is exposed.

Sources :

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part A OERR. EPA/540-1-89-002.

USEPA, 1997: Exposure Factors Handbook. Volume. 1: General Factors. EPA/600/P-95/002Fa. August 1997.

USEPA, 2004: RAGs Volume 1, Human Health Evaluation Manual, Part E: Supplemental Guidance for Dermal Risk Assessment, EPA/540/R/99/005, July 2004.

TABLE 3.18

VALUES USED FOR DAILY INTAKE CALCULATIONS FOR SURFACE WATER - FUTURE INDUSTRIAL/ COMMERCIAL WORKER
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Ingestion and Dermal
Receptor Population: Industrial/ Commercial Worker
Receptor Age: Adult

Exposure Route	*Parameter Code*	*Parameter Definition*	*Units*	*RME Value*	*RME Rationale/ Reference*	*CT Value*	*CT Rationale/ Reference*	*Intake Equation/ Model Name*
Ingestion	CW	Chemical Concentration in Surface Water	mg/L	(1)	(1)	(1)	(1)	CDI (mg/kg-day) =
	IR	Ingestion Rate	L/hour	0.005	USEPA, 1989 (2)	0.005	USEPA, 1989 (2)	CW x IR x ET x EF x ED x 1/BW x 1/AT
	ET	Exposure Time	hour/day	1	Professional Judgement (3)	0.5	Professional Judgement (3)	
	EF	Exposure Frequency	days/year	250	USEPA, 2004	219	USEPA, 2004	
	ED	Exposure Duration	years	25	USEPA, 2004	9	USEPA, 2004	
	BW	Body Weight	kg	70	USEPA, 2002	70	USEPA, 2002	
	AT-C	Averaging Time (cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (non-cancer)	days	9,125	USEPA, 1989	3,285	USEPA, 1989	
Dermal	CW	Chemical Concentration in Surface Water	mg/L	(1)	(1)	(1)	(1)	CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	3,300	USEPA, 2004	3,300	USEPA, 2004	CW x SA x CF x PC x ET x EF x ED x 1/BW x 1/AT
	CF	Conversion Factor	L/cm^3	0.001	–	0.001	–	
	ET	Exposure Time	hour/day	1	Professional Judgement (3)	0.5	Professional Judgement (3)	
	EF	Exposure Frequency	days/year	250	USEPA, 2004	219	USEPA, 2004	
	ED	Exposure Duration	years	25	USEPA, 2004	9	USEPA, 2004	
	BW	Body Weight	kg	70	USEPA, 2002	70	USEPA, 2002	
	AT-C	Averaging Time (cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (non-cancer)	days	9,125	USEPA, 1989	3,285	USEPA, 1989	
	PC	Permeability Constant	cm/hour	chemical-specific	USEPA, 2004	chemical-specific	USEPA, 2004	

Notes:

(1) For surface water concentrations, see Table 3.8

(2) The inadvertent surface water ingestion rate is 5 ml/hour or 0.005 L/hour. The incidental ingestion rate of 50 ml/hour as specified in USEPA (1989) was derived from the incidental water ingestion rate for an adult while swimming. Because the workers are not swimming in the surface water, but instead may have only occasional limited contact, a factor of 10 was applied to arrive at the reasonable incidental ingestion rate of 0.005 L/hr.

(3) Professional Judgment; assumes worker is in direct contact with surface water for half an hour/day (CT) and 1 hour/day (RME).

Sources :

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part A OERR. EPA/540-1-89-002.

USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, OSWER 9355.4-24, December 2002.

USEPA, 2004: RAGs Volume 1, Human Health Evaluation Manual, Part E: Supplemental Guidance for Dermal Risk Assessment, EPA/540/R/99/005, July 2004.

TABLE 3.19

VALUES USED FOR DAILY INTAKE CALCULATIONS FOR SURFACE WATER - FUTURE CONSTRUCTION/ UTILITY WORKER
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Ingestion and Dermal
Receptor Population: Construction/ Utility Worker
Receptor Age: Adult

Exposure Route	*Parameter Code*	*Parameter Definition*	*Units*	*RME Value*	*RME Rationale/ Reference*	*CT Value*	*CT Rationale/ Reference*	*Intake Equation/ Model Name*
Ingestion	CW	Chemical Concentration in Surface Water	mg/L	(1)	(1)	(1)	(1)	CDI (mg/kg-day) =
	IR	Ingestion Rate	L/hour	0.005	USEPA, 1989 (2)	0.005	USEPA, 1989 (2)	CW x IR x ET x EF x ED x 1/BW x 1/AT
	ET	Exposure Time	hour/day	2	Professional Judgement (3)	1	Professional Judgement (3)	
	EF	Exposure Frequency	days/year	20	Professional Judgement (4)	10	Professional Judgement (4)	
	ED	Exposure Duration	years	1	Professional Judgement	1	Professional Judgement	
	BW	Body Weight	kg	70	USEPA, 2002	70	USEPA, 2002	
	AT-C	Averaging Time (cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (non-cancer)	days	365	USEPA, 1989	365	USEPA, 1989	
Dermal	CW	Chemical Concentration in Surface Water	mg/L	(1)	(1)	(1)	(1)	CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	3,300	USEPA, 2004	3,300	USEPA, 2004	CW x SA x CF x PC x ET x EF x ED x 1/BW x 1/AT
	CF	Conversion Factor	L/cm^3	0.001	--	0.001	--	
	ET	Exposure Time	hour/day	2	Professional Judgement (3)	1	Professional Judgement (3)	
	EF	Exposure Frequency	days/year	20	Professional Judgement (4)	10	Professional Judgement (4)	
	ED	Exposure Duration	years	1	Professional Judgement	1	Professional Judgement	
	BW	Body Weight	kg	70	USEPA, 2002	70	USEPA, 2002	
	AT-C	Averaging Time (cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (non-cancer)	days	365	USEPA, 1989	365	USEPA, 1989	
	PC	Permeability Constant	cm/hour	chemical-specific	USEPA, 2004	chemical-specific	USEPA, 2004	

Notes:

(1) For surface water concentrations, see Table 3.8

(2) The inadvertent surface water ingestion rate is 5 ml/hour or 0.005 L/hour. The incidental ingestion rate of 50 ml/hour as specified in USEPA (1989) was derived from the incidental water ingestion rate for an adult while swimming. Because the workers are not swimming in the surface water, but instead may have only occasional limited contact, a factor of 10 was applied to arrive at the reasonable incidental ingestion rate of 0.005 L/hr.

(3) Professional Judgment; assumes worker is in direct contact with groundwater for 1 hour/day (CT) and 2 hours/day (RME).

(4) Professional Judgement; assumes 2 weeks (CT) and one month (RME) excavation period during a construction campaign.

Sources :

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part A OERR. EPA/540-1-89-002.

USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, OSWER 9355.4-24, December 2002.

USEPA, 2004: RAGs Volume 1, Human Health Evaluation Manual, Part E: Supplemental Guidance for Dermal Risk Assessment, EPA/540/R/99/005, July 2004.

TABLE 3.20

VALUES USED FOR DAILY INTAKE CALCULATIONS FOR SEDIMENT - CURRENT MAINTENANCE WORKER
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Ingestion and Dermal
Receptor Population: Maintenance Worker
Receptor Age: Adults

Exposure Route	*Parameter Code*	*Parameter Definition*	*Units*	*RME Value*	*RME Rationale/ Reference*	*CT Value*	*CT Rationale/ Reference*	*Intake Equation/ Model Name*
Ingestion	CS	Chemical Concentration in Sediment	mg/kg	(1)	(1)	(1)	(1)	Chronic Daily Intake (CDI) (mg/kg-day) =
	IR	Ingestion Rate of Soil	mg/day	100	USEPA, 2002	100	USEPA, 2002	CS x IR x ABS x CF x EF x ED x 1/BW x 1/AT
	CF	Conversion Factor	kg/mg	1.00E-06	–	1.00E-06	–	
	EF	Exposure Frequency	days/year	16	Professional Judgement (2)	8	Professional Judgement (2)	
	ED	Exposure Duration	years	25	USEPA, 2004	9	USEPA, 2004	
	BW	Body Weight	kg	70	USEPA, 2002	70	USEPA, 2002	
	AT-C	Averaging Time (cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (non-cancer)	days	9,125	USEPA, 1989	3,285	USEPA, 1989	
	ABS	Absorption Factor	%/100	1	Professional Judgement (3)	1	Professional Judgement (3)	
Dermal	CS	Chemical Concentration in Sediment	mg/kg	(1)	(1)	(1)	(1)	CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	3,300	USEPA, 2004	3,300	USEPA, 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
	CF	Conversion Factor	kg/mg	1.00E-06	–	1.00E-06	–	
	EF	Exposure Frequency	days/year	16	Professional Judgement (2)	8	Professional Judgement (2)	
	ED	Exposure Duration	years	25	USEPA, 2004	9	USEPA, 2004	
	BW	Body Weight	kg	70	USEPA, 2002	70	USEPA, 2002	
	AT-C	Averaging Time (cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (non-cancer)	days	9,125	USEPA, 1989	3,285	USEPA, 1989	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	USEPA, 2004	0.02	USEPA, 2004	
	ABS	Absorption Factor	%/100	chemical-specific	USEPA, 2004 (4)	chemical-specific	USEPA, 2004 (4)	

Notes:
(1) For sediment concentrations, see Table 3.9
(2) Professional Judgement; commercial worker will do maintenance for 2 days/month from April to November or 16 days (RME) and 1 day/month from April to November or 1 days (CT).
(3) Professional Judgment; assumed 100% absorption for conservatism.
(4) Published numbers include: Arsenic (3%), Cadmium (0.1%), Metals (1%).

Sources :
USEPA, 1989: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part A OERR. EPA/540-1-89-002.
USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, OSWER 9355.4-24, December 2002.
USEPA, 2004: RAGs Volume 1, Human Health Evaluation Manual, Part E: Supplemental Guidance for Dermal Risk Assessment, EPA/540/R/99/005, July 2004.

TABLE 3.21

VALUES USED FOR DAILY INTAKE CALCULATIONS FOR SEDIMENT - CURRENT/FUTURE TRESPASSER
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Ingestion and Dermal
Receptor Population: Trespasser
Receptor Age: Adolescent

Exposure Route	*Parameter Code*	*Parameter Definition*	*Units*	*RME Value*	*RME Rationale/ Reference*	*CT Value*	*CT Rationale/ Reference*	*Intake Equation/ Model Name*
Ingestion	CS	Chemical Concentration in Sediment	mg/kg	(1)	(1)	(1)	(1)	Chronic Daily Intake (CDI) (mg/kg-day) =
	IR	Ingestion Rate of Soil	mg/day	100	USEPA, 1997	100	USEPA, 1997	CS x IR x ABS x CF x EF x ED x 1/BW x 1/AT
	CF	Conversion Factor	kg/mg	1.00E-06	--	1.00E-06	--	
	EF	Exposure Frequency	days/year	128	Professional Judgement (2)	64	Professional Judgement (2)	
	ED	Exposure Duration	years	12	Professional Judgement (3)	12	Professional Judgement (3)	
	BW	Body Weight	kg	50	USEPA, 1997 (4)	50	USEPA, 1997 (4)	
	AT-C	Averaging Time (cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (non-cancer)	days	4,380	USEPA, 1989	4,380	USEPA, 1989	
	ABS	Absorption Factor	%/100	1	Professional Judgement (5)	1	Professional Judgement (5)	
Dermal	CS	Chemical Concentration in Sediment	mg/kg	(1)	(1)	(1)	(1)	CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	4,400	USEPA, 1997 (6)	4,400	USEPA, 1997 (6)	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
	CF	Conversion Factor	kg/mg	1.00E-06	--	1.00E-06	--	
	EF	Exposure Frequency	days/year	128	Professional Judgement (2)	64	Professional Judgement (2)	
	ED	Exposure Duration	years	12	Professional Judgement (3)	12	Professional Judgement (3)	
	BW	Body Weight	kg	50	USEPA, 1997 (4)	50	USEPA, 1997 (4)	
	AT-C	Averaging Time (cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (non-cancer)	days	4,380	USEPA, 1989	4,380	USEPA, 1989	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	USEPA, 2004	0.04	USEPA, 2004	
	ABS	Absorption Factor	%/100	chemical-specific	USEPA, 2004 (7)	chemical-specific	USEPA, 2004 (7)	

Notes:
(1) For sediment concentrations, see Table 3.9.
(2) Professional Judgement; adolescent will trespass for 16 days/month from April to November or 128 days (RME) and 8 days/month from April to November or 64 days (CT).
(3) Trespasser is an 7 through 18 year old therefore the exposure duration is 12 years.
(4) Body weight is the average of 13 yr old mean body weights, Table 7-3 of Exposure Factor Handbook, Volume 1.
(5) Professional Judgement; assumed 100% absorption for conservatism.
(6) Skin surface area for youths aged 12-13 yrs old; assuming 25% of the total body surface area is exposed.
(7) Published numbers include: Arsenic (3%), Cadmium (0.1%), Metals (1%).

Sources :
USEPA, 1989: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part A OERR. EPA/540-1-89-002.
USEPA, 1997: Exposure Factors Handbook. Volume. 1: General Factors. EPA/600/P-95/002Fa. August 1997.
USEPA, 2004: RAGs Volume 1, Human Health Evaluation Manual, Part E: Supplemental Guidance for Dermal Risk Assessment, EPA/540/R/99/005, July 2004.

TABLE 3.22

VALUES USED FOR DAILY INTAKE CALCULATIONS FOR SEDIMENT - FUTURE INDUSTRIAL/ COMMERCIAL WORKER
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Ingestion and Dermal
Receptor Population: Industrial/ Commercial Worker
Receptor Age: Adults

Exposure Route	*Parameter Code*	*Parameter Definition*	*Units*	*RME Value*	*RME Rationale/ Reference*	*CT Value*	*CT Rationale/ Reference*	*Intake Equation/ Model Name*
Ingestion	CS	Chemical Concentration in Sediment	mg/kg	(1)	(1)	(1)	(1)	Chronic Daily Intake (CDI) (mg/kg-day) =
	IR	Ingestion Rate of Soil	mg/day	100	USEPA, 2002	100	USEPA, 2002	CS x IR x ABS x CF x EF x ED x 1/BW x 1/AT
	CF	Conversion Factor	kg/mg	1.00E-06	--	1.00E-06	--	
	EF	Exposure Frequency	days/year	250	USEPA, 2004	219	USEPA, 2004	
	ED	Exposure Duration	years	25	USEPA, 2004	9	USEPA, 2004	
	BW	Body Weight	kg	70	USEPA, 2002	70	USEPA, 2002	
	AT-C	Averaging Time (cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (non-cancer)	days	9,125	USEPA, 1989	3,285	USEPA, 1989	
	ABS	Absorption Factor	%/100	1	Professional Judgement (2)	1	Professional Judgement (2)	
Dermal	CS	Chemical Concentration in Sediment	mg/kg	(1)	(1)	(1)	(1)	CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	3,300	USEPA, 2004	3,300	USEPA, 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
	CF	Conversion Factor	kg/mg	1.00E-06	--	1.00E-06	--	
	EF	Exposure Frequency	days/year	250	USEPA, 2004	219	USEPA, 2004	
	ED	Exposure Duration	years	25	USEPA, 2004	9	USEPA, 2004	
	BW	Body Weight	kg	70	USEPA, 2002	70	USEPA, 2002	
	AT-C	Averaging Time (cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (non-cancer)	days	9,125	USEPA, 1989	3,285	USEPA, 1989	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	USEPA, 2004	0.02	USEPA, 2004	
	ABS	Absorption Factor	%/100	chemical-specific	USEPA, 2004 (3)	chemical-specific	USEPA, 2004 (3)	

Notes:
(1) For sediment concentrations, see Table 3.9
(2) Professional Judgment; assumed 100% absorption for conservatism.
(3) Published numbers include: Arsenic (3%), Cadmium (0.1%), Metals (1%).

Sources :
USEPA, 1989: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part A OERR. EPA/540-1-89-002.
USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, OSWER 9355.4-24, December 2002.
USEPA, 2004: RAGs Volume 1, Human Health Evaluation Manual, Part E: Supplemental Guidance for Dermal Risk Assessment, EPA/540/R/99/005, July 2004.

TABLE 3.23

VALUES USED FOR DAILY INTAKE CALCULATIONS FOR SEDIMENT - FUTURE CONSTRUCTION/ UTILITY WORKER
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Ingestion and Dermal
Receptor Population: Construction/ Utility Worker
Receptor Age: Adults

Exposure Route	*Parameter Code*	*Parameter Definition*	*Units*	*RME Value*	*RME Rationale/ Reference*	*CT Value*	*CT Rationale/ Reference*	*Intake Equation/ Model Name*
Ingestion	CS	Chemical Concentration in Sediment	mg/kg	(1)	(1)	(1)	(1)	Chronic Daily Intake (CDI) (mg/kg-day) =
	IR	Ingestion Rate of Soil	mg/day	330	USEPA, 2002	330	USEPA, 2002	CS x IR x ABS x CF x EF x ED x 1/BW x 1/AT
	CF	Conversion Factor	kg/mg	1.00E-06	--	1.00E-06	--	
	EF	Exposure Frequency	days/year	20	Professional Judgement (2)	10	Professional Judgement (2)	
	ED	Exposure Duration	years	1	Professional Judgement	1	Professional Judgement	
	BW	Body Weight	kg	70	USEPA, 2002	70	USEPA, 2002	
	AT-C	Averaging Time (cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (non-cancer)	days	365	USEPA, 1989	365	USEPA, 1989	
	ABS	Absorption Factor	%/100	1	Professional Judgement (3)	1	Professional Judgement (3)	
Dermal	CS	Chemical Concentration in Sediment	mg/kg	(1)	(1)	(1)	(1)	CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	3,300	USEPA, 2004	3,300	USEPA, 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
	CF	Conversion Factor	kg/mg	1.00E-06	--	1.00E-06	--	
	EF	Exposure Frequency	days/year	20	Professional Judgement (2)	10	Professional Judgement (2)	
	ED	Exposure Duration	years	1	Professional Judgement	1	Professional Judgement	
	BW	Body Weight	kg	70	USEPA, 2002	70	USEPA, 2002	
	AT-C	Averaging Time (cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (non-cancer)	days	365	USEPA, 1989	365	USEPA, 1989	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.3	USEPA, 2004	0.1	USEPA, 2004	
	ABS	Absorption Factor	%/100	chemical-specific	USEPA, 2004 (4)	chemical-specific	USEPA, 2004 (4)	

Notes:
(1) For sediment concentrations, see Table 3.9.
(2) Professional Judgement; assumes 2 weeks (CT) and one month (RME) excavation period during a construction campaign.
(3) Professional Judgement; assumed 100% absorption for conservatism.
(4) Published numbers include: Arsenic (3%), Cadmium (0.1%), Metals (1%).

Sources :
USEPA, 1989: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part A OERR. EPA/540-1-89-002.
USEPA, 2002: USEPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, OSWER 9355.4-24, December 2002.
USEPA, 2004: RAGs Volume 1, Human Health Evaluation Manual, Part E: Supplemental Guidance for Dermal Risk Assessment, EPA/540/R/99/005, July 2004.

TABLE 3.24

ADULT LEAD MODEL FOR MAINTENANCE WORKERS EXPOSED TO LEAD
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Model Parameters	*Symbol*	*Units*	*Surface Soil & Slag Maintenance Worker*	*Surface Soil Maintenance Worker*	*Surface Slag Maintenance Worker*	*Ref*
Concentration of Lead in Soil	PbS	µg/g	309	--	1221	Site-Specific
Concentration of Lead in Surface Water	PbW	µg/L	184	184	184	Site-Specific
95th Percentile PbB in fetus	$PbB_{fetal,0.95}$	µg/dL	10	10	10	(1)
R (Mean ratio of fetal to maternal PbB)	$R_{fetal/maternal}$	unitless	0.9	0.9	0.9	(1)
Individual geometric standard deviation	GSD_i	unitless	2	2	2	(2)
Baseline blood lead value	$PbB_{adult,0}$	µg/dL	1.98	1.98	1.98	(2)
Biokinetic slope factor	BKSF	µg/dL per µg/day	0.4	0.4	0.4	(1)
Soil ingestion rate	IR_S	g/day	0.1	0.1	0.1	(3)
Water ingestion rate	IR_W	L/d	0.005	0.005	0.005	0.005 L/h x 1 h/d
Soil Exposure Frequency	EF_S	days/yr	16	16	16	Exposure scenario Specific
Water Exposure Frequency	EF_W	days/yr	16	16	16	Exposure scenario Specific
Absolute absorption fraction of lead in soil	AF_S		0.12	0.12	0.12	(1)
Absolute absorption fraction of lead in water	AF_W		0.2	0.2	0.2	(1)
Averaging time	AT	days/yr	365	365	365	(1)

EXPOSURE VALUE	Formula	PbB (µg/dL)	PbB (µg/dL)	PbB (µg/dL)
Blood lead contribution from Soil	$PbB_{SOIL} = (PbS \times BKSF \times IR_S \times AF_S \times EF_S)/AT$	6.50E-02	--	2.57E-01
Blood lead contribution from Surface Water	$PbB_{WATER} = (PbW \times BKSF \times IR_w \times AF_w \times EF_w)/AT$	3.23E-03	3.23E-03	3.23E-03
Total from site exposure	$PbB_{From\ Site\ Exposure} = PbB_{SOIL} + PbB_{WATER}$	6.82E-02	3.23E-03	2.60E-01
Total from site exposure + non-site exposure	$PbB_{site\ +\ non\text{-}site} = PbB_{From\ Site\ Exposure} + PbB_{adult,\ 0}$	2.05	1.98	2.24
95th percentile for fetal blood lead	$PbB_{fetal,0.95} = R_{fetal/maternal} \times GSD_i^{1.645} \times PbB_{site\ +\ non\text{-}site}$	**5.77**	**5.58**	**6.31**

Notes:

(1) USEPA, 2003:Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil. EPA-540-R-03-001. January 2003.

(2) USEPA, 2002. Blood Lead Concentrations of U.S. Adult Females: Summary Statistics from Phase 1 and 2 of the National Health and Nutrition Evaluation Survey (NHANES III). Office of Solid Waste and Emergency Response. OSWER #9285.7-52, March 2002.

(3) USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, OSWER 9355.4-24, December 2002.

TABLE 3.25

ADULT LEAD MODEL FOR ADOLESCENT TRESPASSERS EXPOSED TO LEAD
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Model Parameters	*Symbol*	*Units*	*Surface Soil & Slag Adolescent Trespasser*	*Surface Soil Adolescent Trespasser*	*Surface Slag Adolescent Trespasser*	*Ref*
Concentration of Lead in Soil	PbS	µg/g	309	--	1221	Site-Specific
Concentration of Lead in Surface Water	PbW	µg/L	184	184	184	Site-Specific
95th Percentile PbB in fetus	$PbB_{fetal,0.95}$	µg/dL	10	10	10	(1)
R (Mean ratio of fetal to maternal PbB)	$R_{fetal/maternal}$	unitless	0.9	0.9	0.9	(1)
Individual geometric standard deviation	GSD_i	unitless	2	2	2	(2)
Baseline blood lead value	$PbB_{adult,0}$	µg/dL	1.98	1.98	1.98	(2)
Biokinetic slope factor	BKSF	µg/dL per µg/day	0.4	0.4	0.4	(1)
Soil ingestion rate	IR_S	g/day	0.1	0.1	0.1	(3)
Water ingestion rate	IR_W	L/d	0.005	0.005	0.005	0.005 L/h x 1 h/d
Soil Exposure Frequency	EF_S	days/yr	128	128	128	Exposure scenario Specific
Water Exposure Frequency	EF_W	days/yr	128	128	128	Exposure scenario Specific
Absolute absorption fraction of lead in soil	AF_S		0.12	0.12	0.12	(1)
Absolute absorption fraction of lead in water	AF_W		0.2	0.2	0.2	(1)
Averaging time	AT	days/yr	365	365	365	(1)

EXPOSURE VALUE	Formula	PbB (µg/dL)	PbB (µg/dL)	PbB (µg/dL)
Blood lead contribution from Soil	$PbB_{SOIL} = (PbS \times BKSF \times IR_S \times AF_S \times EF_S)/AT$	5.20E-01	--	2.06E+00
Blood lead contribution from Surface Water	$PbB_{WATER} = (PbW \times BKSF \times IR_w \times AF_w \times EF_w)/AT$	2.58E-02	2.58E-02	2.58E-02
Total from site exposure	$PbB_{From\ Site\ Exposure} = PbB_{SOIL} + PbB_{WATER}$	5.45E-01	2.58E-02	2.08E+00
Total from site exposure + non-site exposure	$PbB_{site\ +\ non\text{-}site} = PbB_{From\ Site\ Exposure} + PbB_{adult,\ 0}$	2.53	2.01	4.06
95th percentile for fetal blood lead	$PbB_{fetal,0.95} = R_{fetal/maternal} \times GSD_i^{1.645} \times PbB_{site\ +\ non\text{-}site}$	**7.11**	**5.65**	**11.43**

Notes:

(1) USEPA, 2003:Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil. EPA-540-R-03-001. January 2003.

(2) USEPA, 2002: Blood Lead Concentrations of U.S. Adult Females: Summary Statistics from Phase 1 and 2 of the National Health and Nutrition Evaluation Survey (NHANES III). Office of Solid Waste and Emergency Response. OSWER #9285.7-52, March 2002.

(3) USEPA, 1997: Exposure Factors Handbook. Volume. 1: General Factors. EPA/600/P-95/002Fa. August 1997.

TABLE 3.26

ADULT LEAD MODEL FOR INDUSTRIAL/ COMMERCIAL WORKERS EXPOSED TO LEAD
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Model Parameters	*Symbol*	*Units*	*Soil & Slag Industrial Worker*	*Soil Industrial Worker*	*Slag Industrial Worker*	*Ref*
Concentration of Lead in Soil	PbS	µg/g	81.6	226	133	Site-Specific
Concentration of Lead in Surface Water	PbW	µg/L	184	184	184	Site-Specific
95th Percentile PbB in fetus	$PbB_{fetal,0.95}$	µg/dL	10	10	10	(1)
R (Mean ratio of fetal to maternal PbB)	$R_{fetal/maternal}$	unitless	0.9	0.9	0.9	(1)
Individual geometric standard deviation	GSD_i	unitless	2	2	2	(2)
Baseline blood lead value	$PbB_{adult,0}$	µg/dL	1.98	1.98	1.98	(2)
Biokinetic slope factor	BKSF	µg/dL per µg/day	0.4	0.4	0.4	(1)
Soil ingestion rate	IR_S	g/day	0.1	0.1	0.1	(3)
Water ingestion rate	IR_W	L/d	0.005	0.005	0.005	0.005 L/h x 1 h/d
Soil Exposure Frequency	EF_S	days/yr	250	250	250	Exposure scenario Specific
Water Exposure Frequency	EF_W	days/yr	250	250	250	Exposure scenario Specific
Absolute absorption fraction of lead in soil	AF_S		0.12	0.12	0.12	(1)
Absolute absorption fraction of lead in water	AF_W		0.2	0.2	0.2	(1)
Averaging time	AT	days/yr	365	365	365	(1)

EXPOSURE VALUE	Formula	PbB (µg/dL)	PbB (µg/dL)	PbB (µg/dL)
Blood lead contribution from Soil	$PbB_{SOIL} = (PbS \times BKSF \times IR_S \times AF_S \times EF_S)/AT$	2.68E-01	7.44E-01	4.38E-01
Blood lead contribution from Surface Water	$PbB_{WATER} = (PbW \times BKSF \times IR_w \times AF_w \times EF_w)/AT$	5.04E-02	5.04E-02	5.04E-02
Total from site exposure	$PbB_{From\ Site\ Exposure} = PbB_{SOIL} + PbB_{WATER}$	3.19E-01	7.94E-01	4.88E-01
Total from site exposure + non-site exposure	$PbB_{site\ +\ non\text{-}site} = PbB_{From\ Site\ Exposure} + PbB_{adult,\ 0}$	2.30	2.77	2.47
95th percentile for fetal blood lead	$PbB_{fetal,0.95} = R_{fetal/maternal} \times GSD_i^{1.645} \times PbB_{site\ +\ non\text{-}site}$	**6.47**	**7.81**	**6.95**

Notes:

(1) USEPA, 2003:Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil. EPA-540-R-03-001. January 2003.

(2) USEPA, 2002. Blood Lead Concentrations of U.S. Adult Females: Summary Statistics from Phase 1 and 2 of the National Health and Nutrition Evaluation Survey (NHANES III). Office of Solid Waste and Emergency Response. OSWER #9285.7-52, March 2002.

(3) USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, OSWER 9355.4-24, December 2002.

TABLE 3.27

ADULT LEAD MODEL FOR CONSTRUCTION/ UTILITY WORKERS EXPOSED TO LEAD
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Model Parameters	*Symbol*	*Units*	*Soil & Slag Construction Worker*	*Soil Construction Worker*	*Slag Construction Worker*	*Ref*
Concentration of Lead in Soil	PbS	µg/g	81.6	226	133	Site-Specific
Concentration of Lead in Ground Water	PbW	µg/L	61.2	61.2	61.2	Site-Specific
Concentration of Lead in Surface Water	PbW	µg/L	184	184	184	Site-Specific
95th Percentile PbB in fetus	$PbB_{fetal,0.95}$	µg/dL	10	10	10	(1)
R (Mean ratio of fetal to maternal PbB)	$R_{fetal/maternal}$	unitless	0.9	0.9	0.9	(1)
Individual geometric standard deviation	GSD_i	unitless	2	2	2	(2)
Baseline blood lead value	$PbB_{adult,0}$	µg/dL	1.98	1.98	1.98	(2)
Biokinetic slope factor	BKSF	µg/dL per µg/day	0.4	0.4	0.4	(1)
Soil ingestion rate	IR_S	g/day	0.33	0.33	0.33	(3)
Water ingestion rate	IR_W	L/d	0.005	0.005	0.005	0.005 L/h x 1 h/d
Soil Exposure Frequency	EF_S	days/yr	20	20	20	Exposure scenario Specific
Water Exposure Frequency	EF_W	days/yr	20	20	20	Exposure scenario Specific
Absolute absorption fraction of lead in soil	AF_S		0.12	0.12	0.12	(1)
Absolute absorption fraction of lead in water	AF_W		0.2	0.2	0.2	(1)
Averaging time	AT	days/yr	365	365	365	(1)

EXPOSURE VALUE	Formula	PbB (µg/dL)	PbB (µg/dL)	PbB (µg/dL)
Blood lead contribution from Soil	$PbB_{SOIL} = (PbS \times BKSF \times IR_S \times AF_S \times EF_S)/AT$	7.08E-02	1.96E-01	1.16E-01
Blood lead contribution from Ground Water	$PbB_{WATER} = (PbW \times BKSF \times IR_w \times AF_w \times EF_w)/AT$	1.34E-03	1.34E-03	1.34E-03
Blood lead contribution from Surface Water	$PbB_{WATER} = (PbW \times BKSF \times IR_w \times AF_w \times EF_w)/AT$	4.03E-03	4.03E-03	4.03E-03
Total from site exposure	$PbB_{From\ Site\ Exposure} = PbB_{SOIL} + PbB_{WATER}$	7.62E-02	2.02E-01	1.21E-01
Total from site exposure + non-site exposure	$PbB_{site\ +\ non\text{-}site} = PbB_{From\ Site\ Exposure} + PbB_{adult,\ 0}$	2.06	2.18	2.10
95th percentile for fetal blood lead	$PbB_{fetal,0.95} = R_{fetal/maternal} \times GSD_i^{1.645} \times PbB_{site\ +\ non\text{-}site}$	**5.79**	**6.14**	**5.91**

Notes:

(1) USEPA, 2003:Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil. EPA-540-R-03-001. January 2003.

(2) USEPA, 2002. Blood Lead Concentrations of U.S. Adult Females: Summary Statistics from Phase 1 and 2 of the National Health and Nutrition Evaluation Survey (NHANES III). Office of Solid Waste and Emergency Response. OSWER #9285.7-52, March 2002.

(3) USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, OSWER 9355.4-24, December 2002.

TABLE 4.1

NON-CANCER TOXICITY DATA -- ORAL/DERMAL ROUTE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Chemical of Potential Concern (COPC)	*Chronic/ Subchronic*	*Oral RfD Value*	*Oral RfD Units*	*Oral to Dermal Adjustment Factor (1)*	*Adjusted Dermal RfD (2)*	*Units*	*Primary Target Organ*	*Combined Uncertainty/Modifying Factors*	*Sources of RfD: Target Organ*	*Dates of RfD: Target Organ (3) (MM/DD/YY)*
Metals										
Aluminum	chronic	1.00E+00	mg/kg-d	100%	1.00E+00	mg/kg-d	--	--	NCEA	10/01/04
Antimony	chronic	4.00E-04	mg/kg-d	15%	6.00E-05	mg/kg-d	blood system	1000	IRIS	11/10/04
Arsenic	chronic	3.00E-04	mg/kg-d	100%	3.00E-04	mg/kg-d	skin discoloration	3	IRIS	11/10/04
Barium	chronic	7.00E-02	mg/kg-d	7%	4.90E-03	mg/kg-d	no effects	3	IRIS	11/10/04
Beryllium	chronic	2.00E-03	mg/kg-d	0.7%	1.40E-05	mg/kg-d	chronic beryllium disease	300	IRIS	11/10/04
Cadmium	chronic	5.00E-04	mg/kg-d	5%	2.50E-05	mg/kg-d	kidney	10	IRIS	11/10/04
Chromium	chronic	1.50E+00	mg/kg-d	1.3%	1.95E-02	mg/kg-d	no effects	1000	IRIS	11/10/04
Chromium VI (Hexavalent)	chronic	3.00E-03	mg/kg-d	2.5%	7.50E-05	mg/kg-d	no effects	900	IRIS	11/10/04
Cobalt	chronic	2.00E-02	mg/kg-d	100%	2.00E-02	mg/kg-d	--	--	NCEA	10/01/04
Copper	chronic	4.00E-02	mg/kg-d	100%	4.00E-02	mg/kg-d	gastrointestinal system	--	HEAST	07/01/97
Iron	chronic	3.00E-01	mg/kg-d	100%	3.00E-01	mg/kg-d	--	--	NCEA	10/01/04
Lead	chronic	--	--	--	--	--	--	--	--	--
Manganese	chronic	4.67E-02	mg/kg-d	4%	1.87E-03	mg/kg-d	central nervous system	3	IRIS	11/10/04
Mercury	chronic	3.00E-04	mg/kg-d	100%	3.00E-04	mg/kg-d	autoimmune system	1000	IRIS	11/10/04
Nickel	chronic	2.00E-02	mg/kg-d	4%	8.00E-04	mg/kg-d	body weight	300	IRIS	11/10/04
Selenium	chronic	5.00E-03	mg/kg-d	100%	5.00E-03	mg/kg-d	clinical selenosis	3	IRIS	11/10/04
Thallium	chronic	7.00E-05	mg/kg-d	100%	7.00E-05	mg/kg-d	liver	3000	IRIS	11/10/04
Vanadium	chronic	1.00E-03	mg/kg-d	2.6%	2.60E-05	mg/kg-d	--	--	NCEA	10/01/04
Zinc	chronic	3.00E-01	mg/kg-d	100%	3.00E-01	mg/kg-d	blood system	3	IRIS	11/10/04

Notes:

-- = Not Available

N/A = Not Applicable

(1) USEPA, Risk Assessment Guidance for Superfund, Volume 1: Human Health Evaluation Manual, Part E Supplemental Guidance for Dermal Risk Assessment, EPA/540/R/99/005, July 2004.

(2) Adjusted Dermal RfD = Oral RfD x Oral to Dermal Adjustment Factor

(3) IRIS, Integrated Risk Information System Database, November 10, 2004.
Provisional values supplied by NCEA. Values may be taken from either Region III Risk-Based Concentration Table (10/08/04) or Region IX Preliminary Remediation Goals Table (10/20/04).
HEAST, Health Effects Assessment Summary Table, July 1, 1997.

TABLE 4.2

NON-CANCER TOXICITY DATA -- INHALATION
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Chemical of Potential Concern (COPC)	*Chronic/ Subchronic*	*Value Inhalation RfC*	*Units*	*Adjusted Inhalation RfD (1)*	*Units*	*Primary Target Organ*	*Combined Uncertainty/Modifying Factors*	*Sources of RfC:RfD: Target Organ*	*Dates (2) (MM/DD/YY)*
Metals									
Aluminum	chronic	3.50E-03	mg/m3	1.00E-03	mg/kg-d	--	--	NCEA	10/01/04
Antimony	--	--	--	--	--	--	--	--	--
Arsenic	--	--	--	--	--	--	--	--	--
Barium	chronic	5.00E-04	mg/m3	1.40E-04	mg/kg-d	no effects	1000	HEAST	07/01/97
Beryllium	chronic	2.00E-05	mg/m3	5.70E-06	mg/kg-d	chronic beryllium disease	10	IRIS	11/10/04
Cadmium	chronic	2.00E-04	mg/m3	5.70E-05	mg/kg-d	--	--	NCEA	10/01/04
Chromium	--	--	--	--	--	--	--	--	--
Chromium VI (Hexavalent) (3)	chronic	1.00E-04	mg/m3	2.80E-05	mg/kg-d	no effects	300	IRIS	11/10/04
Cobalt	chronic	2.00E-05	mg/m3	5.70E-06	mg/kg-d	--	--	NCEA	10/01/04
Copper	--	--	--	--	--	--	--	--	--
Iron	--	--	--	--	--	--	--	--	--
Lead	--	--	--	--	--	--	--	--	--
Manganese	chronic	5.00E-05	mg/m3	1.43E-05	mg/kg-d	central nervous system	1000	IRIS	08/16/04
Mercury	chronic	3.00E-04	mg/m3	8.60E-05	mg/kg-d	autoimmune system	30	IRIS	08/16/04
Nickel	--	--	--	--	--	--	--	--	--
Selenium	--	--	--	--	--	--	--	--	--
Thallium	--	--	--	--	--	--	--	--	--
Vanadium	--	--	--	--	--	--	--	--	--
Zinc	--	--	--	--	--	--	--	--	--

Notes:

-- = Not Available

(1) (RfC x Inhalation Rate)/Body Weight

(2) IRIS, Integrated Risk Information System Database, November 10, 2004.
Provisional values supplied by NCEA. Values may be taken from either Region III Risk-Based Concentration Table (10/08/04) or Region IX Preliminary Remediation Goals Table (10/20/04).
HEAST, Health Effects Assessment Summary Table, July 1, 1997.

(3) Toxicity data for Chromium VI particulates.

TABLE 4.3

CANCER TOXICITY DATA -- ORAL/DERMAL ROUTE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Chemical of Potential Concern (COPC)	*Oral Cancer Slope Factor*	*Oral to Dermal Adjustment Factor (1)*	*Adjusted Dermal Cancer Slope Factor (2)*	*Units*	*Weight of Evidence/ Cancer Guideline Description*	*Source*	*Date (3) (MM/DD/YY)*
Metals							
Aluminum	--	--	--	--	--	--	--
Antimony	--	--	--	--	--	--	--
Arsenic	1.50E+00	100%	1.50E+00	$(mg/kg\text{-}day)^{-1}$	A	IRIS	11/10/04
Barium	--	--	--	--	D	--	--
Beryllium	--	--	--	--	B1	--	--
Cadmium	--	--	--	--	B1	--	--
Chromium	--	--	--	--	D	--	--
Chromium VI (Hexavalent)	--	--	--	--	--	--	--
Cobalt	--	--	--	--	--	--	--
Copper	--	--	--	--	D	--	--
Iron	--	--	--	--	--	--	--
Lead	--	--	--	--	B2	--	--
Manganese	--	--	--	--	D	--	--
Mercury	--	--	--	--	D	--	--
Nickel	--	--	--	--	--	--	--
Selenium	--	--	--	--	D	--	--
Thallium	--	--	--	--	--	--	--
Vanadium	--	--	--	--	--	--	--
Zinc	--	--	--	--	D	--	--

Notes:

-- = Not Available

(1) USEPA, Risk Assessment Guidance for Superfund, Volume 1: Human Health Evaluation Manual, Part E Supplemental Guidance for Dermal Risk Assessment, EPA/540/R/99/005, July 2004

(2) Adjusted Dermal CSF = Oral CSF / Oral to Dermal Adjustment Factor

(3) IRIS, Integrated Risk Information System Database, November 10, 2004.
Provisional values supplied by NCEA. Values may be taken from either Region III Risk-Based Concentration Table (10/08/04) or Region IX Preliminary Remediation Goals Table (10/20/04).
HEAST, Health Effects Assessment Summary Table, July 1, 1997.

EPA Weight of Evidence Classification :

A - Known Human carcinogen

B1 - Probable human carcinogen - indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

TABLE 4.4

CANCER TOXICITY DATA -- INHALATION
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Chemical of Potential Concern (COPC)	*Unit Risk*	*Units*	*Adjustment (1)*	*Inhalation Cancer Slope Factor (2)*	*Units*	*Weight of Evidence/ Cancer Guideline Description*	*Source*	*Date (3) (MM/DD/YY)*
Metals								
Aluminum	--	--	--	--	--	--	--	--
Antimony	--	--	--	--	--	--	--	--
Arsenic	4.30E-03	$\mu g/m^3$	3500	1.50E+01	$(mg/kg\text{-}day)^{-1}$	A	IRIS	11/10/04
Barium	--	--	--	--	--	D	--	--
Beryllium	2.40E-03	$\mu g/m^3$	3500	8.40E+00	$(mg/kg\text{-}day)^{-1}$	B1	IRIS	11/10/04
Cadmium	1.80E-03	$\mu g/m^3$	3500	6.30E+00	$(mg/kg\text{-}day)^{-1}$	B1	IRIS	11/10/04
Chromium	--	--	--	--	--	D	--	--
Chromium VI (Hexavalent)	1.20E-02	$\mu g/m^3$	3500	4.20E+01	$(mg/kg\text{-}day)^{-1}$	A	IRIS	11/10/04
Cobalt	2.80E-03	$\mu g/m^3$	3500	9.80E+00	$(mg/kg\text{-}day)^{-1}$	--	NCEA	10/01/04
Copper	--	--	--	--	--	D	--	--
Iron	--	--	--	--	--	--	--	--
Lead	--	--	--	--	--	B2	--	--
Manganese	--	--	--	--	--	D	--	--
Mercury	--	--	--	--	--	D	--	--
Nickel	--	--	--	--	--	--	--	--
Selenium	--	--	--	--	--	D		--
Thallium	--	--	--	--	--	--	--	--
Vanadium	--	--	--	--	--	--	--	--
Zinc	--	--	--	--	--	D	--	--

Note:

-- = Not Available

(1) Adjustment Factor = 70 kg x 1/20 m^3/day x 1,000 $\mu g/mg$

(2) Inhalation CSF = Unit Risk x Adjustment Factor

(3) IRIS, Integrated Risk Information System Database, November 10, 2004.
Provisional values supplied by NCEA. Values may be taken from either Region III Risk-Based Concentration Table (10/08/04) or Region IX Preliminary Remediation Goals Table (10/20/04).
HEAST, Health Effects Assessment Summary Table, July 1, 1997.

EPA Weight of Evidence Classification :

A - Known Human carcinogen

B1 - Probable human carcinogen - indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

TABLE 5.1

RISK ASSESSMENT SUMMARY FOR CURRENT/FUTURE TRESPASSER
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/ Future
Receptor Population: Trespasser
Receptor Age: Adolescent

Medium	*Exposure Medium*	*Exposure Point*	*Chemical*	*Carcinogenic Risk*				*Chemical*	*Non-Carcinogenic Hazard Quotient*				
				Ingestion	*Inhalation*	*Dermal*	*Exposure Routes Total*		*Primary Target Organ*	*Ingestion*	*Inhalation*	*Dermal*	*Exposure Routes Total*
Surface Soil and Slag	Surface Soil/ Ambient Air	–	Aluminum	NC	NC	NC	NC	Aluminum	–	2.59E-02	9.14E-04	2.28E-03	2.91E-02
			Antimony	NC	NC	NC	NC	Antimony	blood system	6.70E-02	NC	3.93E-02	1.06E-01
			Arsenic	3.26E-06	1.15E-09	8.60E-07	4.12E-06	Arsenic	skin discoloration	4.22E-02	NC	1.11E-02	5.34E-02
			Cadmium	NC	7.00E-10	NC	7.00E-10	Cadmium	kidney	3.67E-02	1.14E-05	6.46E-03	4.32E-02
			Copper	NC	NC	NC	NC	Copper	gastrointestinal system	2.24E-02	NC	1.97E-03	2.43E-02
			Iron	NC	NC	NC	NC	Iron	–	5.05E-02	NC	4.45E-03	5.50E-02
			Manganese	NC	NC	NC	NC	Manganese	central nervous system	8.10E-02	9.34E-03	1.78E-01	2.68E-01
			Nickel	NC	NC	NC	NC	Nickel	body weight	3.63E-02	NC	7.99E-02	1.16E-01
			Thallium	NC	NC	NC	NC	Thallium	liver	3.89E-02	NC	3.43E-03	4.24E-02
			Vanadium	NC	NC	NC	NC	Vanadium	–	4.63E-02	NC	1.57E-01	2.03E-01
Surface Water	Surface Water	–	Antimony	NC	–	NC	NC	Antimony	blood system	5.93E-03	–	3.48E-02	4.07E-02
			Beryllium	NC	–	NC	NC	Beryllium	chronic beryllium disease	2.13E-04	–	2.68E-02	2.70E-02
			Chromium VI (Hexavalent)	NC	–	NC	NC	Chromium VI (Hexavalent)	no effects	4.78E-03	–	3.37E-01	3.42E-01
			Iron	NC	–	NC	NC	Iron	–	1.47E-02	–	1.30E-02	2.77E-02
			Manganese	NC	–	NC	NC	Manganese	central nervous system	5.74E-03	–	1.26E-01	1.32E-01
			Thallium	NC	–	NC	NC	Thallium	liver	6.85E-02	–	6.03E-02	1.29E-01
			Vanadium	NC	–	NC	NC	Vanadium	–	3.99E-03	–	1.35E-01	1.39E-01
Sediment	Sediment	–	Arsenic	2.41E-06	–	6.37E-07	3.05E-06	Arsenic	skin discoloration	3.13E-02	–	8.25E-03	3.95E-02
			Iron	NC	–	NC	NC	Iron	–	5.58E-02	–	4.91E-03	6.07E-02

Total Risk Across Surface Soil and Slag	4.1E-06	Total Hazard Index Across Surface Soil and Slag	9.4E-01
Total Risk Across Surface Water	NC	Total Hazard Index Across Surface Water	8.4E-01
Total Risk Across Sediment	3.0E-06	Total Hazard Index Across Sediment	1.0E-01

Total Risk Across All Media and All Exposure Routes (surface soil and slag)	8.7E-06	Total Hazard Index Across All Media and All Exposure Routes (surface soil and slag)	2.0E+00
Total Risk Across All Media and All Exposure Routes (surface soil)	6.4E-06	Total Hazard Index Across All Media and All Exposure Routes (surface soil)	1.6E+00
Total Risk Across All Media and All Exposure Routes (slag)	7.8E-06	Total Hazard Index Across All Media and All Exposure Routes (slag)	3.9E+00

Note:
NC = Not Calculated

TABLE 5.2

RISK ASSESSMENT SUMMARY FOR FUTURE INDUSTRIAL WORKER
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Receptor Population: Industrial/ Commercial Worker
Receptor Age: Adult

Medium	*Exposure Medium*	*Exposure Point*	*Chemical*	*Carcinogenic Risk*				*Chemical*	*Non-Carcinogenic Hazard Quotient*				
				Ingestion	*Inhalation*	*Dermal*	*Exposure Routes Total*		*Primary Target Organ*	*Ingestion*	*Inhalation*	*Dermal*	*Exposure Routes Total*
Soil and Slag	Surface Soil/ Ambient Air	--	Aluminum	NC	NC	NC	NC	Aluminum	--	2.83E-02	1.38E-03	1.87E-03	3.15E-02
			Arsenic	5.07E-06	2.48E-09	1.00E-06	6.08E-06	Arsenic	skin discoloration	3.16E-02	NC	6.25E-03	3.78E-02
			Cadmium	NC	1.44E-09	NC	1.44E-09	Cadmium	kidney	2.62E-02	1.12E-05	3.46E-03	2.97E-02
			Chromium VI (Hexavalent)	NC	4.17E-08	NC	4.17E-08	Chromium VI (Hexavalent)	no effects	1.90E-02	9.93E-05	5.01E-02	6.92E-02
			Iron	NC	NC	NC	NC	Iron	--	9.24E-02	NC	6.10E-03	9.85E-02
			Manganese	NC	NC	NC	NC	Manganese	central nervous system	3.80E-02	6.06E-03	6.26E-02	1.07E-01
			Nickel	NC	NC	NC	NC	Nickel	body weight	3.02E-02	NC	4.98E-02	8.00E-02
			Thallium	NC	NC	NC	NC	Thallium	liver	7.55E-02	NC	4.98E-03	8.04E-02
			Vanadium	NC	NC	NC	NC	Vanadium	--	5.72E-02	NC	1.45E-01	2.02E-01
Surface Water	Surface Water	--	Chromium VI (Hexavalent)	NC	--	NC	NC	Chromium VI (Hexavalent)	no effects	1.67E-03	--	8.81E-02	8.98E-02
			Manganese	NC	--	NC	NC	Manganese	central nervous system	2.00E-03	--	3.30E-02	3.50E-02
			Thallium	NC	--	NC	NC	Thallium	liver	2.39E-02	--	1.58E-02	3.97E-02
			Vanadium	NC	--	NC	NC	Vanadium	--	1.39E-03	--	3.53E-02	3.67E-02
Sediment	Sediment		Arsenic	7.01E-06	--	1.39E-06	8.40E-06	Arsenic	skin discoloration	4.36E-02	--	8.63E-03	5.22E-02
			Iron	NC	--	NC	NC	Iron	--	7.79E-02	--	5.14E-03	8.30E-02

Total Risk Across Soil and Slag	6.1E-06	Total Hazard Index Across Soil and Slag	7.4E-01
Total Risk Across Surface Water	NC	Total Hazard Index Across Surface Water	2.0E-01
Total Risk Across Sediment	8.4E-06	Total Hazard Index Across Sediment	1.4E-01

Total Risk Across All Media and All Exposure Routes (soil and slag)	1.6E-05	Total Hazard Index Across All Media and All Exposure Routes (soil and slag)	1.2E+00
Total Risk Across All Media and All Exposure Routes (soil)	1.4E-05	Total Hazard Index Across All Media and All Exposure Routes (surface soil)	8.8E-01
Total Risk Across All Media and All Exposure Routes (slag)	1.6E-05	Total Hazard Index Across All Media and All Exposure Routes (slag)	2.4E+00

Note:

NC = Not Calculated

APPENDIX A

STATISTICAL METHODS

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1.0 INTRODUCTION

Two estimates of exposure are used in the risk assessment process: (i) the mean, or central tendency (CT), exposure, and (ii) the reasonable maximum exposure (RME). The CT exposure scenario uses the mean value to represent probable exposure conditions. The RME scenario generally uses a conservative 95 percent upper confidence limit of the mean to estimate a reasonable maximum exposure. The determinations of the CT and RME estimates are statistically based and driven by characteristics of the data. Key factors determining the statistical methodologies employed include: (i) the probability distribution of the observed data (e.g., normal vs. lognormal, etc.), and (ii) the degree of censored data (non-detected results) present.

The following sections present the procedures used to determine the CT and RME values of the chemicals of potential concern (COPCs) in this risk assessment. A number of guidance documents will be consulted in developing the statistical methodologies including MOE (1997), USEPA (1989), USEPA (1992) updated by USEPA (2002), USEPA (1997), USEPA (2000), and USEPA (2003).

2.0 STATISTICAL PROCEDURES

The development of COPC exposure estimates for each parameter and area of concern is a three step process consisting of (i) determining the percentage of non-detects present, (ii) data distribution testing, and (iii) selecting the appropriate statistical method for exposure estimate calculations.

The first step of the statistical evaluation is to determine the percentage of the non-detects present in each data set. Suggested approaches to account for the presence of non-detect analytical results are outlined in USEPA (2000), and USEPA (2002), and these guidelines are summarized in Table A.1.

The second step of the statistical analysis to establish COPC exposure estimates is to determine the data distribution. Each data set is tested for normality and lognormality using either the Shapiro-Wilk W-test (1965) (for sample sizes up to 50) or the Shapiro-Francia W'-test (1972) (for sample sizes of 50 to 100). Additional tests of normality for larger data sets, if needed, are presented in USEPA (2000).

Methods for determining the CT and RME values are discussed in USEPA 2002 (which updates USEPA 1992), USEPA 1997, and USEPA 2003. The alternative procedures suggested are listed in Table A.2. A summary of the selected statistical methods used to determine the CT and RME values, based on the observed distribution of the data and the proportion of non-detect values is given in Tables A.3 and A.4.

The following sections discuss the calculation procedures used to develop the CT and RME estimates. Section 2.1 deals with the statistical methods used for normally distributed data sets, Section 2.2 discusses the statistical methods used for the lognormally distributed data sets, and Section 2.3 discusses statistical methods used for non-normal data sets. Each section is organized into separate divisions to deal with the cases of a low degree of censored (non-detect) data (0 to 15 percent), moderately censored (16 to 50 percent), highly censored (51 to 75 percent), very highly censored (76 to 99 percent), and 100 percent non-detected data.

2.1 NORMAL DISTRIBUTION

2.1.1 UP TO 15 PERCENT NON-DETECTS

In order to calculate the CT and RME values, the non-detect values will be replaced with one-half the reported detection limit. The arithmetic mean and standard deviation of

this substituted data set will be then calculated. The calculated mean is taken as the CT value. The RME value is established by calculating the 95 percent upper confidence limit (UCL) of the arithmetic mean for the normal distribution using the following equation.

$$95\%UCL = \bar{x} + t_{(0.05,n-1,1)} \cdot s / \sqrt{n}$$

Where:

$\bar{x}$ = mean of the substituted data set;

$t_{(0.05, n-1, 1)}$ = student *t*-statistic for a one-tailed 95 percent confidence (α=0.05) and n-1 degrees of freedom;

s = standard deviation of the substituted data set; and

n = number of samples.

2.1.2 NON-DETECTS GREATER THAN 15 PERCENT UP TO 50 PERCENT

In this case, the mean and standard deviation of the censored data set are adjusted using Cohen's method, as recommended in USEPA 2002. This method is presented in McBean & Rovers (1998) and USEPA (2000). Cohen's method adjusts the sample mean and sample standard deviation to account for the censored data below the detection limit as follows.

Step 1) Compute the sample mean $\bar{x}_d$ using detected data only.

Step 2) Compute the sample variance s_d^2 using detected data only.

Step 3) Compute the two parameters *h* (proportion of non-detects) and γ as:

$$h = \frac{n - m}{n} \qquad \gamma = \frac{s_d^2}{(\bar{x} - DL)^2}$$

Where *m* is the number of detected data points, *n* is the total number of samples and DL is the detection limit.

Step 4) Determine the value of the parameter $\hat{\lambda}$ from the Table A.5 based on h and γ.

Step 5) Estimate the corrected sample mean ($\bar{x}$) and standard deviation (s) as:

$$\bar{x} = \bar{x}_d - \hat{\lambda}(\bar{x}_d - DL) \quad \text{and} \quad s = \sqrt{s_d^2 + \hat{\lambda}(\bar{x}_d - DL)^2}\ .$$

The Cohen-adjusted mean is taken as the CT value. The RME value is established using the Cohen-adjusted mean and standard deviation to calculate the 95 percent UCL of the arithmetic mean using the equation presented in Section 2.1.1.

2.1.3 NON-DETECTS GREATER THAN 50 PERCENT UP TO 74 PERCENT

When more than half of a data set consists of non-detect results, estimates of the mean value and standard deviation become uncertain. If the data set contains greater than 50 percent non-detects (up to 75 percent), the CT and RME values will be calculated using a bounding method estimating maximum values for the mean and 95 percent UCL, as described in Section 3.2 and Appendix A of USEPA (2002).

The CT value is calculated as the mean of the data set, substituting non-detect values with the full reported detection limit. This provides a conservative maximum value for the CT estimate.

For the RME value, an optimization process [USEPA's (2002) bounding method] is applied to find a conservative maximum bound for the 95 percent UCL of the arithmetic mean. This involved re-calculating the normal UCL (see Section 2.1.1) iteratively, allowing the non-detect values to vary between zero and the reported detection limit until a maximum value for the 95 percent UCL is obtained.

2.1.4 NON-DETECTS GREATER THAN 75 PERCENT UP TO 99 PERCENT

According to USEPA (2002), for highly censored data sets (greater than 75 percent non-detects), the recommended approach to calculate exposure estimates is to substitute non-detect results with their full detection limits and report the resulting exposure terms as values likely to be overestimated.

2.1.5 100 PERCENT NON-DETECTS

In any cases where all analytical data for a COPC are non-detect results, then the maximum detection limit is taken for both CT and RME scenarios.

2.2 LOGNORMAL DISTRIBUTION

USEPA (2003) presents three recommended methods for establishing CT and RME estimate from lognormally distributed data depending on the standard deviation of the log-transformed data. These methods are (i) the Student's *t* method, (ii) the Land (H-statistic) method, and (iii) the Chebyshev Inequality method.

The Student's *t* method is presented in Section 2.1.1. If the standard deviation of the lognormal data is small (less than 0.5), then USEPA recommends using the Student's *t* method.

The Land method is appropriate for calculating UCLs of lognormally distributed data. However, as USEPA (2002) notes, the method is very sensitive to deviations from lognormality, large variance or skewness of the dataset, and small datasets (fewer than thirty data points). The Land method can be used in conjunction with a modified Cohen's procedure (USEPA, 2002; Gilbert, 1987) to account for non-detect data.

The Chebyshev Inequality method may provide a more useful estimate (i.e., lower) of the UCL than obtained using the Land Method (USEPA, 2002). It is a distribution-free method that is applicable to a wide variety of data sets (not only lognormal data), as long as the skewness of the dataset is not large. The Chebyshev Inequality method using minimum variance unbiased estimators (MVUEs) of the mean and standard deviation of lognormal data sets is recommended for use by USEPA (2002). For small, moderately skewed datasets, a 99 percent UCL calculation using the Chebyshev Inequality is recommended (as opposed to the 95 percent value typically used).

A list of specific methods recommended for calculating RME estimates for lognormally distributed data sets are given in Table A.4 (USEPA, 2002).

2.2.1 UP TO 15 PERCENT NON-DETECTS

In order to calculate the CT and RME values, the non-detect values will be replaced with one-half the reported detection limit.

For the CT exposure estimate, the arithmetic mean of lognormally-distributed data ($\bar{x}$) is calculated as follows:

$$\bar{x} = e^{(\bar{y} + \frac{s_y^2}{2})}$$

Where:

$\bar{y}$ = mean of the natural log-transformed, substituted data set; and

s_y^2 = standard deviation of the natural log-transformed substituted data set.

If a calculated CT exposure estimate exceeded the corresponding RME estimate (see following), the CT exposure will be set equal to the RME estimate.

For the RME exposure estimate, the standard deviation of the log-transformed data will be calculated, and Table A.4 used to select the UCL method to use. The selected method will be either (i) the Student's t UCL (see Section 2.1.1), (ii) Land's H-UCL, or (iii) Chebyshev Inequality UCL.

Land's H-UCL is calculated as follows:

Step 1) Compute the arithmetic mean $\bar{x}_{\log}$ of the log-transformed data.

Step 2) Compute the standard deviation $s_{\log}$ of the log-transformed data.

Step 3) Look up the $H_{1-\alpha}$ statistic from Table A.6.

Step 4) Compute the one-sided $(1-\alpha)$ upper confidence limit on the mean as:

$$UCL_{1-\alpha} = e^{\left(\bar{x}_{\log} + \frac{s_{\log}^2}{2} + \frac{H_{1-\alpha} s_{\log}}{\sqrt{n-1}}\right)}$$

Where n is the number of samples.

The Chebyshev Inequality UCL is calculated as follows:

Step 1) Compute the arithmetic mean $\bar{x}_{\log}$ of the log-transformed data.

Step 2) Compute the variance $s_{\log}^2$ of the log-transformed data.

Step 3) Look up the g_n statistic from Table A.7.

Step 4) Compute the minimum-variance unbiased estimator (MVUE) of the population mean for a lognormal distribution as:

$$\hat{\mu}_{\log} = e^{\bar{x}_{\log} g_n \frac{s_{\log}^2}{2}}$$

Where n is the number of samples.

Step 5) Calculate the MVUE of the variance of this mean as:

$$\sigma_{\mu}^{2} = e^{2\bar{x}_{\log}}\left[\left(g_n \frac{s_{\log}^2}{2}\right)^2 - g_n\left(\frac{n-2}{n-1}s_{\log}^2\right)\right].$$

Step 6) Compute the one-sided $(1-\alpha)$ upper confidence limit on the mean as:

$$UCL_{1-\alpha} = \hat{\mu}_{\log} + \sqrt{\left(\frac{1}{\alpha} - 1\right)\sigma_{\mu}^{2}}\ .$$

2.2.2 NON-DETECTS GREATER THAN 15 PERCENT UP TO 50 PERCENT

When a moderate proportion of non-detect results is present in a data set, in order to calculate the CT estimate, a correction for non-detects will be made using Gilbert's modified Cohen's method (USEPA, 2002). Gilbert (1987, page 182) suggests extending Cohen's method to account for non-detect values in lognormally distributed concentrations. Cohen's method (USEPA, 2000, page 4-43) assumes the data are normally distributed, so it must be applied to the log-transformed concentration values. If $\hat{\mu}_y$ and $\hat{\sigma}_y$ are the Cohen-corrected (see Section 2.1.2) sample mean and standard deviation, respectively, of the log-transformed concentrations, then the corrected estimates of the mean and standard deviation of the underlying lognormal distribution can be obtained from the following expressions:

$$\hat{\mu} = e^{\left(\hat{\mu}_y + \frac{\hat{\sigma}_y^2}{2}\right)}$$

$$\hat{\sigma} = \hat{\mu}\sqrt{e^{\hat{\sigma}_y^2} - 1}$$

This method assumes a single detection level for all the data values. During CT calculations, if the detection limit varied, then the highest detection limit will be used for the calculations to provide a conservative estimate.

If a calculated CT exposure estimate exceeded the corresponding RME estimate (see following), the CT exposure will be set equal to the RME estimate.

For the RME value, USEPA's bounding methodology (2002) is applied to untransformed data to find a maximum value for the mean, standard deviation, and skewness. The 95 percent UCL is then calculated using Hall's Bootstrap.

The use of Gilbert's modified Cohen's method for lognormal data is evaluated for use in calculating RME estimates for moderately censored data sets. However, attempts to use the procedure in conjunction with the lognormal UCL methods (e.g., Land's method, Chebyshev Inequality) most often resulted with unusable values. This resulted from either calculating UCLs much higher than the maximum data point observed, or by data characteristics being unsuitable for the required calculation (e.g., needing to use a Cohen's parameter λ that is far outside existing tabulated values for this method). As a result of persistent issues with these methods, RME estimates for lognormal, moderately censored data will be calculated using Hall's Bootstrap procedure. This procedure takes into account sample bias and skewness (such as present in lognormal distributions), and may be used with a bounding methodology to provide upper bonds on the UCL (USEPA, 2002). Hall's Bootstrap is calculated as follows.

Step 1) Compute the arithmetic mean $\overline{x}$.

Step 2) Compute the standard deviation s.

Step 3) Compute the skewness k.

Step 4) Re-sample the data a very large number of times, and calculate the each bootstrap set's mean $\overline{x}_b$, standard deviation s_b and skewness k_b.

Step 5) For each bootstrap set, calculate the studentized mean:

$$W = \frac{(\overline{x}_b - \overline{x})}{s_b}$$

Step 6) For each bootstrap set, calculate Hall's statistic:

$$Q = W + \frac{k_b W^2}{3} + \frac{k_b^2 W^3}{27} + \frac{k_b}{6n}$$

Step 7) Sort all the Q values (lowest to highest) and select the lower α^{th} quantile of the B re-sample sets. This is the $(\alpha B)^{th}$ lowest value (e.g., for 10,000 resample sets, and an α=0.05, select the 500th lowest value).

Step 8) Compute the one-sided $(1-\alpha)$ upper confidence limit on the mean as:

$$W(Q)=\frac{3}{k}\left[\sqrt[3]{1+\left(Q_\alpha-\frac{k}{6n}\right)}-1\right]$$

Where n is the number of samples.

Step 9) Compute the one-sided $(1-\alpha)$ upper confidence limit on the mean as:

$$UCL_{1-\alpha}=\bar{x}-W(Q_\alpha)s\,.$$

In calculating Hall's bootstrap, five replicate calculations of the ten-thousand resample sets each will be generated, and the median UCL value used. These replicates will be used to determine whether or not each given data set is sensitive to small differences with the random re-sampling algorithm used by the procedure.

2.2.3 NON-DETECTS GREATER THAN 50 PERCENT UP TO 74 PERCENT

In order to calculate exposure estimates for highly-censored data sets (i.e., greater than 50 percent non-detect up to 75 percent), conservative bounding assumptions will be made, as described below.

The CT value is determined by substituting the full detection limit for non-detect values and applying a bootstrap re-sampling procedure. The bootstrap is carried out using 2,000 re-sampled data sets of the same sample size as the original data set, and the CT estimate is then taken as the average of the bootstrap means.

In this case of a highly censored data set, Hall's Bootstrap procedure fails with increasing degrees of non-detect data due to undefined skewness values if a re-sampled data set by random chance contains only non-detects. For the RME value, USEPA's Bootstrap t methodology (2003) will therefore be applied to calculate the 95 percent UCL. A modified bounding methodology is applied by considering four non-detect substitution scenarios: i) zero, ii) one-half detection limit, iii) full detection limit, and iv) alternating zero and full detection limit. These scenarios will be considered because attempting bounding procedures on each individual re-sample set in computationally impractical. The bootstrap t calculation is applied under each of the four scenarios and the largest resulting UCL will be selected as the RME estimate.

The bootstrap t is calculated as follows (USEPA, 2003):

Step 1) Calculate the arithmetic mean $\bar{x}$ of the original data.

Step 2) Re-sample the original data a very large number of times (in this case thousands of times) and calculate each resample set's mean ($\bar{x}_b$) and standard deviation (s_b).

Step 3) For each re-sample set calculate the value.

$$t_b = \frac{(\bar{x}_b - \bar{x})}{s_b} \times \sqrt{n}$$

Where n is the number of samples.

Step 4) Sort the t_b values from the lowest to the highest, and select the pivotal quantity $t_{(\alpha^*N)}$, where N is the number of bootstrap sets (e.g., if 10,000 bootstrap sets are generated and α=0.05, select the 500th lowest t_b value)

Step 5) Calculate the UCL of the population mean as:

$$UCL = \bar{x} - \frac{t_{(\alpha \bullet N)} s}{\sqrt{n}}$$

2.2.4 NON-DETECTS GREATER THAN 75 PERCENT UP TO 99 PERCENT

For very highly censored data sets (greater than 75 percent non-detects), USEPA (2002) recommends calculating exposure estimates substituting non-detects with their full detection limits, and reporting the resulting values as likely to be overestimated. The CT value is calculated as the arithmetic mean of a lognormal distribution (introduced in Section 2.2.1), setting non-detects as their detection limits. If a calculated CT exposure estimate exceeded the corresponding RME estimate (see following), the CT exposure is set equal to the RME estimate. For the RME calculation, the non-detects will be substituted with the full detection limit, the standard deviation of the log-transformed data calculated, and Table A.4 will be consulted to select an appropriate UCL method. The selected methods are presented in Section 2.1.1 (Student's t method) and Section 2.2.1 (Land's Method and Chebyshev Inequality Procedure).

2.2.5 100 PERCENT NON-DETECTS

As for the normal case, in any situations where all analytical data for a COPC with a lognormal distribution will be non-detect results, then the maximum detection limit will be taken for both CT and RME scenarios.

2.3 NON-NORMAL DATASETS

For any data sets that will be neither normally, nor lognormally distributed, the non-parametric/distribution-free methods presented in USEPA (2002) will be used to calculate CT and RME exposures. The specific methods applied are presented below.

2.3.1 UP TO 15 PERCENT NON-DETECTS

For the CT exposure estimate, the arithmetic mean is calculated substituting non-detects with one-half the detection limit and using a bootstrap method to estimate the arithmetic mean. The bootstrap is carried out using 2,000 re-sampled data sets of the same sample size as the original data set. The CT value is then taken as the average of the bootstrap means.

For the RME exposure estimate, non-detects will be substituted with one-half the detection limit, and the standard deviation calculated. If the standard deviation is below 0.75 and the number of samples is 30 or greater, then the adjusted central limit theorem (CLT) UCL is calculated. Otherwise, Hall's bootstrap 95-UCL is used.

If sample size is sufficiently large, the Central Limit Theorem (CLT) states that the mean will be normally distributed, no matter how complex the underlying distribution of concentrations might be (USEPA, 2002). An adjusted CLT UCL method is presented in USEPA (2002) and is calculated as follows.

Step 1) Compute the arithmetic mean $\overline{x}$.

Step 2) Compute the standard deviation s.

Step 3) Compute the skewness β.

Step 4) Let z_α be the $(1-\alpha)^{th}$ quantile of the standard normal distribution (for 95 percent confidence, $z_\alpha = 1.645$).

Step 5) Compute the one-sided $(1-\alpha)$ upper confidence limit on the mean as:

$$UCL_{1-\alpha} = \bar{x} + (z_\alpha + \frac{\beta}{6\sqrt{n}}(1 + 2z_\alpha^2))\frac{s}{\sqrt{n}}$$

Where n is the number of samples.

The Hall's Bootstrap procedure is calculated as described in Section 2.2.2.

2.3.2 NON-DETECTS GREATER THAN 15 PERCENT AND LESS THAN 50 PERCENT

For CT exposure estimates, a conservative approach is taken substituting non-detects with the full detection limit and calculating the bootstrap arithmetic mean (see Section 2.3.1).

For RME exposure estimates, Hall's bootstrap procedure (see Section 2.2.2) is used, applying bounding methodology to find maximum mean, standard deviation, and skewness values for the original data set prior to re-sampling. These bounded estimates will be used to calculate the Hall's Bootstrap UCL for the data using 5 sets of 10,000 re-samples each (as in Section 2.3.1), and the median of these five UCLs taken as the RME estimate.

2.3.3 NON-DETECTS GREATER THAN 50 PERCENT UP TO 75 PERCENT

For CT exposure estimates, the conservative method used for the moderately censored case (described in Section 2.3.2) is used. For RME exposure estimates, the Bootstrap t method with modified bounding procedure described in Section 2.2.3 is applied.

2.3.4 NON-DETECTS GREATER THAN 75 PERCENT UP TO 99 PERCENT

As noted for the normal (Section 2.1.4) and lognormal (Section 2.2.4) cases for very highly censored data sets (greater than 75 percent non-detects), USEPA (2002) recommends substituting non-detects with their full detection limits and reporting exposure estimates as likely to be overestimated. Both CT and RME values will be calculated accordingly, as follows.

For CT exposure estimates, a conservative approach is taken substituting non-detects with the full detection limit and calculating the bootstrap arithmetic mean (see Section 2.3.1). This is the same method used for the moderately censored 15 to 50 percent non-detect case (Section 2.3.2).

For RME estimates, the non-detects will be substituted with the full detection limit and Bootstrap *t* is used to calculate the UCL (refer to Section 2.2.3).

2.3.5 100 PERCENT NON-DETECTS

In any cases where all analytical data for a COPC will be non-detect results, then the maximum detection limit is taken for both CT and RME estimates.

3.0 MAXIMUM DETECTED VALUE

USEPA (1992 and 2002) allow an optional use of the maximum observed concentrations for the RME estimate in cases where the calculated UCL exceeds the maximum value. However, USEPA (2002) warns that this may not be appropriate for data sets with very small sample sizes, because the observed maximum may be below the population mean.

If the RME estimate calculated using any of the statistical methods presented in Section 2.0 is larger than the maximum detected value, then the maximum detected value is used for the RME.

4.0 REFERENCES

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TABLE A.1

GUIDELINES FOR ANALYZING DATA WITH NON-DETECTS [1]

Percentage of Non-detects	*Statistical Analysis Method*
<15%	Replace non-detects with detection limit/2, detection limit, or a very small number.
15% - 50%	Trimmed mean, Cohen's adjustment, Winsorized mean and standard deviation, bounding method[2], probability substitution based on specific distribution[2].
>50% - 90%	Use tests for proportions, bounding method[2][3].

Notes:

(1) adapted from USEPA, (2000), *Guidance for Data Quality Assessment Practical Methods for Data Analysis EPA QA/G-9,* EPA/600/R-96/084, July 2000.

(2) USEPA, (2002), *Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites,* Office of Emergency and Remedial Response, OSWER 9285.6-10, December 2002.

(3) When greater than 75 percent non-detects present and the sample size is small (less than five samples), the bounding method should be conservatively applied setting non-detects at the detection limit (USEPA, 2002).

TABLE A.2

RECOMMENDED METHODS FOR CALCULATING UPPER CONFIDENCE LIMITS (UCLs)

Method	*Applicability*	*Advantages*	*Disadvantages*	*Reference*
(i) *For Normal or Lognormal Distributions*				
Student's *t*	means normally distributed, samples random	simple, robust if n is large	distribution of means must be normal	Gilbert 1987; EPA 1992
Land's *H*	lognormal data, small variance, large n, samples random	good coverage[1]	sensitive to deviations from lognormality, produces very high values for large variance or small n	Gilbert 1987; EPA 1992
Chebyshev Inequality (MVUE)	skewness and variance small or moderate, samples random	often smaller than Land	may need to resort to higher confidence levels for adequate coverage	Singh *et al*. 1997
Wong	gamma distribution	second order accuracy[2]	requires numerical solution of an improper integral	Schulz and Griffin 1999; Wong 1993
(ii) *Nonparametric/Distribution-free Methods*				
Central Limit Theorem - Adjusted	large n, samples random	simple, robust	sample size may not be sufficient	Gilbert 1987; Singh *et al*. 1997
Bootstrap *t* Resampling	sampling is random and representative	useful when distribution cannot be identified	inadequate coverage for some distributions; computationally intensive	Singh *et al*. 1997; Efron 1982
Hall's Bootstrap Procedure	sampling is random and representative	useful when distribution cannot be identified; takes bias and skewness into account	inadequate coverage for some distributions; computationally intensive	Hall 1988; Hall 1992; Manly 1997; Schultz and Griffin 1999
Jackknife Procedure	sampling is random and representative	useful when distribution cannot be identified	inadequate coverage for some distributions; computationally intensive	Singh *et al*. 1997
Chebyshev Inequality	skewness and variance small or moderate, samples random	useful when distribution cannot be identified	inappropriate for small sample sizes when skewness or variance is large	Singh *et al*. 1997; EPA 2000c

Notes:

This Table was taken from USEPA, 2002.

TABLE A.2

RECOMMENDED METHODS FOR CALCULATING UPPER CONFIDENCE LIMITS (UCLs)

(1) Coverage refers to whether a UCL method performs in accordance with its definition.

(2) As opposed to maximum likelihood estimation, which offers first order accuracy.

TABLE A.3

STATISTICAL METHODS USED FOR DETERMINING EXPOSURE ESTIMATES UNDER CENTRAL TENDENCY (CT) AND REASONABLE MAXIMUM EXPOSURE (RME) SCENARIOS

Percentage of Non-detect Values	*Data Distribution*		
	Normal	*Lognormal*	*Not Normal*
I) Central Tendency (CT) Exposure Scenarios			
0-15 percent	Substitute non-detect results with one-half detection limit. Calculate arithmetic mean.	Substitute non-detect results with one-half detection limit. Calculate arithmetic mean of lognormal distribution.	Substitute non-detect results with one-half detection limit. Calculate arithmetic mean of 2000 bootstrap resample set means.
>15-50 percent	Use Cohen's method to determine non-detect-adjusted estimate of arithmetic mean.	Use Gilbert's modified Cohen's method to determine non-detect-adjusted estimate of arithmetic mean for lognormal data.	Substitute non-detect results with full detection limit. Calculate arithmetic mean of 2000 bootstrap resample set means.
>50-74 percent	Substitute non-detect results with full detection limit. Calculate arithmetic mean.	Substitute non-detect results with full detection limit. Calculate arithmetic mean of 2000 bootstrap resample set means.	Substitute non-detect results with full detection limit. Calculate arithmetic mean of 2000 bootstrap resample set means.
>75-99 percent	Substitute non-detect results with full detection limit. Calculate arithmetic mean.	Substitute non-detect results with full detection limit. Calculate arithmetic mean of lognormal distribution.	Substitute non-detect results with full detection limit. Calculate arithmetic mean of 2000 bootstrap resample set means.
100 percent	Use maximum detection limit.	Use maximum detection limit.	Use maximum detection limit.

TABLE A.3

STATISTICAL METHODS USED FOR DETERMINING EXPOSURE ESTIMATES UNDER CENTRAL TENDENCY (CT) AND REASONABLE MAXIMUM EXPOSURE (RME) SCENARIOS

Percentage of Non-detect Values	*Data Distribution*		
	Normal	*Lognormal*	*Not Normal*
II) Reasonable Maximum Exposure (RME) Scenarios [1]			
0-15 percent[2]	Substitute non-detect results with one-half detection limit. Calculate Student's *t* 95-percent UCL of arithmetic mean.	Substitute non-detect results with one-half detection limit. Calculate standard deviation of log-transformed data. Use Table D.4 to select UCL method.	Substitute non-detect results with one-half detection limit. If s >0.75 and n>29: Use Adjusted Central Limit Theorem 95-percent UCL of mean. Otherwise, calculate Hall's bootrap 95-UCL.
>15-50 percent[2]	Use Cohen's method to determine non-detect-adjusted estimates of mean and standard deviation. Calculate Student's *t* 95-percent UCL of arithmetic mean.	Use Cohen's method to determine non-detect-adjusted estimates of mean and standard deviation of log-transformed data. Use Table D.4 to select UCL method.	Use bounding methodology[3] to find maximum mean, standard deviation and skewness. Calculate Hall's bootstrap 95-percent UCL.
>50-74 percent[2]	Use a bounding methodology[3] to find maximum Student's *t* 95-percent UCL of arithmetic mean.	Considering data set with ND=0, ND=0.5 DL, ND=DL and alternating NDs 0 and DL. Calculate bootstrap-*t* 95-percent UCL for each of the four data sets. Select the largest value as "bounded" UCL.	Considering data set with ND=0, ND=0.5 DL, ND=DL and alternating NDs 0 and DL. Calculate bootstrap-*t* 95-percent UCL for each of the four data sets. Select the largest value as "bounded" UCL.
>75-99 percent[2]	Substitute non-detects with their full detection limit. Calculate Student's *t* UCL of arithmetic mean (likely to be overestimated - per USEPA 2002).	Substitute non-detects with their full detection limit. Calculate standard deviation of log-transformed data. Use Table D.4 to select UCL method (likely to be overestimated - per USEPA 2002).	Substitute non-detects with their full detection limit. Calculate bootstrap-*t* 95-percent UCL (likely to be overestimated - per USEPA 2002).
100 percent	Use maximum detection limit.	Use maximum detection limit.	Use maximum detection limit.

Notes:

(1) RMEs are calculated as 95 percent upper confidence limits of the mean. Specific UCL methods were chosen based on Figure 1 and the text of USEPA (2002) and (2003).

(2) As per USEPA 2002, if the calculated UCL value exceeds the maximum detected value and a sufficient number of samples have been collected to meet data quality objectives, then the maximum detected value is used for the UCL.

(3) See Appendix A of USEPA 2002 for description of bounding methodology (note that "Step 9" of the appendix should say "less than", not "greater than").

(4) For Student's *t* UCL, use Cohen's method; for Land's H UCL, use Gilbert's modified Cohen's method; for Chebyshev UCL, use Cohen's method on log-transformed data.

TABLE A.4

95 PERCENT UPPER CONFIDENCE LIMIT (UCL) CALCULATION METHODS FOR LOGNORMAL DATA

Standard deviation of log-transformed data (s)	*Number of Samples (n)*	*Selected Upper Confidence Limit Method* [1]
$0 \le s < 0.5$	For all n (≥ 5)	Student's *t* UCL
$0.5 \le s < 1.0$	For all n	Land's H-UCL
$1.0 \le s < 1.5$	$n < 25$	Chebyshev UCL (95% MVUE)
	$n \ge 25$	Land's H-UCL
$1.5 \le s < 2.0$	$n < 20$	Chebyshev UCL (99% MVUE)
	$20 \le n \le 50$	Chebyshev UCL (95% MVUE)
	$n \ge 50$	Land's H-UCL
$2.0 \le s < 2.5$	$n < 25$	Chebyshev UCL (99% MVUE)
	$25 \le n \le 70$	Chebyshev UCL (95% MVUE)
	$n \ge 70$	Land's H-UCL
$2.5 \le s < 3.0$	$n < 30$	Chebyshev UCL (max of 99% MVUE or 99% mean)
	$30 \le n \le 70$	Chebyshev UCL (max of 95% MVUE or 95% mean)
	$n \ge 70$	Land's H-UCL
$s \ge 3.0$	Small n	Further investigation required
	$n > 100$	Land's H-UCL

Note:

[1] Source: Table A1 of USEPA (2003) -- ProUCL User's Guide Version 2.1, February, 2003.

TABLE A.5

VALUES OF LAMBDA (λ) FOR COHEN'S METHOD

λ	*Percentage of Non-detects (h)*						
	0.01	***0.05***	***0.10***	***0.15***	***0.25***	***0.40***	***0.50***
0.01	0.0102	0.0530	0.1111	0.1747	0.3205	0.5989	0.8403
0.05	0.0105	0.0547	0.1143	0.1793	0.3279	0.6101	0.8540
0.10	0.0110	0.0566	0.1180	0.1848	0.3366	0.6234	0.8703
0.15	0.0113	0.0584	0.1215	0.1898	0.3448	0.6361	0.8860
0.20	0.0116	0.0600	0.1247	0.1946	0.3525	0.6483	0.9012
0.30	0.0122	0.0630	0.1306	0.2034	0.3670	0.6713	0.9300
0.40	0.0128	0.0657	0.1360	0.2114	0.3803	0.6927	0.9570
0.50	0.0133	0.0681	0.1409	0.2188	0.3928	0.7129	0.9826
0.60	0.0137	0.0704	0.1455	0.2258	0.4045	0.7320	1.0070
0.70	0.0142	0.0726	0.1499	0.2323	0.4156	0.7502	1.0303
0.80	0.0146	0.0747	0.1540	0.2386	0.4261	0.7676	1.0527
0.90	0.0150	0.0766	0.1579	0.2445	0.4362	0.7844	1.0743
1.00	0.0153	0.0785	0.1617	0.2502	0.4459	0.8005	1.0951
1.10	0.0157	0.0803	0.1653	0.2557	0.4553	0.8161	1.1152
1.20	0.0160	0.0820	0.1688	0.2610	0.4643	0.8312	1.1347
1.30	0.0164	0.0836	0.1722	0.2661	0.4730	0.8458	1.1537
1.40	0.0167	0.0853	0.1754	0.2710	0.4815	0.8600	1.1721
1.50	0.0170	0.0868	0.1786	0.2758	0.4897	0.8738	1.1901
1.60	0.0173	0.0883	0.1817	0.2805	0.4977	0.8873	1.2076
1.70	0.0176	0.0898	0.1846	0.2851	0.5055	0.9005	1.2248
1.80	0.0179	0.0913	0.1876	0.2895	0.5132	0.9133	1.2415
1.90	0.0181	0.0927	0.1904	0.2938	0.5206	0.9259	1.2579
2.00	0.0184	0.0940	0.1932	0.2981	0.5279	0.9382	1.2739
2.10	0.0187	0.0954	0.1959	0.3022	0.5350	0.9502	1.2897
2.20	0.0189	0.0967	0.1986	0.3062	0.5420	0.9620	1.3051
2.30	0.0192	0.0980	0.2012	0.3102	0.5488	0.9736	1.3203
2.40	0.0194	0.0992	0.2037	0.3141	0.5555	0.9850	1.3352
2.50	0.0197	0.1005	0.2062	0.3179	0.5621	0.9962	1.3498
2.60	0.0199	0.1017	0.2087	0.3217	0.5686	1.0072	1.3642
2.70	0.0202	0.1029	0.2111	0.3254	0.5750	1.0180	1.3784
2.80	0.0204	0.1040	0.2135	0.3290	0.5812	1.0287	1.3924
2.90	0.0206	0.1052	0.2158	0.3326	0.5874	1.0392	1.4061

TABLE A.5

VALUES OF LAMBDA (λ) FOR COHEN'S METHOD

	Percentage of Non-detects (h)						
λ	***0.01***	***0.05***	***0.10***	***0.15***	***0.25***	***0.40***	***0.50***
3.00	0.0209	0.1063	0.2182	0.3361	0.5935	1.0495	1.4197
3.10	0.0211	0.1074	0.2204	0.3396	0.5995	1.0597	1.4330
3.20	0.0213	0.1085	0.2227	0.3430	0.6054	1.0697	1.4462
3.30	0.0215	0.1096	0.2249	0.3464	0.6112	1.0796	1.4592
3.40	0.0217	0.1107	0.2270	0.3497	0.6169	1.0894	1.4720
3.50	0.0219	0.1118	0.2292	0.3529	0.6226	1.0990	1.4847
3.60	0.0221	0.1128	0.2313	0.3562	0.6282	1.1086	1.4972
3.70	0.0223	0.1138	0.2334	0.3594	0.6337	1.1180	1.5096
3.80	0.0225	0.1148	0.2355	0.3625	0.6391	1.1273	1.5218
3.90	0.0227	0.1158	0.2375	0.3656	0.6445	1.1364	1.5339
4.00	0.0229	0.1168	0.2395	0.3687	0.6498	1.1455	1.5458
4.10	0.0231	0.1178	0.2415	0.3717	0.6551	1.1545	1.5577
4.20	0.0233	0.1188	0.2435	0.3747	0.6603	1.1634	1.5693
4.30	0.0235	0.1197	0.2454	0.3777	0.6654	1.1722	1.5809
4.40	0.0237	0.1207	0.2473	0.3806	0.6705	1.1809	1.5924
4.50	0.0239	0.1216	0.2492	0.3836	0.6755	1.1895	1.6037
4.60	0.0241	0.1225	0.2511	0.3864	0.6805	1.1980	1.6149
4.70	0.0242	0.1235	0.2530	0.3893	0.6855	1.2064	1.6260
4.80	0.0244	0.1244	0.2548	0.3921	0.6903	1.2148	1.6370
4.90	0.0246	0.1253	0.2567	0.3949	0.6952	1.2230	1.6479
5.00	0.0248	0.1262	0.2585	0.3977	0.7000	1.2312	1.6587
5.10	0.0249	0.1270	0.2603	0.4004	0.7047	1.2394	1.6694
5.20	0.0251	0.1279	0.2621	0.4031	0.7094	1.2474	1.6800
5.30	0.0253	0.1288	0.2638	0.4058	0.7141	1.2554	1.6905
5.40	0.0255	0.1296	0.2656	0.4085	0.7187	1.2633	1.7010
5.50	0.0256	0.1305	0.2673	0.4111	0.7233	1.2711	1.7113
5.60	0.0258	0.1313	0.2690	0.4137	0.7278	1.2789	1.7215
5.70	0.0260	0.1322	0.2707	0.4163	0.7323	1.2866	1.7317
5.80	0.0261	0.1330	0.2724	0.4189	0.7368	1.2943	1.7418
5.90	0.0263	0.1338	0.2741	0.4215	0.7412	1.3019	1.7518
6.00	0.0264	0.1346	0.2757	0.4240	0.7456	1.3094	1.7617

Source: McBean & Rovers, 1998

TABLE A.6

VALUES OF H(0.95) FOR LAND'S METHOD

Standard deviation of log-transformed data (S_{log})	*Number of Samples*												
	3	*5*	*7*	*10*	*12*	*15*	*21*	*31*	*51*	*101*	*301*	*601*	*1001*
0.10	2.750	2.035	1.886	1.802	1.775	1.749	1.722	1.701	1.684	1.670	1.659	1.656	1.654
0.20	3.295	2.198	1.992	1.881	1.843	1.809	1.771	1.742	1.718	1.697	1.680	1.674	1.671
0.30	4.109	2.402	2.125	1.977	1.927	1.882	1.833	1.793	1.761	1.733	1.709	1.700	1.696
0.40	5.220	2.651	2.282	2.089	2.026	1.968	1.905	1.856	1.813	1.777	1.746	1.734	1.728
0.50	6.495	2.947	2.465	2.220	2.141	2.068	1.989	1.928	1.876	1.830	1.790	1.776	1.769
0.60	7.807	3.287	2.673	2.368	2.271	2.181	2.085	2.010	1.946	1.891	1.843	1.825	1.816
0.70	9.120	3.662	2.904	2.532	2.414	2.306	2.191	2.102	2.025	1.960	1.902	1.881	1.870
0.80	10.43	4.062	3.155	2.710	2.570	2.443	2.307	2.202	2.112	2.035	1.968	1.944	1.931
0.90	11.74	4.478	3.420	2.902	2.738	2.589	2.432	2.310	2.206	2.117	2.040	2.012	1.997
1.00	13.05	4.905	3.695	3.103	2.915	2.744	2.564	2.423	2.306	2.205	2.117	2.085	2.068
1.25	16.33	6.001	4.426	3.639	3.389	3.163	2.923	2.737	2.580	2.447	2.330	2.288	2.266
1.50	19.60	7.120	5.184	4.207	3.896	3.612	3.311	3.077	2.881	2.713	2.566	2.514	2.486
1.75	22.87	8.250	5.960	4.795	4.422	4.081	3.719	3.437	3.200	2.997	2.820	2.757	2.723
2.00	26.14	9.387	6.747	5.396	4.962	4.564	4.141	3.812	3.533	3.295	3.088	3.013	2.974
2.50	32.69	11.67	8.339	6.621	6.067	5.557	5.013	4.588	4.228	3.920	3.650	3.553	3.503
3.00	39.23	13.97	9.945	7.864	7.191	6.570	5.907	5.388	4.947	4.569	4.238	4.119	4.057
3.50	45.77	16.27	11.56	9.118	8.326	7.596	6.815	6.201	5.681	5.233	4.842	4.700	4.627
4.00	52.31	18.58	13.18	10.38	9.469	8.630	7.731	7.024	6.424	5.908	5.456	5.293	5.208
4.50	58.85	20.88	14.80	11.64	10.62	9.669	8.652	7.854	7.174	6.590	6.077	5.892	5.796
5.00	65.39	23.19	16.43	12.91	11.77	10.71	9.579	8.688	7.929	7.277	6.704	6.497	6.390
6.00	78.47	27.81	19.68	15.45	14.08	12.81	11.44	10.36	9.449	8.661	7.968	7.718	7.588
7.00	91.55	32.43	22.94	18.00	16.39	14.90	13.31	12.05	10.98	10.05	9.242	8.949	8.797
8.00	104.6	37.06	26.20	20.55	18.71	17.01	15.18	13.74	12.51	11.45	10.52	10.19	10.01
9.00	117.7	41.68	29.46	23.10	21.03	19.11	17.05	15.43	14.05	12.85	11.81	11.43	11.23
10.00	130.8	46.31	32.73	25.66	23.35	21.22	18.93	17.13	15.59	14.26	13.10	12.67	12.45

Sources: Land (1975) and Gilbert (1987).

TABLE A.7

VALUES OF g_n FOR CHEBYSHEV'S METHOD

Variance ÷ 2 of log-transformed data ($S_{log}^2 \div 2$)	*Number of Samples*																
	2	*5*	*8*	*10*	*13*	*15*	*20*	*25*	*30*	*50*	*70*	*90*	*100*	*150*	*200*	*500*	*∞*
0.05	1.025	1.041	1.045	1.046	1.047	1.048	1.049	1.049	1.049	1.050	1.050	1.051	1.051	1.051	1.051	1.051	1.051
0.10	1.050	1.082	1.091	1.093	1.096	1.097	1.099	1.100	1.101	1.103	1.103	1.104	1.104	1.104	1.105	1.105	1.105
0.15	1.076	1.125	1.138	1.143	1.147	1.149	1.152	1.154	1.155	1.158	1.159	1.160	1.160	1.161	1.161	1.161	1.162
0.20	1.102	1.169	1.187	1.194	1.200	1.203	1.207	1.210	1.212	1.216	1.217	1.218	1.218	1.219	1.220	1.221	1.221
0.25	1.128	1.214	1.238	1.247	1.255	1.259	1.265	1.268	1.271	1.276	1.278	1.280	1.280	1.281	1.282	1.283	1.284
0.30	1.154	1.260	1.291	1.302	1.312	1.317	1.325	1.330	1.333	1.340	1.342	1.344	1.345	1.346	1.347	1.349	1.350
0.35	1.180	1.307	1.345	1.359	1.372	1.378	1.387	1.393	1.398	1.406	1.410	1.412	1.412	1.415	1.416	1.418	1.419
0.40	1.207	1.356	1.401	1.418	1.433	1.441	1.453	1.460	1.465	1.476	1.480	1.483	1.484	1.486	1.488	1.490	1.492
0.45	1.234	1.406	1.459	1.479	1.498	1.506	1.521	1.530	1.536	1.548	1.554	1.557	1.558	1.562	1.563	1.566	1.568
0.50	1.261	1.457	1.519	1.542	1.564	1.574	1.592	1.602	1.610	1.625	1.631	1.635	1.637	1.641	1.643	1.646	1.649
0.55	1.288	1.509	1.581	1.608	1.633	1.645	1.666	1.678	1.687	1.705	1.713	1.717	1.719	1.724	1.726	1.730	1.733
0.60	1.315	1.563	1.645	1.675	1.705	1.719	1.743	1.757	1.768	1.789	1.798	1.803	1.805	1.811	1.813	1.819	1.822
0.65	1.343	1.618	1.711	1.746	1.780	1.796	1.823	1.840	1.852	1.876	1.887	1.893	1.895	1.902	1.905	1.911	1.916
0.70	1.371	1.675	1.779	1.818	1.857	1.876	1.907	1.926	1.940	1.968	1.981	1.988	1.990	1.998	2.002	2.009	2.014
0.75	1.399	1.733	1.849	1.894	1.938	1.959	1.994	2.016	2.032	2.064	2.079	2.087	2.090	2.099	2.103	2.111	2.117
0.80	1.427	1.792	1.922	1.971	2.021	2.045	2.085	2.110	2.128	2.165	2.182	2.191	2.194	2.205	2.210	2.219	2.226
0.85	1.456	1.853	1.996	2.052	2.108	2.134	2.179	2.208	2.228	2.270	2.289	2.300	2.304	2.316	2.322	2.332	2.340
0.90	1.485	1.915	2.074	2.135	2.197	2.227	2.278	2.310	2.333	2.381	2.402	2.415	2.419	2.432	2.439	2.451	2.460
0.95	1.514	1.979	2.153	2.221	2.291	2.323	2.380	2.417	2.442	2.496	2.521	2.535	2.539	2.555	2.562	2.576	2.586
1.00	1.543	2.044	2.235	2.310	2.387	2.424	2.487	2.528	2.557	2.617	2.645	2.660	2.666	2.683	2.692	2.707	2.718
1.05	1.573	2.111	2.320	2.403	2.487	2.528	2.598	2.644	2.676	2.744	2.774	2.792	2.798	2.818	2.827	2.845	2.858
1.10	1.602	2.180	2.407	2.498	2.591	2.636	2.714	2.765	2.800	2.876	2.911	2.930	2.938	2.959	2.970	2.990	3.004
1.15	1.632	2.250	2.497	2.596	2.699	2.748	2.834	2.891	2.930	3.014	3.053	3.075	3.083	3.108	3.120	3.143	3.158
1.20	1.662	2.321	2.589	2.698	2.810	2.864	2.960	3.022	3.066	3.159	3.203	3.227	3.236	3.263	3.277	3.303	3.320
1.25	1.693	2.395	2.685	2.803	2.926	2.985	3.090	3.159	3.207	3.311	3.359	3.387	3.397	3.427	3.442	3.471	3.490
1.30	1.724	2.470	2.783	2.911	3.045	3.111	3.226	3.301	3.354	3.470	3.523	3.554	3.565	3.599	3.616	3.648	3.669
1.35	1.754	2.547	2.884	3.023	3.169	3.241	3.367	3.450	3.508	3.636	3.695	3.729	3.741	3.779	3.798	3.833	3.857
1.40	1.786	2.626	2.988	3.139	3.298	3.376	3.513	3.604	3.669	3.809	3.875	3.912	3.926	3.968	3.989	4.028	4.055
1.45	1.817	2.706	3.096	3.259	3.431	3.515	3.666	3.766	3.836	3.991	4.063	4.105	4.120	4.166	4.190	4.233	4.263
1.50	1.849	2.788	3.206	3.382	3.569	3.661	3.825	3.933	4.011	4.181	4.260	4.307	4.323	4.374	4.400	4.448	4.482
1.55	1.880	2.873	3.320	3.510	3.711	3.811	3.990	4.108	4.193	4.379	4.467	4.518	4.536	4.592	4.621	4.675	4.711
1.60	1.913	2.959	3.437	3.642	3.859	3.967	4.161	4.291	4.383	4.587	4.683	4.739	4.759	4.821	4.853	4.912	4.953
1.65	1.945	3.047	3.558	3.777	4.012	4.129	4.339	4.480	4.581	4.804	4.910	4.971	4.993	5.062	5.097	5.162	5.207
1.70	1.977	3.137	3.682	3.918	4.171	4.297	4.525	4.678	4.788	5.031	5.147	5.215	5.239	5.314	5.353	5.424	5.474
1.75	2.010	3.229	3.810	4.062	4.334	4.471	4.717	4.883	5.003	5.269	5.395	5.469	5.496	5.578	5.621	5.700	5.755
1.80	2.043	3.323	3.942	4.212	4.504	4.651	4.917	5.097	5.227	5.517	5.655	5.736	5.766	5.856	5.903	5.990	6.050
1.85	2.077	3.420	4.077	4.366	4.680	4.838	5.125	5.320	5.461	5.776	5.927	6.016	6.048	6.147	6.198	6.294	6.360
1.90	2.110	3.518	4.216	4.525	4.861	5.031	5.341	5.552	5.705	6.048	6.212	6.309	6.344	6.453	6.509	6.613	6.686
1.95	2.144	3.619	4.359	4.688	5.049	5.232	5.566	5.794	5.959	6.331	6.511	6.617	6.655	6.773	6.834	6.949	7.029
2.00	2.178	3.721	4.506	4.858	5.243	5.439	5.799	6.045	6.224	6.628	6.823	6.938	6.980	7.109	7.176	7.302	7.389

Source: After Gilbert (1987).

APPENDIX B

RISK CALCULATIONS

TABLE B.1.1.CT

CALCULATION OF NON-CANCER HAZARDS FOR CURRENT MAINTENANCE WORKER EXPOSURE TO SURFACE SOIL AND SLAG
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Medium: Surface Soil and Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Aluminum	1.87E+04	mg/kg	1.87E+04	mg/kg	M	5.85E-04	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	5.85E-04
	Antimony	2.32E+01	mg/kg	2.32E+01	mg/kg	M	7.26E-07	mg/kg-day	4.00E-04	mg/kg-day	N/A	N/A	1.82E-03
	Arsenic	6.43E+00	mg/kg	6.43E+00	mg/kg	M	2.01E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	6.71E-04
	Barium	1.66E+02	mg/kg	1.66E+02	mg/kg	M	5.19E-06	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	7.42E-05
	Beryllium	5.85E-01	mg/kg	5.85E-01	mg/kg	M	1.83E-08	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	9.16E-06
	Cadmium	3.35E+00	mg/kg	3.35E+00	mg/kg	M	1.05E-07	mg/kg-day	5.00E-04	mg/kg-day	N/A	N/A	2.10E-04
	Chromium Total	1.24E+03	mg/kg	1.24E+03	mg/kg	M	3.89E-05	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	2.59E-05
	Chromium VI (Hexavalent)	6.80E+00	mg/kg	6.80E+00	mg/kg	M	2.13E-07	mg/kg-day	3.00E-03	mg/kg-day	N/A	N/A	7.10E-05
	Cobalt	2.24E+01	mg/kg	2.24E+01	mg/kg	M	7.01E-07	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	3.51E-05
	Copper	1.65E+02	mg/kg	1.65E+02	mg/kg	M	5.17E-06	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	1.29E-04
	Iron	1.92E+04	mg/kg	1.92E+04	mg/kg	M	6.00E-04	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	2.00E-03
	Lead	7.23E+01	mg/kg	7.23E+01	mg/kg	M	2.26E-06	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.76E+03	mg/kg	1.76E+03	mg/kg	M	5.52E-05	mg/kg-day	4.67E-02	mg/kg-day	N/A	N/A	1.18E-03
	Mercury	3.00E-01	mg/kg	3.00E-01	mg/kg	M	9.39E-09	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	3.13E-05
	Nickel	2.54E+02	mg/kg	2.54E+02	mg/kg	M	7.95E-06	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	3.97E-04
	Selenium	4.87E+00	mg/kg	4.87E+00	mg/kg	M	1.52E-07	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	3.05E-05
	Thallium	2.62E+00	mg/kg	2.62E+00	mg/kg	M	8.20E-08	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	1.17E-03
	Vanadium	5.22E+01	mg/kg	5.22E+01	mg/kg	M	1.63E-06	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	1.63E-03
	Zinc	1.74E+02	mg/kg	1.74E+02	mg/kg	M	5.46E-06	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	1.82E-05
	(Total)												1.01E-02
Dermal	Aluminum	1.87E+04	mg/kg	1.87E+04	mg/kg	M	3.86E-06	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	3.86E-06
	Antimony	2.32E+01	mg/kg	2.32E+01	mg/kg	M	4.79E-09	mg/kg-day	6.00E-05	mg/kg-day	N/A	N/A	7.99E-05
	Arsenic	6.43E+00	mg/kg	6.43E+00	mg/kg	M	3.99E-09	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.33E-05
	Barium	1.66E+02	ng/g	1.66E-01	mg/kg	M	3.43E-11	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	6.99E-09
	Beryllium	5.85E-01	mg/kg	5.85E-01	mg/kg	M	1.21E-10	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	8.64E-06
	Cadmium	3.35E+00	mg/kg	3.35E+00	mg/kg	M	6.92E-11	mg/kg-day	2.50E-05	mg/kg-day	N/A	N/A	2.77E-06
	Chromium Total	1.24E+03	mg/kg	1.24E+03	mg/kg	M	2.57E-07	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	1.32E-05
	Chromium VI (Hexavalent)	6.80E+00	mg/kg	6.80E+00	mg/kg	M	1.41E-09	mg/kg-day	7.50E-05	mg/kg-day	N/A	N/A	1.87E-05
	Cobalt	2.24E+01	mg/kg	2.24E+01	mg/kg	M	4.63E-09	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	2.31E-07
	Copper	1.65E+02	mg/kg	1.65E+02	mg/kg	M	3.41E-08	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	8.52E-07
	Iron	1.92E+04	mg/kg	1.92E+04	mg/kg	M	3.96E-06	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	1.32E-05
	Lead	7.23E+01	mg/kg	7.23E+01	mg/kg	M	1.49E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.76E+03	mg/kg	1.76E+03	mg/kg	M	3.64E-07	mg/kg-day	1.87E-03	mg/kg-day	N/A	N/A	1.95E-04
	Mercury	3.00E-01	mg/kg	3.00E-01	mg/kg	M	6.20E-11	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	2.07E-07
	Nickel	2.54E+02	mg/kg	2.54E+02	mg/kg	M	5.24E-08	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	6.56E-05
	Selenium	4.87E+00	mg/kg	4.87E+00	mg/kg	M	1.01E-09	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	2.01E-07
	Thallium	2.62E+00	mg/kg	2.62E+00	mg/kg	M	5.41E-10	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	7.73E-06
	Vanadium	5.22E+01	mg/kg	5.22E+01	mg/kg	M	1.08E-08	mg/kg-day	2.60E-05	mg/kg-day	N/A	N/A	4.15E-04
	Zinc	1.74E+02	mg/kg	1.74E+02	mg/kg	M	3.60E-08	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	1.20E-07
	(Total)												8.38E-04

TABLE B.1.1.CT

CALCULATION OF NON-CANCER HAZARDS FOR CURRENT MAINTENANCE WORKER EXPOSURE TO SURFACE SOIL AND SLAG
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Medium: Surface Soil and Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Inhalation	Aluminum	1.87E+04	mg/kg	1.87E+04	mg/kg	M	2.85E-08	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	2.85E-05
	Antimony	2.32E+01	mg/kg	2.32E+01	mg/kg	M	3.55E-11	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Arsenic	6.43E+00	mg/kg	6.43E+00	mg/kg	M	9.83E-12	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Barium	1.66E+02	mg/kg	1.66E+02	mg/kg	M	2.53E-10	mg/kg-day	1.40E-04	mg/kg-day	N/A	N/A	1.81E-06
	Beryllium	5.85E-01	mg/kg	5.85E-01	mg/kg	M	8.94E-13	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	1.57E-07
	Cadmium	3.35E+00	mg/kg	3.35E+00	mg/kg	M	5.12E-12	mg/kg-day	5.70E-05	mg/kg-day	N/A	N/A	8.98E-08
	Chromium Total	1.24E+03	mg/kg	1.24E+03	mg/kg	M	1.90E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Chromium VI (Hexavalent)	6.80E+00	mg/kg	6.80E+00	mg/kg	M	1.04E-11	mg/kg-day	2.80E-05	mg/kg-day	N/A	N/A	3.71E-07
	Cobalt	2.24E+01	mg/kg	2.24E+01	mg/kg	M	3.42E-11	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	6.01E-06
	Copper	1.65E+02	mg/kg	1.65E+02	mg/kg	M	2.52E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Iron	1.92E+04	mg/kg	1.92E+04	mg/kg	M	2.93E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Lead	7.23E+01	mg/kg	7.23E+01	mg/kg	M	1.11E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.76E+03	mg/kg	1.76E+03	mg/kg	M	2.69E-09	mg/kg-day	1.43E-05	mg/kg-day	N/A	N/A	1.88E-04
	Mercury	3.00E-01	mg/kg	3.00E-01	mg/kg	M	4.59E-13	mg/kg-day	8.60E-05	mg/kg-day	N/A	N/A	5.33E-09
	Nickel	2.54E+02	mg/kg	2.54E+02	mg/kg	M	3.88E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Selenium	4.87E+00	mg/kg	4.87E+00	mg/kg	M	7.44E-12	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Thallium	2.62E+00	mg/kg	2.62E+00	mg/kg	M	4.01E-12	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Vanadium	5.22E+01	mg/kg	5.22E+01	mg/kg	M	7.98E-11	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Zinc	1.74E+02	mg/kg	1.74E+02	mg/kg	M	2.67E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	(Total)												2.25E-04
												Total Hazard Index Across All Exposure Routes/Pathways	1.1E-02

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.1.RME

CALCULATION OF NON-CANCER HAZARDS FOR CURRENT MAINTENANCE WORKER EXPOSURE TO SURFACE SOIL AND SLAG
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Medium: Surface Soil and Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Aluminum	3.69E+04	mg/kg	3.69E+04	mg/kg	M	2.31E-03	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	2.31E-03
	Antimony	3.82E+01	mg/kg	3.82E+01	mg/kg	M	2.39E-06	mg/kg-day	4.00E-04	mg/kg-day	N/A	N/A	5.98E-03
	Arsenic	1.81E+01	mg/kg	1.81E+01	mg/kg	M	1.13E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	3.77E-03
	Barium	3.77E+02	mg/kg	3.77E+02	mg/kg	M	2.36E-05	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	3.38E-04
	Beryllium	1.21E+00	mg/kg	1.21E+00	mg/kg	M	7.57E-08	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	3.79E-05
	Cadmium	2.62E+01	mg/kg	2.62E+01	mg/kg	M	1.64E-06	mg/kg-day	5.00E-04	mg/kg-day	N/A	N/A	3.28E-03
	Chromium Total	1.97E+03	mg/kg	1.97E+03	mg/kg	M	1.24E-04	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	8.24E-05
	Chromium VI (Hexavalent)	9.95E+00	mg/kg	9.95E+00	mg/kg	M	6.23E-07	mg/kg-day	3.00E-03	mg/kg-day	N/A	N/A	2.08E-04
	Cobalt	9.15E+01	mg/kg	9.15E+01	mg/kg	M	5.73E-06	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	2.86E-04
	Copper	1.27E+03	mg/kg	1.27E+03	mg/kg	M	7.98E-05	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	2.00E-03
	Iron	2.16E+04	mg/kg	2.16E+04	mg/kg	M	1.35E-03	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	4.51E-03
	Lead	3.09E+02	mg/kg	3.09E+02	mg/kg	M	1.93E-05	mg/kg-day	–	mg/kg-day	N/A	N/A	NC
	Manganese	5.39E+03	mg/kg	5.39E+03	mg/kg	M	3.38E-04	mg/kg-day	4.67E-02	mg/kg-day	N/A	N/A	7.23E-03
	Mercury	2.49E+00	mg/kg	2.49E+00	mg/kg	M	1.56E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	5.19E-04
	Nickel	1.04E+03	mg/kg	1.04E+03	mg/kg	M	6.49E-05	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	3.24E-03
	Selenium	6.61E+00	mg/kg	6.61E+00	mg/kg	M	4.14E-07	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	8.28E-05
	Thallium	3.89E+00	mg/kg	3.89E+00	mg/kg	M	2.43E-07	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	3.48E-03
	Vanadium	6.60E+01	mg/kg	6.60E+01	mg/kg	M	4.13E-06	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	4.13E-03
	Zinc	4.17E+02	mg/kg	4.17E+02	mg/kg	M	2.61E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	8.70E-05
	(Total)												4.16E-02
Dermal	Aluminum	3.69E+04	mg/kg	3.69E+04	mg/kg	M	1.53E-04	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	1.53E-04
	Antimony	3.82E+01	mg/kg	3.82E+01	mg/kg	M	1.58E-07	mg/kg-day	6.00E-05	mg/kg-day	N/A	N/A	2.63E-03
	Arsenic	1.81E+01	mg/kg	1.81E+01	mg/kg	M	2.24E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	7.47E-04
	Barium	3.77E+02	ng/g	3.77E-01	mg/kg	M	1.56E-09	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	3.18E-07
	Beryllium	1.21E+00	mg/kg	1.21E+00	mg/kg	M	5.00E-09	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	3.57E-04
	Cadmium	2.62E+01	mg/kg	2.62E+01	mg/kg	M	1.08E-08	mg/kg-day	2.50E-05	mg/kg-day	N/A	N/A	4.33E-04
	Chromium Total	1.97E+03	mg/kg	1.97E+03	mg/kg	M	8.15E-06	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	4.18E-04
	Chromium VI (Hexavalent)	9.95E+00	mg/kg	9.95E+00	mg/kg	M	4.11E-08	mg/kg-day	7.50E-05	mg/kg-day	N/A	N/A	5.48E-04
	Cobalt	9.15E+01	mg/kg	9.15E+01	mg/kg	M	3.78E-07	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	1.89E-05
	Copper	1.27E+03	mg/kg	1.27E+03	mg/kg	M	5.27E-06	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	1.32E-04
	Iron	2.16E+04	mg/kg	2.16E+04	mg/kg	M	8.93E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	2.98E-04
	Lead	3.09E+02	mg/kg	3.09E+02	mg/kg	M	1.28E-06	mg/kg-day	–	mg/kg-day	N/A	N/A	NC
	Manganese	5.39E+03	mg/kg	5.39E+03	mg/kg	M	2.23E-05	mg/kg-day	1.87E-03	mg/kg-day	N/A	N/A	1.19E-02
	Mercury	2.49E+00	mg/kg	2.49E+00	mg/kg	M	1.03E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	3.42E-05
	Nickel	1.04E+03	mg/kg	1.04E+03	mg/kg	M	4.28E-06	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	5.35E-03
	Selenium	6.61E+00	mg/kg	6.61E+00	mg/kg	M	2.73E-08	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	5.47E-06
	Thallium	3.89E+00	mg/kg	3.89E+00	mg/kg	M	1.61E-08	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	2.30E-04
	Vanadium	6.60E+01	mg/kg	6.60E+01	mg/kg	M	2.73E-07	mg/kg-day	2.60E-05	mg/kg-day	N/A	N/A	1.05E-02
	Zinc	4.17E+02	mg/kg	4.17E+02	mg/kg	M	1.72E-06	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	5.74E-06
	(Total)												3.38E-02

TABLE B.1.1.RME

CALCULATION OF NON-CANCER HAZARDS FOR CURRENT MAINTENANCE WORKER EXPOSURE TO SURFACE SOIL AND SLAG
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Medium: Surface Soil and Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Inhalation	Aluminum	3.69E+04	mg/kg	3.69E+04	mg/kg	M	1.13E-07	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	1.13E-04
	Antimony	3.82E+01	mg/kg	3.82E+01	mg/kg	M	1.17E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Arsenic	1.81E+01	mg/kg	1.81E+01	mg/kg	M	5.52E-11	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Barium	3.77E+02	mg/kg	3.77E+02	mg/kg	M	1.15E-09	mg/kg-day	1.40E-04	mg/kg-day	N/A	N/A	8.24E-06
	Beryllium	1.21E+00	mg/kg	1.21E+00	mg/kg	M	3.70E-12	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	6.49E-07
	Cadmium	2.62E+01	mg/kg	2.62E+01	mg/kg	M	8.00E-11	mg/kg-day	5.70E-05	mg/kg-day	N/A	N/A	1.40E-06
	Chromium Total	1.97E+03	mg/kg	1.97E+03	mg/kg	M	6.03E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Chromium VI (Hexavalent)	9.95E+00	mg/kg	9.95E+00	mg/kg	M	3.04E-11	mg/kg-day	2.80E-05	mg/kg-day	N/A	N/A	1.09E-06
	Cobalt	9.15E+01	mg/kg	9.15E+01	mg/kg	M	2.80E-10	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	4.91E-05
	Copper	1.27E+03	mg/kg	1.27E+03	mg/kg	M	3.90E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Iron	2.16E+04	mg/kg	2.16E+04	mg/kg	M	6.61E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Lead	3.09E+02	mg/kg	3.09E+02	mg/kg	M	9.44E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	5.39E+03	mg/kg	5.39E+03	mg/kg	M	1.65E-08	mg/kg-day	1.43E-05	mg/kg-day	N/A	N/A	1.15E-03
	Mercury	2.49E+00	mg/kg	2.49E+00	mg/kg	M	7.60E-12	mg/kg-day	8.60E-05	mg/kg-day	N/A	N/A	8.84E-08
	Nickel	1.04E+03	mg/kg	1.04E+03	mg/kg	M	3.17E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Selenium	6.61E+00	mg/kg	6.61E+00	mg/kg	M	2.02E-11	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Thallium	3.89E+00	mg/kg	3.89E+00	mg/kg	M	1.19E-11	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Vanadium	6.60E+01	mg/kg	6.60E+01	mg/kg	M	2.02E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Zinc	4.17E+02	mg/kg	4.17E+02	mg/kg	M	1.27E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	(Total)												1.33E-03
												Total Hazard Index Across All Exposure Routes/Pathways	7.7E-02

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.2.CT

CALCULATION OF NON-CANCER HAZARDS FOR CURRENT MAINTENANCE WORKER EXPOSURE TO SURFACE SOIL
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Antimony	1.06E+01	mg/kg	1.06E+01	mg/kg	M	3.32E-07	mg/kg-day	4.00E-04	mg/kg-day	N/A	N/A	8.30E-04
	Arsenic	6.27E+00	mg/kg	6.27E+00	mg/kg	M	1.96E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	6.54E-04
	Barium	1.65E+02	mg/kg	1.65E+02	mg/kg	M	5.17E-06	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	7.38E-05
	Beryllium	6.07E-01	mg/kg	6.07E-01	mg/kg	M	1.90E-08	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	9.50E-06
	Cadmium	9.43E-01	mg/kg	9.43E-01	mg/kg	M	2.95E-08	mg/kg-day	5.00E-04	mg/kg-day	N/A	N/A	5.91E-05
	Chromium Total	2.90E+02	mg/kg	2.90E+02	mg/kg	M	9.07E-06	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	6.05E-06
	Cobalt	2.43E+01	mg/kg	2.43E+01	mg/kg	M	7.61E-07	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	3.80E-05
	Copper	3.10E+01	mg/kg	3.10E+01	mg/kg	M	9.69E-07	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	2.42E-05
	Iron	1.92E+04	mg/kg	1.92E+04	mg/kg	M	6.00E-04	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	2.00E-03
	Manganese	1.45E+03	mg/kg	1.45E+03	mg/kg	M	4.54E-05	mg/kg-day	4.67E-02	mg/kg-day	N/A	N/A	9.73E-04
	Mercury	4.20E-01	mg/kg	4.20E-01	mg/kg	M	1.32E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	4.38E-05
	Nickel	2.46E+01	mg/kg	2.46E+01	mg/kg	M	7.72E-07	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	3.86E-05
	Selenium	2.76E+00	mg/kg	2.76E+00	mg/kg	M	8.64E-08	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	1.73E-05
	Thallium	1.54E+00	mg/kg	1.54E+00	mg/kg	M	4.82E-08	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	6.89E-04
	Zinc	1.55E+02	mg/kg	1.55E+02	mg/kg	M	4.85E-06	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	1.62E-05
	(Total)												5.47E-03
Dermal	Antimony	1.06E+01	mg/kg	1.06E+01	mg/kg	M	2.19E-09	mg/kg-day	6.00E-05	mg/kg-day	N/A	N/A	3.65E-05
	Arsenic	6.27E+00	mg/kg	6.27E+00	mg/kg	M	3.89E-09	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.30E-05
	Barium	1.65E+02	ng/g	1.65E-01	mg/kg	M	3.41E-11	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	6.96E-09
	Beryllium	6.07E-01	mg/kg	6.07E-01	mg/kg	M	1.25E-10	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	8.96E-06
	Cadmium	9.43E-01	mg/kg	9.43E-01	mg/kg	M	1.95E-11	mg/kg-day	2.50E-05	mg/kg-day	N/A	N/A	7.79E-07
	Chromium Total	2.90E+02	mg/kg	2.90E+02	mg/kg	M	5.99E-08	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	3.07E-06
	Cobalt	2.43E+01	mg/kg	2.43E+01	mg/kg	M	5.02E-09	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	2.51E-07
	Copper	3.10E+01	mg/kg	3.10E+01	mg/kg	M	6.40E-09	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	1.60E-07
	Iron	1.92E+04	mg/kg	1.92E+04	mg/kg	M	3.96E-06	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	1.32E-05
	Manganese	1.45E+03	mg/kg	1.45E+03	mg/kg	M	3.00E-07	mg/kg-day	1.87E-03	mg/kg-day	N/A	N/A	1.60E-04
	Mercury	4.20E-01	mg/kg	4.20E-01	mg/kg	M	8.68E-11	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	2.89E-07
	Nickel	2.46E+01	mg/kg	2.46E+01	mg/kg	M	5.09E-09	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	6.37E-06
	Selenium	2.76E+00	mg/kg	2.76E+00	mg/kg	M	5.70E-10	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	1.14E-07
	Thallium	1.54E+00	mg/kg	1.54E+00	mg/kg	M	3.18E-10	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	4.55E-06
	Zinc	1.55E+02	mg/kg	1.55E+02	mg/kg	M	3.20E-08	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	1.07E-07
	(Total)												2.48E-04

TABLE B.1.2.CT

CALCULATION OF NON-CANCER HAZARDS FOR CURRENT MAINTENANCE WORKER EXPOSURE TO SURFACE SOIL
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Inhalation	Antimony	1.06E+01	mg/kg	1.06E+01	mg/kg	M	1.62E-11	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Arsenic	6.27E+00	mg/kg	6.27E+00	mg/kg	M	9.59E-12	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Barium	1.65E+02	mg/kg	1.65E+02	mg/kg	M	2.52E-10	mg/kg-day	1.40E-04	mg/kg-day	N/A	N/A	1.80E-06
	Beryllium	6.07E-01	mg/kg	6.07E-01	mg/kg	M	9.28E-13	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	1.63E-07
	Cadmium	9.43E-01	mg/kg	9.43E-01	mg/kg	M	1.44E-12	mg/kg-day	5.70E-05	mg/kg-day	N/A	N/A	2.53E-08
	Chromium Total	2.90E+02	mg/kg	2.90E+02	mg/kg	M	4.43E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Cobalt	2.43E+01	mg/kg	2.43E+01	mg/kg	M	3.71E-11	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	6.52E-06
	Copper	3.10E+01	mg/kg	3.10E+01	mg/kg	M	4.73E-11	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Iron	1.92E+04	mg/kg	1.92E+04	mg/kg	M	2.93E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.45E+03	mg/kg	1.45E+03	mg/kg	M	2.22E-09	mg/kg-day	1.43E-05	mg/kg-day	N/A	N/A	1.55E-04
	Mercury	4.20E-01	mg/kg	4.20E-01	mg/kg	M	6.42E-13	mg/kg-day	8.60E-05	mg/kg-day	N/A	N/A	7.47E-09
	Nickel	2.46E+01	mg/kg	2.46E+01	mg/kg	M	3.77E-11	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Selenium	2.76E+00	mg/kg	2.76E+00	mg/kg	M	4.22E-12	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Thallium	1.54E+00	mg/kg	1.54E+00	mg/kg	M	2.35E-12	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Zinc	1.55E+02	mg/kg	1.55E+02	mg/kg	M	2.37E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	(Total)												1.64E-04

Total Hazard Index Across All Exposure Routes/Pathways 5.9E-03

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.2.RME

CALCULATION OF NON-CANCER HAZARDS FOR CURRENT MAINTENANCE WORKER EXPOSURE TO SURFACE SOIL
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Antimony	1.54E+01	mg/kg	1.54E+01	mg/kg	M	9.67E-07	mg/kg-day	4.00E-04	mg/kg-day	N/A	N/A	2.42E-03
	Arsenic	7.90E+00	mg/kg	7.90E+00	mg/kg	M	4.95E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.65E-03
	Barium	5.40E+02	mg/kg	5.40E+02	mg/kg	M	3.38E-05	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	4.83E-04
	Beryllium	8.12E-01	mg/kg	8.12E-01	mg/kg	M	5.08E-08	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	2.54E-05
	Cadmium	1.29E+00	mg/kg	1.29E+00	mg/kg	M	8.05E-08	mg/kg-day	5.00E-04	mg/kg-day	N/A	N/A	1.61E-04
	Chromium Total	4.66E+02	mg/kg	4.66E+02	mg/kg	M	2.92E-05	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	1.95E-05
	Cobalt	1.75E+02	mg/kg	1.75E+02	mg/kg	M	1.10E-05	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	5.48E-04
	Copper	3.86E+01	mg/kg	3.86E+01	mg/kg	M	2.42E-06	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	6.04E-05
	Iron	2.16E+04	mg/kg	2.16E+04	mg/kg	M	1.36E-03	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	4.52E-03
	Manganese	8.82E+03	mg/kg	8.82E+03	mg/kg	M	5.52E-04	mg/kg-day	4.67E-02	mg/kg-day	N/A	N/A	1.18E-02
	Mercury	4.86E+00	mg/kg	4.86E+00	mg/kg	M	3.04E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.01E-03
	Nickel	2.78E+01	mg/kg	2.78E+01	mg/kg	M	1.74E-06	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	8.69E-05
	Selenium	3.85E+00	mg/kg	3.85E+00	mg/kg	M	2.41E-07	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	4.82E-05
	Thallium	2.28E+00	mg/kg	2.28E+00	mg/kg	M	1.43E-07	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	2.04E-03
	Zinc	2.03E+02	mg/kg	2.03E+02	mg/kg	M	1.27E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	4.23E-05
	(Total)												2.49E-02
Dermal	Antimony	1.54E+01	mg/kg	1.54E+01	mg/kg	M	6.38E-08	mg/kg-day	6.00E-05	mg/kg-day	N/A	N/A	1.06E-03
	Arsenic	7.90E+00	mg/kg	7.90E+00	mg/kg	M	9.79E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	3.26E-04
	Barium	5.40E+02	ng/g	5.40E-01	mg/kg	M	2.23E-09	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	4.55E-07
	Beryllium	8.12E-01	mg/kg	8.12E-01	mg/kg	M	3.36E-09	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	2.40E-04
	Cadmium	1.29E+00	mg/kg	1.29E+00	mg/kg	M	5.31E-10	mg/kg-day	2.50E-05	mg/kg-day	N/A	N/A	2.12E-05
	Chromium Total	4.66E+02	mg/kg	4.66E+02	mg/kg	M	1.93E-06	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	9.88E-05
	Cobalt	1.75E+02	mg/kg	1.75E+02	mg/kg	M	7.23E-07	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	3.62E-05
	Copper	3.86E+01	mg/kg	3.86E+01	mg/kg	M	1.59E-07	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	3.99E-06
	Iron	2.16E+04	mg/kg	2.16E+04	mg/kg	M	8.94E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	2.98E-04
	Manganese	8.82E+03	mg/kg	8.82E+03	mg/kg	M	3.64E-05	mg/kg-day	1.87E-03	mg/kg-day	N/A	N/A	1.95E-02
	Mercury	4.86E+00	mg/kg	4.86E+00	mg/kg	M	2.01E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	6.69E-05
	Nickel	2.78E+01	mg/kg	2.78E+01	mg/kg	M	1.15E-07	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	1.43E-04
	Selenium	3.85E+00	mg/kg	3.85E+00	mg/kg	M	1.59E-08	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	3.18E-06
	Thallium	2.28E+00	mg/kg	2.28E+00	mg/kg	M	9.43E-09	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	1.35E-04
	Zinc	2.03E+02	mg/kg	2.03E+02	mg/kg	M	8.38E-07	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	2.79E-06
	(Total)												2.19E-02

TABLE B.1.2.RME

CALCULATION OF NON-CANCER HAZARDS FOR CURRENT MAINTENANCE WORKER EXPOSURE TO SURFACE SOIL
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Inhalation	Antimony	1.54E+01	mg/kg	1.54E+01	mg/kg	M	4.72E-11	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Arsenic	7.90E+00	mg/kg	7.90E+00	mg/kg	M	2.41E-11	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Barium	5.40E+02	mg/kg	5.40E+02	mg/kg	M	1.65E-09	mg/kg-day	1.40E-04	mg/kg-day	N/A	N/A	1.18E-05
	Beryllium	8.12E-01	mg/kg	8.12E-01	mg/kg	M	2.48E-12	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	4.35E-07
	Cadmium	1.29E+00	mg/kg	1.29E+00	mg/kg	M	3.93E-12	mg/kg-day	5.70E-05	mg/kg-day	N/A	N/A	6.89E-08
	Chromium Total	4.66E+02	mg/kg	4.66E+02	mg/kg	M	1.43E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Cobalt	1.75E+02	mg/kg	1.75E+02	mg/kg	M	5.35E-10	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	9.39E-05
	Copper	3.86E+01	mg/kg	3.86E+01	mg/kg	M	1.18E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Iron	2.16E+04	mg/kg	2.16E+04	mg/kg	M	6.62E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	8.82E+03	mg/kg	8.82E+03	mg/kg	M	2.70E-08	mg/kg-day	1.43E-05	mg/kg-day	N/A	N/A	1.89E-03
	Mercury	4.86E+00	mg/kg	4.86E+00	mg/kg	M	1.49E-11	mg/kg-day	8.60E-05	mg/kg-day	N/A	N/A	1.73E-07
	Nickel	2.78E+01	mg/kg	2.78E+01	mg/kg	M	8.49E-11	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Selenium	3.85E+00	mg/kg	3.85E+00	mg/kg	M	1.18E-11	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Thallium	2.28E+00	mg/kg	2.28E+00	mg/kg	M	6.97E-12	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Zinc	2.03E+02	mg/kg	2.03E+02	mg/kg	M	6.20E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	(Total)												1.99E-03
												Total Hazard Index Across All Exposure Routes/Pathways	4.9E-02

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.3.CT

CALCULATION OF NON-CANCER HAZARDS FOR CURRENT MAINTENANCE WORKER EXPOSURE TO SLAG
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Medium: Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Aluminum	2.07E+04	mg/kg	2.07E+04	mg/kg	M	6.49E-04	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	6.49E-04
	Antimony	9.77E+01	mg/kg	9.77E+01	mg/kg	M	3.06E-06	mg/kg-day	4.00E-04	mg/kg-day	N/A	N/A	7.65E-03
	Arsenic	4.60E+00	mg/kg	4.60E+00	mg/kg	M	1.44E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	4.80E-04
	Barium	1.75E+02	mg/kg	1.75E+02	mg/kg	M	5.48E-06	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	7.83E-05
	Beryllium	4.36E-01	mg/kg	4.36E-01	mg/kg	M	1.36E-08	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	6.82E-06
	Cadmium	8.90E+00	mg/kg	8.90E+00	mg/kg	M	2.79E-07	mg/kg-day	5.00E-04	mg/kg-day	N/A	N/A	5.57E-04
	Chromium Total	3.86E+03	mg/kg	3.86E+03	mg/kg	M	1.21E-04	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	8.06E-05
	Chromium VI (Hexavalent)	1.40E+01	mg/kg	1.40E+01	mg/kg	M	4.38E-07	mg/kg-day	3.00E-03	mg/kg-day	N/A	N/A	1.46E-04
	Cobalt	2.02E+01	mg/kg	2.02E+01	mg/kg	M	6.31E-07	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	3.16E-05
	Copper	3.44E+02	mg/kg	3.44E+02	mg/kg	M	1.08E-05	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	2.69E-04
	Iron	1.93E+04	mg/kg	1.93E+04	mg/kg	M	6.04E-04	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	2.01E-03
	Lead	1.35E+02	mg/kg	1.35E+02	mg/kg	M	4.23E-06	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	2.68E+03	mg/kg	2.68E+03	mg/kg	M	8.40E-05	mg/kg-day	4.67E-02	mg/kg-day	N/A	N/A	1.80E-03
	Mercury	7.20E-02	mg/kg	7.20E-02	mg/kg	M	2.25E-09	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	7.51E-06
	Nickel	1.41E+03	mg/kg	1.41E+03	mg/kg	M	4.41E-05	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	2.20E-03
	Selenium	1.29E+01	mg/kg	1.29E+01	mg/kg	M	4.04E-07	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	8.07E-05
	Thallium	5.88E+00	mg/kg	5.88E+00	mg/kg	M	1.84E-07	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	2.63E-03
	Vanadium	1.00E+02	mg/kg	1.00E+02	mg/kg	M	3.14E-06	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	3.14E-03
	Zinc	2.24E+02	mg/kg	2.24E+02	mg/kg	M	7.01E-06	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	2.34E-05
	(Total)												2.19E-02
Dermal	Aluminum	2.07E+04	mg/kg	2.07E+04	mg/kg	M	4.28E-06	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	4.28E-06
	Antimony	9.77E+01	mg/kg	9.77E+01	mg/kg	M	2.02E-08	mg/kg-day	6.00E-05	mg/kg-day	N/A	N/A	3.37E-04
	Arsenic	4.60E+00	mg/kg	4.60E+00	mg/kg	M	2.85E-09	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	9.51E-06
	Barium	1.75E+02	ng/g	1.75E-01	mg/kg	M	3.62E-11	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	7.38E-09
	Beryllium	4.36E-01	mg/kg	4.36E-01	mg/kg	M	9.01E-11	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	6.43E-06
	Cadmium	8.90E+00	mg/kg	8.90E+00	mg/kg	M	1.84E-10	mg/kg-day	2.50E-05	mg/kg-day	N/A	N/A	7.36E-06
	Chromium Total	3.86E+03	mg/kg	3.86E+03	mg/kg	M	7.98E-07	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	4.09E-05
	Chromium VI (Hexavalent)	1.40E+01	mg/kg	1.40E+01	mg/kg	M	2.89E-09	mg/kg-day	7.50E-05	mg/kg-day	N/A	N/A	3.86E-05
	Cobalt	2.02E+01	mg/kg	2.02E+01	mg/kg	M	4.17E-09	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	2.08E-07
	Copper	3.44E+02	mg/kg	3.44E+02	mg/kg	M	7.10E-08	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	1.78E-06
	Iron	1.93E+04	mg/kg	1.93E+04	mg/kg	M	3.99E-06	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	1.33E-05
	Lead	1.35E+02	mg/kg	1.35E+02	mg/kg	M	2.79E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	2.68E+03	mg/kg	2.68E+03	mg/kg	M	5.54E-07	mg/kg-day	1.87E-03	mg/kg-day	N/A	N/A	2.96E-04
	Mercury	7.20E-02	mg/kg	7.20E-02	mg/kg	M	1.49E-11	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	4.96E-08
	Nickel	1.41E+03	mg/kg	1.41E+03	mg/kg	M	2.91E-07	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	3.64E-04
	Selenium	1.29E+01	mg/kg	1.29E+01	mg/kg	M	2.66E-09	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	5.33E-07
	Thallium	5.88E+00	mg/kg	5.88E+00	mg/kg	M	1.22E-09	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	1.74E-05
	Vanadium	1.00E+02	mg/kg	1.00E+02	mg/kg	M	2.08E-08	mg/kg-day	2.60E-05	mg/kg-day	N/A	N/A	7.98E-04
	Zinc	2.24E+02	mg/kg	2.24E+02	mg/kg	M	4.63E-08	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	1.54E-07
	(Total)												1.94E-03

TABLE B.1.3.CT

CALCULATION OF NON-CANCER HAZARDS FOR CURRENT MAINTENANCE WORKER EXPOSURE TO SLAG
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Medium: Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Inhalation	Aluminum	2.07E+04	mg/kg	2.07E+04	mg/kg	M	3.17E-08	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	3.17E-05
	Antimony	9.77E+01	mg/kg	9.77E+01	mg/kg	M	1.49E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Arsenic	4.60E+00	mg/kg	4.60E+00	mg/kg	M	7.03E-12	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Barium	1.75E+02	mg/kg	1.75E+02	mg/kg	M	2.67E-10	mg/kg-day	1.40E-04	mg/kg-day	N/A	N/A	1.91E-06
	Beryllium	4.36E-01	mg/kg	4.36E-01	mg/kg	M	6.66E-13	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	1.17E-07
	Cadmium	8.90E+00	mg/kg	8.90E+00	mg/kg	M	1.36E-11	mg/kg-day	5.70E-05	mg/kg-day	N/A	N/A	2.39E-07
	Chromium Total	3.86E+03	mg/kg	3.86E+03	mg/kg	M	5.91E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Chromium VI (Hexavalent)	1.40E+01	mg/kg	1.40E+01	mg/kg	M	2.14E-11	mg/kg-day	2.80E-05	mg/kg-day	N/A	N/A	7.64E-07
	Cobalt	2.02E+01	mg/kg	2.02E+01	mg/kg	M	3.08E-11	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	5.41E-06
	Copper	3.44E+02	mg/kg	3.44E+02	mg/kg	M	5.25E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Iron	1.93E+04	mg/kg	1.93E+04	mg/kg	M	2.95E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Lead	1.35E+02	mg/kg	1.35E+02	mg/kg	M	2.07E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	2.68E+03	mg/kg	2.68E+03	mg/kg	M	4.10E-09	mg/kg-day	1.43E-05	mg/kg-day	N/A	N/A	2.87E-04
	Mercury	7.20E-02	mg/kg	7.20E-02	mg/kg	M	1.10E-13	mg/kg-day	8.60E-05	mg/kg-day	N/A	N/A	1.28E-09
	Nickel	1.41E+03	mg/kg	1.41E+03	mg/kg	M	2.15E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Selenium	1.29E+01	mg/kg	1.29E+01	mg/kg	M	1.97E-11	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Thallium	5.88E+00	mg/kg	5.88E+00	mg/kg	M	8.99E-12	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Vanadium	1.00E+02	mg/kg	1.00E+02	mg/kg	M	1.54E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Zinc	2.24E+02	mg/kg	2.24E+02	mg/kg	M	3.42E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	(Total)												3.27E-04

Total Hazard Index Across All Exposure Routes/Pathways 2.4E-02

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.3.RME

CALCULATION OF NON-CANCER HAZARDS FOR CURRENT MAINTENANCE WORKER EXPOSURE TO SLAG
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Medium: Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Aluminum	7.70E+04	mg/kg	7.70E+04	mg/kg	M	4.82E-03	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	4.82E-03
	Antimony	3.39E+02	mg/kg	3.39E+02	mg/kg	M	2.12E-05	mg/kg-day	4.00E-04	mg/kg-day	N/A	N/A	5.31E-02
	Arsenic	1.39E+01	mg/kg	1.39E+01	mg/kg	M	8.68E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	2.89E-03
	Barium	2.73E+02	mg/kg	2.73E+02	mg/kg	M	1.71E-05	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	2.44E-04
	Beryllium	5.48E-01	mg/kg	5.48E-01	mg/kg	M	3.43E-08	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	1.72E-05
	Cadmium	2.11E+01	mg/kg	2.11E+01	mg/kg	M	1.32E-06	mg/kg-day	5.00E-04	mg/kg-day	N/A	N/A	2.65E-03
	Chromium Total	8.38E+03	mg/kg	8.38E+03	mg/kg	M	5.25E-04	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	3.50E-04
	Chromium VI (Hexavalent)	7.93E+01	mg/kg	7.93E+01	mg/kg	M	4.96E-06	mg/kg-day	3.00E-03	mg/kg-day	N/A	N/A	1.65E-03
	Cobalt	3.65E+01	mg/kg	3.65E+01	mg/kg	M	2.29E-06	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	1.14E-04
	Copper	1.70E+03	mg/kg	1.70E+03	mg/kg	M	1.06E-04	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	2.66E-03
	Iron	2.43E+04	mg/kg	2.43E+04	mg/kg	M	1.52E-03	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	5.06E-03
	Lead	1.22E+03	mg/kg	1.22E+03	mg/kg	M	7.65E-05	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	5.68E+03	mg/kg	5.68E+03	mg/kg	M	3.56E-04	mg/kg-day	4.67E-02	mg/kg-day	N/A	N/A	7.62E-03
	Mercury	3.75E-01	mg/kg	3.75E-01	mg/kg	M	2.35E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	7.83E-05
	Nickel	5.16E+03	mg/kg	5.16E+03	mg/kg	M	3.23E-04	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	1.62E-02
	Selenium	2.63E+01	mg/kg	2.63E+01	mg/kg	M	1.65E-06	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	3.29E-04
	Thallium	1.01E+01	mg/kg	1.01E+01	mg/kg	M	6.34E-07	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	9.05E-03
	Vanadium	1.87E+02	mg/kg	1.87E+02	mg/kg	M	1.17E-05	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	1.17E-02
	Zinc	9.94E+02	mg/kg	9.94E+02	mg/kg	M	6.22E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	2.07E-04
	(Total)												1.19E-01
Dermal	Aluminum	7.70E+04	mg/kg	7.70E+04	mg/kg	M	3.18E-04	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	3.18E-04
	Antimony	3.39E+02	mg/kg	3.39E+02	mg/kg	M	1.40E-06	mg/kg-day	6.00E-05	mg/kg-day	N/A	N/A	2.34E-02
	Arsenic	1.39E+01	mg/kg	1.39E+01	mg/kg	M	1.72E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	5.73E-04
	Barium	2.73E+02	ng/g	2.73E-01	mg/kg	M	1.13E-09	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	2.30E-07
	Beryllium	5.48E-01	mg/kg	5.48E-01	mg/kg	M	2.26E-09	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	1.62E-04
	Cadmium	2.11E+01	mg/kg	2.11E+01	mg/kg	M	8.74E-09	mg/kg-day	2.50E-05	mg/kg-day	N/A	N/A	3.49E-04
	Chromium Total	8.38E+03	mg/kg	8.38E+03	mg/kg	M	3.46E-05	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	1.78E-03
	Chromium VI (Hexavalent)	7.93E+01	mg/kg	7.93E+01	mg/kg	M	3.28E-07	mg/kg-day	7.50E-05	mg/kg-day	N/A	N/A	4.37E-03
	Cobalt	3.65E+01	mg/kg	3.65E+01	mg/kg	M	1.51E-07	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	7.55E-06
	Copper	1.70E+03	mg/kg	1.70E+03	mg/kg	M	7.01E-06	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	1.75E-04
	Iron	2.43E+04	mg/kg	2.43E+04	mg/kg	M	1.00E-04	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	3.34E-04
	Lead	1.22E+03	mg/kg	1.22E+03	mg/kg	M	5.05E-06	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	5.68E+03	mg/kg	5.68E+03	mg/kg	M	2.35E-05	mg/kg-day	1.87E-03	mg/kg-day	N/A	N/A	1.26E-02
	Mercury	3.75E-01	mg/kg	3.75E-01	mg/kg	M	1.55E-09	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	5.17E-06
	Nickel	5.16E+03	mg/kg	5.16E+03	mg/kg	M	2.13E-05	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	2.67E-02
	Selenium	2.63E+01	mg/kg	2.63E+01	mg/kg	M	1.09E-07	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	2.17E-05
	Thallium	1.01E+01	mg/kg	1.01E+01	mg/kg	M	4.18E-08	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	5.97E-04
	Vanadium	1.87E+02	mg/kg	1.87E+02	mg/kg	M	7.72E-07	mg/kg-day	2.60E-05	mg/kg-day	N/A	N/A	2.97E-02
	Zinc	9.94E+02	mg/kg	9.94E+02	mg/kg	M	4.11E-06	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	1.37E-05
	(Total)												1.01E-01

TABLE B.1.3.RME

CALCULATION OF NON-CANCER HAZARDS FOR CURRENT MAINTENANCE WORKER EXPOSURE TO SLAG
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Medium: Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Inhalation	Aluminum	7.70E+04	mg/kg	7.70E+04	mg/kg	M	2.35E-07	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	2.35E-04
	Antimony	3.39E+02	mg/kg	3.39E+02	mg/kg	M	1.04E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Arsenic	1.39E+01	mg/kg	1.39E+01	mg/kg	M	4.24E-11	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Barium	2.73E+02	mg/kg	2.73E+02	mg/kg	M	8.35E-10	mg/kg-day	1.40E-04	mg/kg-day	N/A	N/A	5.97E-06
	Beryllium	5.48E-01	mg/kg	5.48E-01	mg/kg	M	1.68E-12	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	2.94E-07
	Cadmium	2.11E+01	mg/kg	2.11E+01	mg/kg	M	6.46E-11	mg/kg-day	5.70E-05	mg/kg-day	N/A	N/A	1.13E-06
	Chromium Total	8.38E+03	mg/kg	8.38E+03	mg/kg	M	2.56E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Chromium VI (Hexavalent)	7.93E+01	mg/kg	7.93E+01	mg/kg	M	2.42E-10	mg/kg-day	2.80E-05	mg/kg-day	N/A	N/A	8.66E-06
	Cobalt	3.65E+01	mg/kg	3.65E+01	mg/kg	M	1.12E-10	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	1.96E-05
	Copper	1.70E+03	mg/kg	1.70E+03	mg/kg	M	5.19E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Iron	2.43E+04	mg/kg	2.43E+04	mg/kg	M	7.41E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Lead	1.22E+03	mg/kg	1.22E+03	mg/kg	M	3.73E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	5.68E+03	mg/kg	5.68E+03	mg/kg	M	1.74E-08	mg/kg-day	1.43E-05	mg/kg-day	N/A	N/A	1.21E-03
	Mercury	3.75E-01	mg/kg	3.75E-01	mg/kg	M	1.15E-12	mg/kg-day	8.60E-05	mg/kg-day	N/A	N/A	1.33E-08
	Nickel	5.16E+03	mg/kg	5.16E+03	mg/kg	M	1.58E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Selenium	2.63E+01	mg/kg	2.63E+01	mg/kg	M	8.04E-11	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Thallium	1.01E+01	mg/kg	1.01E+01	mg/kg	M	3.09E-11	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Vanadium	1.87E+02	mg/kg	1.87E+02	mg/kg	M	5.71E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Zinc	9.94E+02	mg/kg	9.94E+02	mg/kg	M	3.04E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	(Total)												1.49E-03

Total Hazard Index Across All Exposure Routes/Pathways 2.2E-01

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.4.CT

CALCULATION OF NON-CANCER HAZARDS FOR CURRENT/FUTURE TRESPASSER EXPOSURE TO SURFACE SOIL AND SLAG
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Medium: Surface Soil and Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Trespasser
Receptor Age: Adolescent

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Aluminum	1.87E+04	mg/kg	1.87E+04	mg/kg	M	6.55E-03	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	6.55E-03
	Antimony	2.32E+01	mg/kg	2.32E+01	mg/kg	M	8.14E-06	mg/kg-day	4.00E-04	mg/kg-day	N/A	N/A	2.03E-02
	Arsenic	6.43E+00	mg/kg	6.43E+00	mg/kg	M	2.25E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	7.52E-03
	Barium	1.66E+02	mg/kg	1.66E+02	mg/kg	M	5.81E-05	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	8.31E-04
	Beryllium	5.85E-01	mg/kg	5.85E-01	mg/kg	M	2.05E-07	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	1.03E-04
	Cadmium	3.35E+00	mg/kg	3.35E+00	mg/kg	M	1.17E-06	mg/kg-day	5.00E-04	mg/kg-day	N/A	N/A	2.35E-03
	Chromium Total	1.24E+03	mg/kg	1.24E+03	mg/kg	M	4.36E-04	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	2.90E-04
	Chromium VI (Hexavalent)	6.80E+00	mg/kg	6.80E+00	mg/kg	M	2.38E-06	mg/kg-day	3.00E-03	mg/kg-day	N/A	N/A	7.95E-04
	Cobalt	2.24E+01	mg/kg	2.24E+01	mg/kg	M	7.86E-06	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	3.93E-04
	Copper	1.65E+02	mg/kg	1.65E+02	mg/kg	M	5.79E-05	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	1.45E-03
	Iron	1.92E+04	mg/kg	1.92E+04	mg/kg	M	6.72E-03	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	2.24E-02
	Lead	7.23E+01	mg/kg	7.23E+01	mg/kg	M	2.54E-05	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.76E+03	mg/kg	1.76E+03	mg/kg	M	6.18E-04	mg/kg-day	4.67E-02	mg/kg-day	N/A	N/A	1.32E-02
	Mercury	3.00E-01	mg/kg	3.00E-01	mg/kg	M	1.05E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	3.51E-04
	Nickel	2.54E+02	mg/kg	2.54E+02	mg/kg	M	8.90E-05	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	4.45E-03
	Selenium	4.87E+00	mg/kg	4.87E+00	mg/kg	M	1.71E-06	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	3.42E-04
	Thallium	2.62E+00	mg/kg	2.62E+00	mg/kg	M	9.19E-07	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	1.31E-02
	Vanadium	5.22E+01	mg/kg	5.22E+01	mg/kg	M	1.83E-05	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	1.83E-02
	Zinc	1.74E+02	mg/kg	1.74E+02	mg/kg	M	6.12E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	2.04E-04
	(Total)												1.13E-01
Dermal	Aluminum	1.87E+04	mg/kg	1.87E+04	mg/kg	M	1.15E-04	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	1.15E-04
	Antimony	2.32E+01	mg/kg	2.32E+01	mg/kg	M	1.43E-07	mg/kg-day	6.00E-05	mg/kg-day	N/A	N/A	2.39E-03
	Arsenic	6.43E+00	mg/kg	6.43E+00	mg/kg	M	1.19E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	3.97E-04
	Barium	1.66E+02	ng/g	1.66E-01	mg/kg	M	1.02E-09	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	2.09E-07
	Beryllium	5.85E-01	mg/kg	5.85E-01	mg/kg	M	3.61E-09	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	2.58E-04
	Cadmium	3.35E+00	mg/kg	3.35E+00	mg/kg	M	2.07E-09	mg/kg-day	2.50E-05	mg/kg-day	N/A	N/A	8.27E-05
	Chromium Total	1.24E+03	mg/kg	1.24E+03	mg/kg	M	7.67E-06	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	3.93E-04
	Chromium VI (Hexavalent)	6.80E+00	mg/kg	6.80E+00	mg/kg	M	4.20E-08	mg/kg-day	7.50E-05	mg/kg-day	N/A	N/A	5.60E-04
	Cobalt	2.24E+01	mg/kg	2.24E+01	mg/kg	M	1.38E-07	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	6.91E-06
	Copper	1.65E+02	mg/kg	1.65E+02	mg/kg	M	1.02E-06	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	2.55E-05
	Iron	1.92E+04	mg/kg	1.92E+04	mg/kg	M	1.18E-04	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	3.94E-04
	Lead	7.23E+01	mg/kg	7.23E+01	mg/kg	M	4.46E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.76E+03	mg/kg	1.76E+03	mg/kg	M	1.09E-05	mg/kg-day	1.87E-03	mg/kg-day	N/A	N/A	5.82E-03
	Mercury	3.00E-01	mg/kg	3.00E-01	mg/kg	M	1.85E-09	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	6.17E-06
	Nickel	2.54E+02	mg/kg	2.54E+02	mg/kg	M	1.57E-06	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	1.96E-03
	Selenium	4.87E+00	mg/kg	4.87E+00	mg/kg	M	3.01E-08	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	6.01E-06
	Thallium	2.62E+00	mg/kg	2.62E+00	mg/kg	M	1.62E-08	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	2.31E-04
	Vanadium	5.22E+01	mg/kg	5.22E+01	mg/kg	M	3.22E-07	mg/kg-day	2.60E-05	mg/kg-day	N/A	N/A	1.24E-02
	Zinc	1.74E+02	mg/kg	1.74E+02	mg/kg	M	1.08E-06	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	3.59E-06
	(Total)												2.50E-02

TABLE B.1.4.CT

CALCULATION OF NON-CANCER HAZARDS FOR CURRENT/FUTURE TRESPASSER EXPOSURE TO SURFACE SOIL AND SLAG
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Medium: Surface Soil and Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Trespasser
Receptor Age: Adolescent

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Inhalation	Aluminum	1.87E+04	mg/kg	1.87E+04	mg/kg	M	1.16E-07	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	1.16E-04
	Antimony	2.32E+01	mg/kg	2.32E+01	mg/kg	M	1.44E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Arsenic	6.43E+00	mg/kg	6.43E+00	mg/kg	M	3.98E-11	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Barium	1.66E+02	mg/kg	1.66E+02	mg/kg	M	1.03E-09	mg/kg-day	1.40E-04	mg/kg-day	N/A	N/A	7.33E-06
	Beryllium	5.85E-01	mg/kg	5.85E-01	mg/kg	M	3.62E-12	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	6.35E-07
	Cadmium	3.35E+00	mg/kg	3.35E+00	mg/kg	M	2.07E-11	mg/kg-day	5.70E-05	mg/kg-day	N/A	N/A	3.64E-07
	Chromium Total	1.24E+03	mg/kg	1.24E+03	mg/kg	M	7.69E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Chromium VI (Hexavalent)	6.80E+00	mg/kg	6.80E+00	mg/kg	M	4.21E-11	mg/kg-day	2.80E-05	mg/kg-day	N/A	N/A	1.50E-06
	Cobalt	2.24E+01	mg/kg	2.24E+01	mg/kg	M	1.39E-10	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	2.43E-05
	Copper	1.65E+02	mg/kg	1.65E+02	mg/kg	M	1.02E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Iron	1.92E+04	mg/kg	1.92E+04	mg/kg	M	1.19E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Lead	7.23E+01	mg/kg	7.23E+01	mg/kg	M	4.47E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.76E+03	mg/kg	1.76E+03	mg/kg	M	1.09E-08	mg/kg-day	1.43E-05	mg/kg-day	N/A	N/A	7.63E-04
	Mercury	3.00E-01	mg/kg	3.00E-01	mg/kg	M	1.86E-12	mg/kg-day	8.60E-05	mg/kg-day	N/A	N/A	2.16E-08
	Nickel	2.54E+02	mg/kg	2.54E+02	mg/kg	M	1.57E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Selenium	4.87E+00	mg/kg	4.87E+00	mg/kg	M	3.01E-11	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Thallium	2.62E+00	mg/kg	2.62E+00	mg/kg	M	1.62E-11	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Vanadium	5.22E+01	mg/kg	5.22E+01	mg/kg	M	3.23E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Zinc	1.74E+02	mg/kg	1.74E+02	mg/kg	M	1.08E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	(Total)												9.12E-04
												Total Hazard Index Across All Exposure Routes/Pathways	1.4E-01

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.4.RME

CALCULATION OF NON-CANCER HAZARDS FOR CURRENT/FUTURE TRESPASSER EXPOSURE TO SURFACE SOIL AND SLAG
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Medium: Surface Soil and Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Trespasser
Receptor Age: Adolescent

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Aluminum	3.69E+04	mg/kg	3.69E+04	mg/kg	M	2.59E-02	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	2.59E-02
	Antimony	3.82E+01	mg/kg	3.82E+01	mg/kg	M	2.68E-05	mg/kg-day	4.00E-04	mg/kg-day	N/A	N/A	6.70E-02
	Arsenic	1.81E+01	mg/kg	1.81E+01	mg/kg	M	1.27E-05	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	4.22E-02
	Barium	3.77E+02	mg/kg	3.77E+02	mg/kg	M	2.65E-04	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	3.78E-03
	Beryllium	1.21E+00	mg/kg	1.21E+00	mg/kg	M	8.48E-07	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	4.24E-04
	Cadmium	2.62E+01	mg/kg	2.62E+01	mg/kg	M	1.84E-05	mg/kg-day	5.00E-04	mg/kg-day	N/A	N/A	3.67E-02
	Chromium Total	1.97E+03	mg/kg	1.97E+03	mg/kg	M	1.38E-03	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	9.22E-04
	Chromium VI (Hexavalent)	9.95E+00	mg/kg	9.95E+00	mg/kg	M	6.98E-06	mg/kg-day	3.00E-03	mg/kg-day	N/A	N/A	2.33E-03
	Cobalt	9.15E+01	mg/kg	9.15E+01	mg/kg	M	6.42E-05	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	3.21E-03
	Copper	1.27E+03	mg/kg	1.27E+03	mg/kg	M	8.94E-04	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	2.24E-02
	Iron	2.16E+04	mg/kg	2.16E+04	mg/kg	M	1.52E-02	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	5.05E-02
	Lead	3.09E+02	mg/kg	3.09E+02	mg/kg	M	2.17E-04	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	5.39E+03	mg/kg	5.39E+03	mg/kg	M	3.78E-03	mg/kg-day	4.67E-02	mg/kg-day	N/A	N/A	8.10E-02
	Mercury	2.49E+00	mg/kg	2.49E+00	mg/kg	M	1.74E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	5.81E-03
	Nickel	1.04E+03	mg/kg	1.04E+03	mg/kg	M	7.27E-04	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	3.63E-02
	Selenium	6.61E+00	mg/kg	6.61E+00	mg/kg	M	4.64E-06	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	9.28E-04
	Thallium	3.89E+00	mg/kg	3.89E+00	mg/kg	M	2.73E-06	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	3.89E-02
	Vanadium	6.60E+01	mg/kg	6.60E+01	mg/kg	M	4.63E-05	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	4.63E-02
	Zinc	4.17E+02	mg/kg	4.17E+02	mg/kg	M	2.92E-04	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	9.74E-04
	(Total)												4.66E-01
Dermal	Aluminum	3.69E+04	mg/kg	3.69E+04	mg/kg	M	2.28E-03	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	2.28E-03
	Antimony	3.82E+01	mg/kg	3.82E+01	mg/kg	M	2.36E-06	mg/kg-day	6.00E-05	mg/kg-day	N/A	N/A	3.93E-02
	Arsenic	1.81E+01	mg/kg	1.81E+01	mg/kg	M	3.34E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.11E-02
	Barium	3.77E+02	ng/g	3.77E-01	mg/kg	M	2.33E-08	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	4.75E-06
	Beryllium	1.21E+00	mg/kg	1.21E+00	mg/kg	M	7.46E-08	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	5.33E-03
	Cadmium	2.62E+01	mg/kg	2.62E+01	mg/kg	M	1.62E-07	mg/kg-day	2.50E-05	mg/kg-day	N/A	N/A	6.46E-03
	Chromium Total	1.97E+03	mg/kg	1.97E+03	mg/kg	M	1.22E-04	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	6.24E-03
	Chromium VI (Hexavalent)	9.95E+00	mg/kg	9.95E+00	mg/kg	M	6.14E-07	mg/kg-day	7.50E-05	mg/kg-day	N/A	N/A	8.19E-03
	Cobalt	9.15E+01	mg/kg	9.15E+01	mg/kg	M	5.65E-06	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	2.82E-04
	Copper	1.27E+03	mg/kg	1.27E+03	mg/kg	M	7.87E-05	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	1.97E-03
	Iron	2.16E+04	mg/kg	2.16E+04	mg/kg	M	1.33E-03	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	4.45E-03
	Lead	3.09E+02	mg/kg	3.09E+02	mg/kg	M	1.91E-05	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	5.39E+03	mg/kg	5.39E+03	mg/kg	M	3.33E-04	mg/kg-day	1.87E-03	mg/kg-day	N/A	N/A	1.78E-01
	Mercury	2.49E+00	mg/kg	2.49E+00	mg/kg	M	1.53E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	5.11E-04
	Nickel	1.04E+03	mg/kg	1.04E+03	mg/kg	M	6.39E-05	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	7.99E-02
	Selenium	6.61E+00	mg/kg	6.61E+00	mg/kg	M	4.08E-07	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	8.16E-05
	Thallium	3.89E+00	mg/kg	3.89E+00	mg/kg	M	2.40E-07	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	3.43E-03
	Vanadium	6.60E+01	mg/kg	6.60E+01	mg/kg	M	4.07E-06	mg/kg-day	2.60E-05	mg/kg-day	N/A	N/A	1.57E-01
	Zinc	4.17E+02	mg/kg	4.17E+02	mg/kg	M	2.57E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	8.57E-05
	(Total)												5.04E-01

TABLE B.1.4.RME

CALCULATION OF NON-CANCER HAZARDS FOR CURRENT/FUTURE TRESPASSER EXPOSURE TO SURFACE SOIL AND SLAG
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Medium: Surface Soil and Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Trespasser
Receptor Age: Adolescent

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Inhalation	Aluminum	3.69E+04	mg/kg	3.69E+04	mg/kg	M	9.14E-07	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	9.14E-04
	Antimony	3.82E+01	mg/kg	3.82E+01	mg/kg	M	9.46E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Arsenic	1.81E+01	mg/kg	1.81E+01	mg/kg	M	4.47E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Barium	3.77E+02	mg/kg	3.77E+02	mg/kg	M	9.34E-09	mg/kg-day	1.40E-04	mg/kg-day	N/A	N/A	6.67E-05
	Beryllium	1.21E+00	mg/kg	1.21E+00	mg/kg	M	2.99E-11	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	5.25E-06
	Cadmium	2.62E+01	mg/kg	2.62E+01	mg/kg	M	6.48E-10	mg/kg-day	5.70E-05	mg/kg-day	N/A	N/A	1.14E-05
	Chromium Total	1.97E+03	mg/kg	1.97E+03	mg/kg	M	4.88E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Chromium VI (Hexavalent)	9.95E+00	mg/kg	9.95E+00	mg/kg	M	2.46E-10	mg/kg-day	2.80E-05	mg/kg-day	N/A	N/A	8.79E-06
	Cobalt	9.15E+01	mg/kg	9.15E+01	mg/kg	M	2.26E-09	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	3.97E-04
	Copper	1.27E+03	mg/kg	1.27E+03	mg/kg	M	3.16E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Iron	2.16E+04	mg/kg	2.16E+04	mg/kg	M	5.35E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Lead	3.09E+02	mg/kg	3.09E+02	mg/kg	M	7.64E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	5.39E+03	mg/kg	5.39E+03	mg/kg	M	1.34E-07	mg/kg-day	1.43E-05	mg/kg-day	N/A	N/A	9.34E-03
	Mercury	2.49E+00	mg/kg	2.49E+00	mg/kg	M	6.15E-11	mg/kg-day	8.60E-05	mg/kg-day	N/A	N/A	7.15E-07
	Nickel	1.04E+03	mg/kg	1.04E+03	mg/kg	M	2.56E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Selenium	6.61E+00	mg/kg	6.61E+00	mg/kg	M	1.64E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Thallium	3.89E+00	mg/kg	3.89E+00	mg/kg	M	9.62E-11	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Vanadium	6.60E+01	mg/kg	6.60E+01	mg/kg	M	1.63E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Zinc	4.17E+02	mg/kg	4.17E+02	mg/kg	M	1.03E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	(Total)												1.07E-02
												Total Hazard Index Across All Exposure Routes/Pathways	9.8E-01

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.5.CT

CALCULATION OF NON-CANCER HAZARDS FOR CURRENT/FUTURE TRESPASSER EXPOSURE TO SURFACE SOIL
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Trespasser
Receptor Age: Adolescent

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Antimony	1.06E+01	mg/kg	1.06E+01	mg/kg	M	3.72E-06	mg/kg-day	4.00E-04	mg/kg-day	N/A	N/A	9.29E-03
	Arsenic	6.27E+00	mg/kg	6.27E+00	mg/kg	M	2.20E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	7.33E-03
	Barium	1.65E+02	mg/kg	1.65E+02	mg/kg	M	5.79E-05	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	8.27E-04
	Beryllium	6.07E-01	mg/kg	6.07E-01	mg/kg	M	2.13E-07	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	1.06E-04
	Cadmium	9.43E-01	mg/kg	9.43E-01	mg/kg	M	3.31E-07	mg/kg-day	5.00E-04	mg/kg-day	N/A	N/A	6.61E-04
	Chromium Total	2.90E+02	mg/kg	2.90E+02	mg/kg	M	1.02E-04	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	6.77E-05
	Cobalt	2.43E+01	mg/kg	2.43E+01	mg/kg	M	8.52E-06	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	4.26E-04
	Copper	3.10E+01	mg/kg	3.10E+01	mg/kg	M	1.09E-05	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	2.71E-04
	Iron	1.92E+04	mg/kg	1.92E+04	mg/kg	M	6.72E-03	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	2.24E-02
	Manganese	1.45E+03	mg/kg	1.45E+03	mg/kg	M	5.09E-04	mg/kg-day	4.67E-02	mg/kg-day	N/A	N/A	1.09E-02
	Mercury	4.20E-01	mg/kg	4.20E-01	mg/kg	M	1.47E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	4.91E-04
	Nickel	2.46E+01	mg/kg	2.46E+01	mg/kg	M	8.64E-06	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	4.32E-04
	Selenium	2.76E+00	mg/kg	2.76E+00	mg/kg	M	9.68E-07	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	1.94E-04
	Thallium	1.54E+00	mg/kg	1.54E+00	mg/kg	M	5.40E-07	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	7.72E-03
	Zinc	1.55E+02	mg/kg	1.55E+02	mg/kg	M	5.43E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	1.81E-04
	(Total)												6.13E-02
Dermal	Antimony	1.06E+01	mg/kg	1.06E+01	mg/kg	M	6.54E-08	mg/kg-day	6.00E-05	mg/kg-day	N/A	N/A	1.09E-03
	Arsenic	6.27E+00	mg/kg	6.27E+00	mg/kg	M	1.16E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	3.87E-04
	Barium	1.65E+02	ng/g	1.65E-01	mg/kg	M	1.02E-09	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	2.08E-07
	Beryllium	6.07E-01	mg/kg	6.07E-01	mg/kg	M	3.75E-09	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	2.68E-04
	Cadmium	9.43E-01	mg/kg	9.43E-01	mg/kg	M	5.82E-10	mg/kg-day	2.50E-05	mg/kg-day	N/A	N/A	2.33E-05
	Chromium Total	2.90E+02	mg/kg	2.90E+02	mg/kg	M	1.79E-06	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	9.17E-05
	Cobalt	2.43E+01	mg/kg	2.43E+01	mg/kg	M	1.50E-07	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	7.50E-06
	Copper	3.10E+01	mg/kg	3.10E+01	mg/kg	M	1.91E-07	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	4.78E-06
	Iron	1.92E+04	mg/kg	1.92E+04	mg/kg	M	1.18E-04	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	3.94E-04
	Manganese	1.45E+03	mg/kg	1.45E+03	mg/kg	M	8.96E-06	mg/kg-day	1.87E-03	mg/kg-day	N/A	N/A	4.79E-03
	Mercury	4.20E-01	mg/kg	4.20E-01	mg/kg	M	2.59E-09	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	8.64E-06
	Nickel	2.46E+01	mg/kg	2.46E+01	mg/kg	M	1.52E-07	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	1.90E-04
	Selenium	2.76E+00	mg/kg	2.76E+00	mg/kg	M	1.70E-08	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	3.41E-06
	Thallium	1.54E+00	mg/kg	1.54E+00	mg/kg	M	9.50E-09	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	1.36E-04
	Zinc	1.55E+02	mg/kg	1.55E+02	mg/kg	M	9.55E-07	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	3.18E-06
	(Total)												7.40E-03

TABLE B.1.5.CT

CALCULATION OF NON-CANCER HAZARDS FOR CURRENT/FUTURE TRESPASSER EXPOSURE TO SURFACE SOIL
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Trespasser
Receptor Age: Adolescent

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Inhalation	Antimony	1.06E+01	mg/kg	1.06E+01	mg/kg	M	6.56E-11	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Arsenic	6.27E+00	mg/kg	6.27E+00	mg/kg	M	3.88E-11	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Barium	1.65E+02	mg/kg	1.65E+02	mg/kg	M	1.02E-09	mg/kg-day	1.40E-04	mg/kg-day	N/A	N/A	7.29E-06
	Beryllium	6.07E-01	mg/kg	6.07E-01	mg/kg	M	3.76E-12	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	6.59E-07
	Cadmium	9.43E-01	mg/kg	9.43E-01	mg/kg	M	5.84E-12	mg/kg-day	5.70E-05	mg/kg-day	N/A	N/A	1.02E-07
	Chromium Total	2.90E+02	mg/kg	2.90E+02	mg/kg	M	1.79E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Cobalt	2.43E+01	mg/kg	2.43E+01	mg/kg	M	1.50E-10	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	2.64E-05
	Copper	3.10E+01	mg/kg	3.10E+01	mg/kg	M	1.92E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Iron	1.92E+04	mg/kg	1.92E+04	mg/kg	M	1.19E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.45E+03	mg/kg	1.45E+03	mg/kg	M	8.98E-09	mg/kg-day	1.43E-05	mg/kg-day	N/A	N/A	6.28E-04
	Mercury	4.20E-01	mg/kg	4.20E-01	mg/kg	M	2.60E-12	mg/kg-day	8.60E-05	mg/kg-day	N/A	N/A	3.02E-08
	Nickel	2.46E+01	mg/kg	2.46E+01	mg/kg	M	1.53E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Selenium	2.76E+00	mg/kg	2.76E+00	mg/kg	M	1.71E-11	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Thallium	1.54E+00	mg/kg	1.54E+00	mg/kg	M	9.53E-12	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Zinc	1.55E+02	mg/kg	1.55E+02	mg/kg	M	9.58E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	(Total)												6.62E-04
												Total Hazard Index Across All Exposure Routes/Pathways	6.9E-02

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.5.RME

CALCULATION OF NON-CANCER HAZARDS FOR CURRENT/FUTURE TRESPASSER EXPOSURE TO SURFACE SOIL
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Trespasser
Receptor Age: Adolescent

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Antimony	1.54E+01	mg/kg	1.54E+01	mg/kg	M	1.08E-05	mg/kg-day	4.00E-04	mg/kg-day	N/A	N/A	2.71E-02
	Arsenic	7.90E+00	mg/kg	7.90E+00	mg/kg	M	5.54E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.85E-02
	Barium	5.40E+02	mg/kg	5.40E+02	mg/kg	M	3.79E-04	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	5.41E-03
	Beryllium	8.12E-01	mg/kg	8.12E-01	mg/kg	M	5.69E-07	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	2.85E-04
	Cadmium	1.29E+00	mg/kg	1.29E+00	mg/kg	M	9.01E-07	mg/kg-day	5.00E-04	mg/kg-day	N/A	N/A	1.80E-03
	Chromium Total	4.66E+02	mg/kg	4.66E+02	mg/kg	M	3.27E-04	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	2.18E-04
	Cobalt	1.75E+02	mg/kg	1.75E+02	mg/kg	M	1.23E-04	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	6.14E-03
	Copper	3.86E+01	mg/kg	3.86E+01	mg/kg	M	2.71E-05	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	6.77E-04
	Iron	2.16E+04	mg/kg	2.16E+04	mg/kg	M	1.52E-02	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	5.06E-02
	Manganese	8.82E+03	mg/kg	8.82E+03	mg/kg	M	6.18E-03	mg/kg-day	4.67E-02	mg/kg-day	N/A	N/A	1.32E-01
	Mercury	4.86E+00	mg/kg	4.86E+00	mg/kg	M	3.41E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.14E-02
	Nickel	2.78E+01	mg/kg	2.78E+01	mg/kg	M	1.95E-05	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	9.74E-04
	Selenium	3.85E+00	mg/kg	3.85E+00	mg/kg	M	2.70E-06	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	5.40E-04
	Thallium	2.28E+00	mg/kg	2.28E+00	mg/kg	M	1.60E-06	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	2.29E-02
	Zinc	2.03E+02	mg/kg	2.03E+02	mg/kg	M	1.42E-04	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	4.74E-04
	(Total)												2.79E-01
Dermal	Antimony	1.54E+01	mg/kg	1.54E+01	mg/kg	M	9.53E-07	mg/kg-day	6.00E-05	mg/kg-day	N/A	N/A	1.59E-02
	Arsenic	7.90E+00	mg/kg	7.90E+00	mg/kg	M	1.46E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	4.87E-03
	Barium	5.40E+02	ng/g	5.40E-01	mg/kg	M	3.33E-08	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	6.80E-06
	Beryllium	8.12E-01	mg/kg	8.12E-01	mg/kg	M	5.01E-08	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	3.58E-03
	Cadmium	1.29E+00	mg/kg	1.29E+00	mg/kg	M	7.93E-09	mg/kg-day	2.50E-05	mg/kg-day	N/A	N/A	3.17E-04
	Chromium Total	4.66E+02	mg/kg	4.66E+02	mg/kg	M	2.88E-05	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	1.48E-03
	Cobalt	1.75E+02	mg/kg	1.75E+02	mg/kg	M	1.08E-05	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	5.40E-04
	Copper	3.86E+01	mg/kg	3.86E+01	mg/kg	M	2.38E-06	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	5.95E-05
	Iron	2.16E+04	mg/kg	2.16E+04	mg/kg	M	1.34E-03	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	4.45E-03
	Manganese	8.82E+03	mg/kg	8.82E+03	mg/kg	M	5.44E-04	mg/kg-day	1.87E-03	mg/kg-day	N/A	N/A	2.91E-01
	Mercury	4.86E+00	mg/kg	4.86E+00	mg/kg	M	3.00E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	9.99E-04
	Nickel	2.78E+01	mg/kg	2.78E+01	mg/kg	M	1.71E-06	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	2.14E-03
	Selenium	3.85E+00	mg/kg	3.85E+00	mg/kg	M	2.38E-07	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	4.75E-05
	Thallium	2.28E+00	mg/kg	2.28E+00	mg/kg	M	1.41E-07	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	2.01E-03
	Zinc	2.03E+02	mg/kg	2.03E+02	mg/kg	M	1.25E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	4.17E-05
	(Total)												3.27E-01

TABLE B.1.5.RME

CALCULATION OF NON-CANCER HAZARDS FOR CURRENT/FUTURE TRESPASSER EXPOSURE TO SURFACE SOIL
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Trespasser
Receptor Age: Adolescent

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Inhalation	Antimony	1.54E+01	mg/kg	1.54E+01	mg/kg	M	3.82E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Arsenic	7.90E+00	mg/kg	7.90E+00	mg/kg	M	1.96E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Barium	5.40E+02	mg/kg	5.40E+02	mg/kg	M	1.34E-08	mg/kg-day	1.40E-04	mg/kg-day	N/A	N/A	9.55E-05
	Beryllium	8.12E-01	mg/kg	8.12E-01	mg/kg	M	2.01E-11	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	3.53E-06
	Cadmium	1.29E+00	mg/kg	1.29E+00	mg/kg	M	3.18E-11	mg/kg-day	5.70E-05	mg/kg-day	N/A	N/A	5.58E-07
	Chromium Total	4.66E+02	mg/kg	4.66E+02	mg/kg	M	1.15E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Cobalt	1.75E+02	mg/kg	1.75E+02	mg/kg	M	4.33E-09	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	7.60E-04
	Copper	3.86E+01	mg/kg	3.86E+01	mg/kg	M	9.55E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Iron	2.16E+04	mg/kg	2.16E+04	mg/kg	M	5.36E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	8.82E+03	mg/kg	8.82E+03	mg/kg	M	2.18E-07	mg/kg-day	1.43E-05	mg/kg-day	N/A	N/A	1.53E-02
	Mercury	4.86E+00	mg/kg	4.86E+00	mg/kg	M	1.20E-10	mg/kg-day	8.60E-05	mg/kg-day	N/A	N/A	1.40E-06
	Nickel	2.78E+01	mg/kg	2.78E+01	mg/kg	M	6.87E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Selenium	3.85E+00	mg/kg	3.85E+00	mg/kg	M	9.53E-11	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Thallium	2.28E+00	mg/kg	2.28E+00	mg/kg	M	5.65E-11	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Zinc	2.03E+02	mg/kg	2.03E+02	mg/kg	M	5.02E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	(Total)												1.61E-02
												Total Hazard Index Across All Exposure Routes/Pathways	6.2E-01

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.6.CT

CALCULATION OF NON-CANCER HAZARDS FOR CURRENT/FUTURE TRESPASSER EXPOSURE TO SLAG
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Medium: Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Trespasser
Receptor Age: Adolescent

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Aluminum	2.07E+04	mg/kg	2.07E+04	mg/kg	M	7.27E-03	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	7.27E-03
	Antimony	9.77E+01	mg/kg	9.77E+01	mg/kg	M	3.43E-05	mg/kg-day	4.00E-04	mg/kg-day	N/A	N/A	8.57E-02
	Arsenic	4.60E+00	mg/kg	4.60E+00	mg/kg	M	1.61E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	5.38E-03
	Barium	1.75E+02	mg/kg	1.75E+02	mg/kg	M	6.14E-05	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	8.77E-04
	Beryllium	4.36E-01	mg/kg	4.36E-01	mg/kg	M	1.53E-07	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	7.64E-05
	Cadmium	8.90E+00	mg/kg	8.90E+00	mg/kg	M	3.12E-06	mg/kg-day	5.00E-04	mg/kg-day	N/A	N/A	6.24E-03
	Chromium Total	3.86E+03	mg/kg	3.86E+03	mg/kg	M	1.35E-03	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	9.03E-04
	Chromium VI (Hexavalent)	1.40E+01	mg/kg	1.40E+01	mg/kg	M	4.91E-06	mg/kg-day	3.00E-03	mg/kg-day	N/A	N/A	1.64E-03
	Cobalt	2.02E+01	mg/kg	2.02E+01	mg/kg	M	7.07E-06	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	3.53E-04
	Copper	3.44E+02	mg/kg	3.44E+02	mg/kg	M	1.21E-04	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	3.01E-03
	Iron	1.93E+04	mg/kg	1.93E+04	mg/kg	M	6.77E-03	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	2.26E-02
	Lead	1.35E+02	mg/kg	1.35E+02	mg/kg	M	4.74E-05	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	2.68E+03	mg/kg	2.68E+03	mg/kg	M	9.41E-04	mg/kg-day	4.67E-02	mg/kg-day	N/A	N/A	2.01E-02
	Mercury	7.20E-02	mg/kg	7.20E-02	mg/kg	M	2.52E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	8.42E-05
	Nickel	1.41E+03	mg/kg	1.41E+03	mg/kg	M	4.94E-04	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	2.47E-02
	Selenium	1.29E+01	mg/kg	1.29E+01	mg/kg	M	4.52E-06	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	9.04E-04
	Thallium	5.88E+00	mg/kg	5.88E+00	mg/kg	M	2.06E-06	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	2.95E-02
	Vanadium	1.00E+02	mg/kg	1.00E+02	mg/kg	M	3.52E-05	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	3.52E-02
	Zinc	2.24E+02	mg/kg	2.24E+02	mg/kg	M	7.86E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	2.62E-04
	(Total)												2.45E-01
Dermal	Aluminum	2.07E+04	mg/kg	2.07E+04	mg/kg	M	1.28E-04	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	1.28E-04
	Antimony	9.77E+01	mg/kg	9.77E+01	mg/kg	M	6.03E-07	mg/kg-day	6.00E-05	mg/kg-day	N/A	N/A	1.01E-02
	Arsenic	4.60E+00	mg/kg	4.60E+00	mg/kg	M	8.52E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	2.84E-04
	Barium	1.75E+02	ng/g	1.75E-01	mg/kg	M	1.08E-09	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	2.20E-07
	Beryllium	4.36E-01	mg/kg	4.36E-01	mg/kg	M	2.69E-09	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	1.92E-04
	Cadmium	8.90E+00	mg/kg	8.90E+00	mg/kg	M	5.49E-09	mg/kg-day	2.50E-05	mg/kg-day	N/A	N/A	2.20E-04
	Chromium Total	3.86E+03	mg/kg	3.86E+03	mg/kg	M	2.38E-05	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	1.22E-03
	Chromium VI (Hexavalent)	1.40E+01	mg/kg	1.40E+01	mg/kg	M	8.64E-08	mg/kg-day	7.50E-05	mg/kg-day	N/A	N/A	1.15E-03
	Cobalt	2.02E+01	mg/kg	2.02E+01	mg/kg	M	1.24E-07	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	6.22E-06
	Copper	3.44E+02	mg/kg	3.44E+02	mg/kg	M	2.12E-06	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	5.30E-05
	Iron	1.93E+04	mg/kg	1.93E+04	mg/kg	M	1.19E-04	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	3.97E-04
	Lead	1.35E+02	mg/kg	1.35E+02	mg/kg	M	8.34E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	2.68E+03	mg/kg	2.68E+03	mg/kg	M	1.66E-05	mg/kg-day	1.87E-03	mg/kg-day	N/A	N/A	8.86E-03
	Mercury	7.20E-02	mg/kg	7.20E-02	mg/kg	M	4.44E-10	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.48E-06
	Nickel	1.41E+03	mg/kg	1.41E+03	mg/kg	M	8.69E-06	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	1.09E-02
	Selenium	1.29E+01	mg/kg	1.29E+01	mg/kg	M	7.96E-08	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	1.59E-05
	Thallium	5.88E+00	mg/kg	5.88E+00	mg/kg	M	3.63E-08	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	5.18E-04
	Vanadium	1.00E+02	mg/kg	1.00E+02	mg/kg	M	6.20E-07	mg/kg-day	2.60E-05	mg/kg-day	N/A	N/A	2.38E-02
	Zinc	2.24E+02	mg/kg	2.24E+02	mg/kg	M	1.38E-06	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	4.61E-06
	(Total)												5.78E-02

TABLE B.1.6.CT

CALCULATION OF NON-CANCER HAZARDS FOR CURRENT/FUTURE TRESPASSER EXPOSURE TO SLAG
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Medium: Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Trespasser
Receptor Age: Adolescent

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Inhalation	Aluminum	2.07E+04	mg/kg	2.07E+04	mg/kg	M	1.28E-07	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	1.28E-04
	Antimony	9.77E+01	mg/kg	9.77E+01	mg/kg	M	6.05E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Arsenic	4.60E+00	mg/kg	4.60E+00	mg/kg	M	2.85E-11	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Barium	1.75E+02	mg/kg	1.75E+02	mg/kg	M	1.08E-09	mg/kg-day	1.40E-04	mg/kg-day	N/A	N/A	7.73E-06
	Beryllium	4.36E-01	mg/kg	4.36E-01	mg/kg	M	2.70E-12	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	4.73E-07
	Cadmium	8.90E+00	mg/kg	8.90E+00	mg/kg	M	5.51E-11	mg/kg-day	5.70E-05	mg/kg-day	N/A	N/A	9.66E-07
	Chromium Total	3.86E+03	mg/kg	3.86E+03	mg/kg	M	2.39E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Chromium VI (Hexavalent)	1.40E+01	mg/kg	1.40E+01	mg/kg	M	8.66E-11	mg/kg-day	2.80E-05	mg/kg-day	N/A	N/A	3.09E-06
	Cobalt	2.02E+01	mg/kg	2.02E+01	mg/kg	M	1.25E-10	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	2.19E-05
	Copper	3.44E+02	mg/kg	3.44E+02	mg/kg	M	2.13E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Iron	1.93E+04	mg/kg	1.93E+04	mg/kg	M	1.19E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Lead	1.35E+02	mg/kg	1.35E+02	mg/kg	M	8.37E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	2.68E+03	mg/kg	2.68E+03	mg/kg	M	1.66E-08	mg/kg-day	1.43E-05	mg/kg-day	N/A	N/A	1.16E-03
	Mercury	7.20E-02	mg/kg	7.20E-02	mg/kg	M	4.46E-13	mg/kg-day	8.60E-05	mg/kg-day	N/A	N/A	5.18E-09
	Nickel	1.41E+03	mg/kg	1.41E+03	mg/kg	M	8.72E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Selenium	1.29E+01	mg/kg	1.29E+01	mg/kg	M	7.98E-11	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Thallium	5.88E+00	mg/kg	5.88E+00	mg/kg	M	3.64E-11	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Vanadium	1.00E+02	mg/kg	1.00E+02	mg/kg	M	6.22E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Zinc	2.24E+02	mg/kg	2.24E+02	mg/kg	M	1.39E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	(Total)												1.32E-03

Total Hazard Index Across All Exposure Routes/Pathways 3.0E-01

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.6.RME

CALCULATION OF NON-CANCER HAZARDS FOR CURRENT/FUTURE TRESPASSER EXPOSURE TO SLAG
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Medium: Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Trespasser
Receptor Age: Adolescent

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Aluminum	7.70E+04	mg/kg	7.70E+04	mg/kg	M	5.40E-02	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	5.40E-02
	Antimony	3.39E+02	mg/kg	3.39E+02	mg/kg	M	2.38E-04	mg/kg-day	4.00E-04	mg/kg-day	N/A	N/A	5.94E-01
	Arsenic	1.39E+01	mg/kg	1.39E+01	mg/kg	M	9.72E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	3.24E-02
	Barium	2.73E+02	mg/kg	2.73E+02	mg/kg	M	1.92E-04	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	2.74E-03
	Beryllium	5.48E-01	mg/kg	5.48E-01	mg/kg	M	3.84E-07	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	1.92E-04
	Cadmium	2.11E+01	mg/kg	2.11E+01	mg/kg	M	1.48E-05	mg/kg-day	5.00E-04	mg/kg-day	N/A	N/A	2.96E-02
	Chromium Total	8.38E+03	mg/kg	8.38E+03	mg/kg	M	5.88E-03	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	3.92E-03
	Chromium VI (Hexavalent)	7.93E+01	mg/kg	7.93E+01	mg/kg	M	5.56E-05	mg/kg-day	3.00E-03	mg/kg-day	N/A	N/A	1.85E-02
	Cobalt	3.65E+01	mg/kg	3.65E+01	mg/kg	M	2.56E-05	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	1.28E-03
	Copper	1.70E+03	mg/kg	1.70E+03	mg/kg	M	1.19E-03	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	2.97E-02
	Iron	2.43E+04	mg/kg	2.43E+04	mg/kg	M	1.70E-02	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	5.67E-02
	Lead	1.22E+03	mg/kg	1.22E+03	mg/kg	M	8.56E-04	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	5.68E+03	mg/kg	5.68E+03	mg/kg	M	3.98E-03	mg/kg-day	4.67E-02	mg/kg-day	N/A	N/A	8.53E-02
	Mercury	3.75E-01	mg/kg	3.75E-01	mg/kg	M	2.63E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	8.77E-04
	Nickel	5.16E+03	mg/kg	5.16E+03	mg/kg	M	3.62E-03	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	1.81E-01
	Selenium	2.63E+01	mg/kg	2.63E+01	mg/kg	M	1.84E-05	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	3.69E-03
	Thallium	1.01E+01	mg/kg	1.01E+01	mg/kg	M	7.10E-06	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	1.01E-01
	Vanadium	1.87E+02	mg/kg	1.87E+02	mg/kg	M	1.31E-04	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	1.31E-01
	Zinc	9.94E+02	mg/kg	9.94E+02	mg/kg	M	6.97E-04	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	2.32E-03
	(Total)												1.33E+00
Dermal	Aluminum	7.70E+04	mg/kg	7.70E+04	mg/kg	M	4.75E-03	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	4.75E-03
	Antimony	3.39E+02	mg/kg	3.39E+02	mg/kg	M	2.09E-05	mg/kg-day	6.00E-05	mg/kg-day	N/A	N/A	3.49E-01
	Arsenic	1.39E+01	mg/kg	1.39E+01	mg/kg	M	2.57E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	8.55E-03
	Barium	2.73E+02	ng/g	2.73E-01	mg/kg	M	1.69E-08	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	3.44E-06
	Beryllium	5.48E-01	mg/kg	5.48E-01	mg/kg	M	3.38E-08	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	2.42E-03
	Cadmium	2.11E+01	mg/kg	2.11E+01	mg/kg	M	1.30E-07	mg/kg-day	2.50E-05	mg/kg-day	N/A	N/A	5.22E-03
	Chromium Total	8.38E+03	mg/kg	8.38E+03	mg/kg	M	5.17E-04	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	2.65E-02
	Chromium VI (Hexavalent)	7.93E+01	mg/kg	7.93E+01	mg/kg	M	4.89E-06	mg/kg-day	7.50E-05	mg/kg-day	N/A	N/A	6.52E-02
	Cobalt	3.65E+01	mg/kg	3.65E+01	mg/kg	M	2.25E-06	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	1.13E-04
	Copper	1.70E+03	mg/kg	1.70E+03	mg/kg	M	1.05E-04	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	2.62E-03
	Iron	2.43E+04	mg/kg	2.43E+04	mg/kg	M	1.50E-03	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	4.99E-03
	Lead	1.22E+03	mg/kg	1.22E+03	mg/kg	M	7.54E-05	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	5.68E+03	mg/kg	5.68E+03	mg/kg	M	3.51E-04	mg/kg-day	1.87E-03	mg/kg-day	N/A	N/A	1.87E-01
	Mercury	3.75E-01	mg/kg	3.75E-01	mg/kg	M	2.31E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	7.72E-05
	Nickel	5.16E+03	mg/kg	5.16E+03	mg/kg	M	3.18E-04	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	3.98E-01
	Selenium	2.63E+01	mg/kg	2.63E+01	mg/kg	M	1.62E-06	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	3.25E-04
	Thallium	1.01E+01	mg/kg	1.01E+01	mg/kg	M	6.25E-07	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	8.92E-03
	Vanadium	1.87E+02	mg/kg	1.87E+02	mg/kg	M	1.15E-05	mg/kg-day	2.60E-05	mg/kg-day	N/A	N/A	4.43E-01
	Zinc	9.94E+02	mg/kg	9.94E+02	mg/kg	M	6.13E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	2.04E-04
	(Total)												1.51E+00

TABLE B.1.6.RME

CALCULATION OF NON-CANCER HAZARDS FOR CURRENT/FUTURE TRESPASSER EXPOSURE TO SLAG
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Medium: Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Trespasser
Receptor Age: Adolescent

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Inhalation	Aluminum	7.70E+04	mg/kg	7.70E+04	mg/kg	M	1.91E-06	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	1.91E-03
	Antimony	3.39E+02	mg/kg	3.39E+02	mg/kg	M	8.39E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Arsenic	1.39E+01	mg/kg	1.39E+01	mg/kg	M	3.43E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Barium	2.73E+02	mg/kg	2.73E+02	mg/kg	M	6.76E-09	mg/kg-day	1.40E-04	mg/kg-day	N/A	N/A	4.83E-05
	Beryllium	5.48E-01	mg/kg	5.48E-01	mg/kg	M	1.36E-11	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	2.38E-06
	Cadmium	2.11E+01	mg/kg	2.11E+01	mg/kg	M	5.23E-10	mg/kg-day	5.70E-05	mg/kg-day	N/A	N/A	9.18E-06
	Chromium Total	8.38E+03	mg/kg	8.38E+03	mg/kg	M	2.07E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Chromium VI (Hexavalent)	7.93E+01	mg/kg	7.93E+01	mg/kg	M	1.96E-09	mg/kg-day	2.80E-05	mg/kg-day	N/A	N/A	7.01E-05
	Cobalt	3.65E+01	mg/kg	3.65E+01	mg/kg	M	9.04E-10	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	1.59E-04
	Copper	1.70E+03	mg/kg	1.70E+03	mg/kg	M	4.20E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Iron	2.43E+04	mg/kg	2.43E+04	mg/kg	M	6.00E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Lead	1.22E+03	mg/kg	1.22E+03	mg/kg	M	3.02E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	5.68E+03	mg/kg	5.68E+03	mg/kg	M	1.41E-07	mg/kg-day	1.43E-05	mg/kg-day	N/A	N/A	9.83E-03
	Mercury	3.75E-01	mg/kg	3.75E-01	mg/kg	M	9.28E-12	mg/kg-day	8.60E-05	mg/kg-day	N/A	N/A	1.08E-07
	Nickel	5.16E+03	mg/kg	5.16E+03	mg/kg	M	1.28E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Selenium	2.63E+01	mg/kg	2.63E+01	mg/kg	M	6.51E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Thallium	1.01E+01	mg/kg	1.01E+01	mg/kg	M	2.50E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Vanadium	1.87E+02	mg/kg	1.87E+02	mg/kg	M	4.62E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Zinc	9.94E+02	mg/kg	9.94E+02	mg/kg	M	2.46E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	(Total)												1.20E-02
												Total Hazard Index Across All Exposure Routes/Pathways	2.8E+00

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.7.CT

CALCULATION OF NON-CANCER HAZARDS FOR FUTURE INDUSTRIAL/ COMMERCIAL WORKER EXPOSURE TO SOIL AND SLAG
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Soil and Slag (0-10 ftbgs)
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Aluminum	1.80E+04	mg/kg	1.80E+04	mg/kg	M	1.54E-02	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	1.54E-02
	Arsenic	6.94E+00	mg/kg	6.94E+00	mg/kg	M	5.95E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.98E-02
	Barium	1.45E+02	mg/kg	1.45E+02	mg/kg	M	1.24E-04	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	1.77E-03
	Beryllium	7.66E-01	mg/kg	7.66E-01	mg/kg	M	6.57E-07	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	3.28E-04
	Cadmium	2.41E+00	mg/kg	2.41E+00	mg/kg	M	2.07E-06	mg/kg-day	5.00E-04	mg/kg-day	N/A	N/A	4.13E-03
	Chromium Total	1.24E+03	mg/kg	1.24E+03	mg/kg	M	1.06E-03	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	7.07E-04
	Chromium VI (Hexavalent)	1.70E+01	mg/kg	1.70E+01	mg/kg	M	1.46E-05	mg/kg-day	3.00E-03	mg/kg-day	N/A	N/A	4.86E-03
	Cobalt	1.78E+01	mg/kg	1.78E+01	mg/kg	M	1.53E-05	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	7.63E-04
	Copper	1.16E+02	mg/kg	1.16E+02	mg/kg	M	9.93E-05	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	2.48E-03
	Iron	2.29E+04	mg/kg	2.29E+04	mg/kg	M	1.96E-02	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	6.55E-02
	Lead	5.67E+01	mg/kg	5.67E+01	mg/kg	M	4.86E-05	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.43E+03	mg/kg	1.43E+03	mg/kg	M	1.22E-03	mg/kg-day	4.67E-02	mg/kg-day	N/A	N/A	2.62E-02
	Mercury	3.60E-01	mg/kg	3.60E-01	mg/kg	M	3.09E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.03E-03
	Nickel	1.74E+02	mg/kg	1.74E+02	mg/kg	M	1.49E-04	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	7.46E-03
	Selenium	4.30E+00	mg/kg	4.30E+00	mg/kg	M	3.69E-06	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	7.37E-04
	Thallium	3.75E+00	mg/kg	3.75E+00	mg/kg	M	3.21E-06	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	4.59E-02
	Vanadium	5.07E+01	mg/kg	5.07E+01	mg/kg	M	4.34E-05	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	4.34E-02
	Zinc	1.70E+02	mg/kg	1.70E+02	mg/kg	M	1.45E-04	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	4.85E-04
	(Total)												2.41E-01
Dermal	Aluminum	1.80E+04	mg/kg	1.80E+04	mg/kg	M	1.02E-04	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	1.02E-04
	Arsenic	6.94E+00	mg/kg	6.94E+00	mg/kg	M	1.18E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	3.93E-04
	Barium	1.45E+02	ng/g	1.45E-01	mg/kg	M	8.19E-10	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	1.67E-07
	Beryllium	7.66E-01	mg/kg	7.66E-01	mg/kg	M	4.33E-09	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	3.10E-04
	Cadmium	2.41E+00	mg/kg	2.41E+00	mg/kg	M	1.36E-09	mg/kg-day	2.50E-05	mg/kg-day	N/A	N/A	5.45E-05
	Chromium Total	1.24E+03	mg/kg	1.24E+03	mg/kg	M	7.00E-06	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	3.59E-04
	Chromium VI (Hexavalent)	1.70E+01	mg/kg	1.70E+01	mg/kg	M	9.62E-08	mg/kg-day	7.50E-05	mg/kg-day	N/A	N/A	1.28E-03
	Cobalt	1.78E+01	mg/kg	1.78E+01	mg/kg	M	1.01E-07	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	5.03E-06
	Copper	1.16E+02	mg/kg	1.16E+02	mg/kg	M	6.55E-07	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	1.64E-05
	Iron	2.29E+04	mg/kg	2.29E+04	mg/kg	M	1.30E-04	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	4.32E-04
	Lead	5.67E+01	mg/kg	5.67E+01	mg/kg	M	3.21E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.43E+03	mg/kg	1.43E+03	mg/kg	M	8.07E-06	mg/kg-day	1.87E-03	mg/kg-day	N/A	N/A	4.32E-03
	Mercury	3.60E-01	mg/kg	3.60E-01	mg/kg	M	2.04E-09	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	6.79E-06
	Nickel	1.74E+02	mg/kg	1.74E+02	mg/kg	M	9.84E-07	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	1.23E-03
	Selenium	4.30E+00	mg/kg	4.30E+00	mg/kg	M	2.43E-08	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	4.87E-06
	Thallium	3.75E+00	mg/kg	3.75E+00	mg/kg	M	2.12E-08	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	3.03E-04
	Vanadium	5.07E+01	mg/kg	5.07E+01	mg/kg	M	2.87E-07	mg/kg-day	2.60E-05	mg/kg-day	N/A	N/A	1.10E-02
	Zinc	1.70E+02	mg/kg	1.70E+02	mg/kg	M	9.60E-07	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	3.20E-06
	(Total)												1.98E-02

TABLE B.1.7.CT

CALCULATION OF NON-CANCER HAZARDS FOR FUTURE INDUSTRIAL/ COMMERCIAL WORKER EXPOSURE TO SOIL AND SLAG
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Soil and Slag (0-10 ftbgs)
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Inhalation	Aluminum	1.80E+04	mg/kg	1.80E+04	mg/kg	M	7.53E-07	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	7.53E-04
	Arsenic	6.94E+00	mg/kg	6.94E+00	mg/kg	M	2.90E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Barium	1.45E+02	mg/kg	1.45E+02	mg/kg	M	6.06E-09	mg/kg-day	1.40E-04	mg/kg-day	N/A	N/A	4.33E-05
	Beryllium	7.66E-01	mg/kg	7.66E-01	mg/kg	M	3.21E-11	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	5.63E-06
	Cadmium	2.41E+00	mg/kg	2.41E+00	mg/kg	M	1.01E-10	mg/kg-day	5.70E-05	mg/kg-day	N/A	N/A	1.77E-06
	Chromium Total	1.24E+03	mg/kg	1.24E+03	mg/kg	M	5.18E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Chromium VI (Hexavalent)	1.70E+01	mg/kg	1.70E+01	mg/kg	M	7.11E-10	mg/kg-day	2.80E-05	mg/kg-day	N/A	N/A	2.54E-05
	Cobalt	1.78E+01	mg/kg	1.78E+01	mg/kg	M	7.45E-10	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	1.31E-04
	Copper	1.16E+02	mg/kg	1.16E+02	mg/kg	M	4.85E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Iron	2.29E+04	mg/kg	2.29E+04	mg/kg	M	9.59E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Lead	5.67E+01	mg/kg	5.67E+01	mg/kg	M	2.37E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.43E+03	mg/kg	1.43E+03	mg/kg	M	5.97E-08	mg/kg-day	1.43E-05	mg/kg-day	N/A	N/A	4.18E-03
	Mercury	3.60E-01	mg/kg	3.60E-01	mg/kg	M	1.51E-11	mg/kg-day	8.60E-05	mg/kg-day	N/A	N/A	1.75E-07
	Nickel	1.74E+02	mg/kg	1.74E+02	mg/kg	M	7.28E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Selenium	4.30E+00	mg/kg	4.30E+00	mg/kg	M	1.80E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Thallium	3.75E+00	mg/kg	3.75E+00	mg/kg	M	1.57E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Vanadium	5.07E+01	mg/kg	5.07E+01	mg/kg	M	2.12E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Zinc	1.70E+02	mg/kg	1.70E+02	mg/kg	M	7.10E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	(Total)												5.14E-03
												Total Hazard Index Across All Exposure Routes/Pathways	2.7E-01

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.7.RME

CALCULATION OF NON-CANCER HAZARDS FOR FUTURE INDUSTRIAL/ COMMERCIAL WORKER EXPOSURE TO SOIL AND SLAG
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Soil and Slag (0-10 ftbgs)
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Aluminum	2.89E+04	mg/kg	2.89E+04	mg/kg	M	2.83E-02	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	2.83E-02
	Arsenic	9.68E+00	mg/kg	9.68E+00	mg/kg	M	9.47E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	3.16E-02
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M	1.67E-04	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	2.38E-03
	Beryllium	9.71E-01	mg/kg	9.71E-01	mg/kg	M	9.51E-07	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	4.75E-04
	Cadmium	1.34E+01	mg/kg	1.34E+01	mg/kg	M	1.31E-05	mg/kg-day	5.00E-04	mg/kg-day	N/A	N/A	2.62E-02
	Chromium Total	1.59E+03	mg/kg	1.59E+03	mg/kg	M	1.56E-03	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	1.04E-03
	Chromium VI (Hexavalent)	5.82E+01	mg/kg	5.82E+01	mg/kg	M	5.70E-05	mg/kg-day	3.00E-03	mg/kg-day	N/A	N/A	1.90E-02
	Cobalt	5.70E+01	mg/kg	5.70E+01	mg/kg	M	5.58E-05	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	2.79E-03
	Copper	5.37E+02	mg/kg	5.37E+02	mg/kg	M	5.25E-04	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	1.31E-02
	Iron	2.83E+04	mg/kg	2.83E+04	mg/kg	M	2.77E-02	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	9.24E-02
	Lead	8.16E+01	mg/kg	8.16E+01	mg/kg	M	7.99E-05	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.81E+03	mg/kg	1.81E+03	mg/kg	M	1.77E-03	mg/kg-day	4.67E-02	mg/kg-day	N/A	N/A	3.80E-02
	Mercury	3.56E+00	mg/kg	3.56E+00	mg/kg	M	3.48E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.16E-02
	Nickel	6.17E+02	mg/kg	6.17E+02	mg/kg	M	6.04E-04	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	3.02E-02
	Selenium	5.41E+00	mg/kg	5.41E+00	mg/kg	M	5.29E-06	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	1.06E-03
	Thallium	5.40E+00	mg/kg	5.40E+00	mg/kg	M	5.28E-06	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	7.55E-02
	Vanadium	5.84E+01	mg/kg	5.84E+01	mg/kg	M	5.72E-05	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	5.72E-02
	Zinc	2.08E+02	mg/kg	2.08E+02	mg/kg	M	2.04E-04	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	6.79E-04
	(Total)												4.31E-01
Dermal	Aluminum	2.89E+04	mg/kg	2.89E+04	mg/kg	M	1.87E-03	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	1.87E-03
	Arsenic	9.68E+00	mg/kg	9.68E+00	mg/kg	M	1.87E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	6.25E-03
	Barium	1.70E+02	ng/g	1.70E-01	mg/kg	M	1.10E-08	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	2.24E-06
	Beryllium	9.71E-01	mg/kg	9.71E-01	mg/kg	M	6.27E-08	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	4.48E-03
	Cadmium	1.34E+01	mg/kg	1.34E+01	mg/kg	M	8.65E-08	mg/kg-day	2.50E-05	mg/kg-day	N/A	N/A	3.46E-03
	Chromium Total	1.59E+03	mg/kg	1.59E+03	mg/kg	M	1.03E-04	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	5.27E-03
	Chromium VI (Hexavalent)	5.82E+01	mg/kg	5.82E+01	mg/kg	M	3.76E-06	mg/kg-day	7.50E-05	mg/kg-day	N/A	N/A	5.01E-02
	Cobalt	5.70E+01	mg/kg	5.70E+01	mg/kg	M	3.68E-06	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	1.84E-04
	Copper	5.37E+02	mg/kg	5.37E+02	mg/kg	M	3.47E-05	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	8.67E-04
	Iron	2.83E+04	mg/kg	2.83E+04	mg/kg	M	1.83E-03	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	6.10E-03
	Lead	8.16E+01	mg/kg	8.16E+01	mg/kg	M	5.27E-06	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.81E+03	mg/kg	1.81E+03	mg/kg	M	1.17E-04	mg/kg-day	1.87E-03	mg/kg-day	N/A	N/A	6.26E-02
	Mercury	3.56E+00	mg/kg	3.56E+00	mg/kg	M	2.30E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	7.66E-04
	Nickel	6.17E+02	mg/kg	6.17E+02	mg/kg	M	3.99E-05	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	4.98E-02
	Selenium	5.41E+00	mg/kg	5.41E+00	mg/kg	M	3.49E-07	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	6.98E-05
	Thallium	5.40E+00	mg/kg	5.40E+00	mg/kg	M	3.49E-07	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	4.98E-03
	Vanadium	5.84E+01	mg/kg	5.84E+01	mg/kg	M	3.77E-06	mg/kg-day	2.60E-05	mg/kg-day	N/A	N/A	1.45E-01
	Zinc	2.08E+02	mg/kg	2.08E+02	mg/kg	M	1.34E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	4.48E-05
	(Total)												3.42E-01

TABLE B.1.7.RME

CALCULATION OF NON-CANCER HAZARDS FOR FUTURE INDUSTRIAL/ COMMERCIAL WORKER EXPOSURE TO SOIL AND SLAG
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Soil and Slag (0-10 ftbgs)
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Inhalation	Aluminum	2.89E+04	mg/kg	2.89E+04	mg/kg	M	1.38E-06	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	1.38E-03
	Arsenic	9.68E+00	mg/kg	9.68E+00	mg/kg	M	4.62E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M	8.13E-09	mg/kg-day	1.40E-04	mg/kg-day	N/A	N/A	5.81E-05
	Beryllium	9.71E-01	mg/kg	9.71E-01	mg/kg	M	4.64E-11	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	8.14E-06
	Cadmium	1.34E+01	mg/kg	1.34E+01	mg/kg	M	6.40E-10	mg/kg-day	5.70E-05	mg/kg-day	N/A	N/A	1.12E-05
	Chromium Total	1.59E+03	mg/kg	1.59E+03	mg/kg	M	7.61E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Chromium VI (Hexavalent)	5.82E+01	mg/kg	5.82E+01	mg/kg	M	2.78E-09	mg/kg-day	2.80E-05	mg/kg-day	N/A	N/A	9.93E-05
	Cobalt	5.70E+01	mg/kg	5.70E+01	mg/kg	M	2.72E-09	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	4.78E-04
	Copper	5.37E+02	mg/kg	5.37E+02	mg/kg	M	2.56E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Iron	2.83E+04	mg/kg	2.83E+04	mg/kg	M	1.35E-06	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Lead	8.16E+01	mg/kg	8.16E+01	mg/kg	M	3.90E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.81E+03	mg/kg	1.81E+03	mg/kg	M	8.66E-08	mg/kg-day	1.43E-05	mg/kg-day	N/A	N/A	6.06E-03
	Mercury	3.56E+00	mg/kg	3.56E+00	mg/kg	M	1.70E-10	mg/kg-day	8.60E-05	mg/kg-day	N/A	N/A	1.98E-06
	Nickel	6.17E+02	mg/kg	6.17E+02	mg/kg	M	2.95E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Selenium	5.41E+00	mg/kg	5.41E+00	mg/kg	M	2.58E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Thallium	5.40E+00	mg/kg	5.40E+00	mg/kg	M	2.58E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Vanadium	5.84E+01	mg/kg	5.84E+01	mg/kg	M	2.79E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Zinc	2.08E+02	mg/kg	2.08E+02	mg/kg	M	9.95E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	(Total)												8.09E-03
												Total Hazard Index Across All Exposure Routes/Pathways	7.8E-01

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.8.CT

CALCULATION OF NON-CANCER HAZARDS FOR FUTURE INDUSTRIAL/ COMMERCIAL WORKER EXPOSURE TO SOIL
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Arsenic	6.16E+00	mg/kg	6.16E+00	mg/kg	M	5.28E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.76E-02
	Barium	1.48E+02	mg/kg	1.48E+02	mg/kg	M	1.27E-04	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	1.81E-03
	Beryllium	6.90E-01	mg/kg	6.90E-01	mg/kg	M	5.91E-07	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	2.96E-04
	Cadmium	1.22E+00	mg/kg	1.22E+00	mg/kg	M	1.05E-06	mg/kg-day	5.00E-04	mg/kg-day	N/A	N/A	2.09E-03
	Chromium Total	1.65E+02	mg/kg	1.65E+02	mg/kg	M	1.42E-04	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	9.43E-05
	Cobalt	1.79E+01	mg/kg	1.79E+01	mg/kg	M	1.53E-05	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	7.67E-04
	Copper	3.34E+01	mg/kg	3.34E+01	mg/kg	M	2.86E-05	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	7.15E-04
	Iron	2.42E+04	mg/kg	2.42E+04	mg/kg	M	2.08E-02	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	6.92E-02
	Lead	5.41E+01	mg/kg	5.41E+01	mg/kg	M	4.64E-05	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.05E+03	mg/kg	1.05E+03	mg/kg	M	9.00E-04	mg/kg-day	4.67E-02	mg/kg-day	N/A	N/A	1.93E-02
	Mercury	4.40E-01	mg/kg	4.40E-01	mg/kg	M	3.77E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.26E-03
	Nickel	2.62E+01	mg/kg	2.62E+01	mg/kg	M	2.24E-05	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	1.12E-03
	Selenium	2.35E+00	mg/kg	2.35E+00	mg/kg	M	2.01E-06	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	4.03E-04
	Zinc	1.64E+02	mg/kg	1.64E+02	mg/kg	M	1.40E-04	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	4.67E-04
	(Total)												1.15E-01
Dermal	Arsenic	6.16E+00	mg/kg	6.16E+00	mg/kg	M	1.05E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	3.48E-04
	Barium	1.48E+02	ng/g	1.48E-01	mg/kg	M	8.36E-10	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	1.71E-07
	Beryllium	6.90E-01	mg/kg	6.90E-01	mg/kg	M	3.90E-09	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	2.79E-04
	Cadmium	1.22E+00	mg/kg	1.22E+00	mg/kg	M	6.90E-10	mg/kg-day	2.50E-05	mg/kg-day	N/A	N/A	2.76E-05
	Chromium Total	1.65E+02	mg/kg	1.65E+02	mg/kg	M	9.34E-07	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	4.79E-05
	Cobalt	1.79E+01	mg/kg	1.79E+01	mg/kg	M	1.01E-07	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	5.06E-06
	Copper	3.34E+01	mg/kg	3.34E+01	mg/kg	M	1.89E-07	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	4.72E-06
	Iron	2.42E+04	mg/kg	2.42E+04	mg/kg	M	1.37E-04	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	4.57E-04
	Lead	5.41E+01	mg/kg	5.41E+01	mg/kg	M	3.06E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.05E+03	mg/kg	1.05E+03	mg/kg	M	5.94E-06	mg/kg-day	1.87E-03	mg/kg-day	N/A	N/A	3.18E-03
	Mercury	4.40E-01	mg/kg	4.40E-01	mg/kg	M	2.49E-09	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	8.30E-06
	Nickel	2.62E+01	mg/kg	2.62E+01	mg/kg	M	1.48E-07	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	1.85E-04
	Selenium	2.35E+00	mg/kg	2.35E+00	mg/kg	M	1.33E-08	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	2.66E-06
	Zinc	1.64E+02	mg/kg	1.64E+02	mg/kg	M	9.25E-07	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	3.08E-06
	(Total)												4.54E-03

TABLE B.1.8.CT

CALCULATION OF NON-CANCER HAZARDS FOR FUTURE INDUSTRIAL/ COMMERCIAL WORKER EXPOSURE TO SOIL
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Inhalation	Arsenic	6.16E+00	mg/kg	6.16E+00	mg/kg	M	2.58E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Barium	1.48E+02	mg/kg	1.48E+02	mg/kg	M	6.18E-09	mg/kg-day	1.40E-04	mg/kg-day	N/A	N/A	4.42E-05
	Beryllium	6.90E-01	mg/kg	6.90E-01	mg/kg	M	2.89E-11	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	5.07E-06
	Cadmium	1.22E+00	mg/kg	1.22E+00	mg/kg	M	5.11E-11	mg/kg-day	5.70E-05	mg/kg-day	N/A	N/A	8.96E-07
	Chromium Total	1.65E+02	mg/kg	1.65E+02	mg/kg	M	6.91E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Cobalt	1.79E+01	mg/kg	1.79E+01	mg/kg	M	7.49E-10	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	1.31E-04
	Copper	3.34E+01	mg/kg	3.34E+01	mg/kg	M	1.40E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Iron	2.42E+04	mg/kg	2.42E+04	mg/kg	M	1.01E-06	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Lead	5.41E+01	mg/kg	5.41E+01	mg/kg	M	2.26E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.05E+03	mg/kg	1.05E+03	mg/kg	M	4.39E-08	mg/kg-day	1.43E-05	mg/kg-day	N/A	N/A	3.07E-03
	Mercury	4.40E-01	mg/kg	4.40E-01	mg/kg	M	1.84E-11	mg/kg-day	8.60E-05	mg/kg-day	N/A	N/A	2.14E-07
	Nickel	2.62E+01	mg/kg	2.62E+01	mg/kg	M	1.10E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Selenium	2.35E+00	mg/kg	2.35E+00	mg/kg	M	9.83E-11	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Zinc	1.64E+02	mg/kg	1.64E+02	mg/kg	M	6.84E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	(Total)												3.25E-03

Total Hazard Index Across All Exposure Routes/Pathways 1.2E-01

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.8.RME

CALCULATION OF NON-CANCER HAZARDS FOR FUTURE INDUSTRIAL/ COMMERCIAL WORKER EXPOSURE TO SOIL
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Arsenic	7.06E+00	mg/kg	7.06E+00	mg/kg	M	6.91E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	2.30E-02
	Barium	3.36E+02	mg/kg	3.36E+02	mg/kg	M	3.29E-04	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	4.70E-03
	Beryllium	7.90E-01	mg/kg	7.90E-01	mg/kg	M	7.73E-07	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	3.87E-04
	Cadmium	1.52E+00	mg/kg	1.52E+00	mg/kg	M	1.49E-06	mg/kg-day	5.00E-04	mg/kg-day	N/A	N/A	2.98E-03
	Chromium Total	2.58E+02	mg/kg	2.58E+02	mg/kg	M	2.53E-04	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	1.68E-04
	Cobalt	8.89E+01	mg/kg	8.89E+01	mg/kg	M	8.70E-05	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	4.35E-03
	Copper	4.68E+01	mg/kg	4.68E+01	mg/kg	M	4.57E-05	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	1.14E-03
	Iron	3.85E+04	mg/kg	3.85E+04	mg/kg	M	3.77E-02	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	1.26E-01
	Lead	2.26E+02	mg/kg	2.26E+02	mg/kg	M	2.21E-04	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	4.49E+03	mg/kg	4.49E+03	mg/kg	M	4.39E-03	mg/kg-day	4.67E-02	mg/kg-day	N/A	N/A	9.40E-02
	Mercury	8.44E-01	mg/kg	8.44E-01	mg/kg	M	8.26E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	2.75E-03
	Nickel	2.82E+01	mg/kg	2.82E+01	mg/kg	M	2.76E-05	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	1.38E-03
	Selenium	2.88E+00	mg/kg	2.88E+00	mg/kg	M	2.82E-06	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	5.65E-04
	Zinc	2.08E+02	mg/kg	2.08E+02	mg/kg	M	2.03E-04	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	6.78E-04
	(Total)												2.62E-01
Dermal	Arsenic	7.06E+00	mg/kg	7.06E+00	mg/kg	M	1.37E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	4.56E-03
	Barium	3.36E+02	ng/g	3.36E-01	mg/kg	M	2.17E-08	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	4.43E-06
	Beryllium	7.90E-01	mg/kg	7.90E-01	mg/kg	M	5.10E-08	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	3.65E-03
	Cadmium	1.52E+00	mg/kg	1.52E+00	mg/kg	M	9.83E-09	mg/kg-day	2.50E-05	mg/kg-day	N/A	N/A	3.93E-04
	Chromium Total	2.58E+02	mg/kg	2.58E+02	mg/kg	M	1.67E-05	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	8.55E-04
	Cobalt	8.89E+01	mg/kg	8.89E+01	mg/kg	M	5.74E-06	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	2.87E-04
	Copper	4.68E+01	mg/kg	4.68E+01	mg/kg	M	3.02E-06	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	7.55E-05
	Iron	3.85E+04	mg/kg	3.85E+04	mg/kg	M	2.49E-03	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	8.29E-03
	Lead	2.26E+02	mg/kg	2.26E+02	mg/kg	M	1.46E-05	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	4.49E+03	mg/kg	4.49E+03	mg/kg	M	2.90E-04	mg/kg-day	1.87E-03	mg/kg-day	N/A	N/A	1.55E-01
	Mercury	8.44E-01	mg/kg	8.44E-01	mg/kg	M	5.45E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.82E-04
	Nickel	2.82E+01	mg/kg	2.82E+01	mg/kg	M	1.82E-06	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	2.28E-03
	Selenium	2.88E+00	mg/kg	2.88E+00	mg/kg	M	1.86E-07	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	3.73E-05
	Zinc	2.08E+02	mg/kg	2.08E+02	mg/kg	M	1.34E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	4.48E-05
	(Total)												1.76E-01

TABLE B.1.8.RME

CALCULATION OF NON-CANCER HAZARDS FOR FUTURE INDUSTRIAL/ COMMERCIAL WORKER EXPOSURE TO SOIL
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Inhalation	Arsenic	7.06E+00	mg/kg	7.06E+00	mg/kg	M	3.37E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Barium	3.36E+02	mg/kg	3.36E+02	mg/kg	M	1.61E-08	mg/kg-day	1.40E-04	mg/kg-day	N/A	N/A	1.15E-04
	Beryllium	7.90E-01	mg/kg	7.90E-01	mg/kg	M	3.78E-11	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	6.62E-06
	Cadmium	1.52E+00	mg/kg	1.52E+00	mg/kg	M	7.27E-11	mg/kg-day	5.70E-05	mg/kg-day	N/A	N/A	1.28E-06
	Chromium Total	2.58E+02	mg/kg	2.58E+02	mg/kg	M	1.23E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Cobalt	8.89E+01	mg/kg	8.89E+01	mg/kg	M	4.25E-09	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	7.45E-04
	Copper	4.68E+01	mg/kg	4.68E+01	mg/kg	M	2.23E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Iron	3.85E+04	mg/kg	3.85E+04	mg/kg	M	1.84E-06	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Lead	2.26E+02	mg/kg	2.26E+02	mg/kg	M	1.08E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	4.49E+03	mg/kg	4.49E+03	mg/kg	M	2.14E-07	mg/kg-day	1.43E-05	mg/kg-day	N/A	N/A	1.50E-02
	Mercury	8.44E-01	mg/kg	8.44E-01	mg/kg	M	4.03E-11	mg/kg-day	8.60E-05	mg/kg-day	N/A	N/A	4.69E-07
	Nickel	2.82E+01	mg/kg	2.82E+01	mg/kg	M	1.35E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Selenium	2.88E+00	mg/kg	2.88E+00	mg/kg	M	1.38E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Zinc	2.08E+02	mg/kg	2.08E+02	mg/kg	M	9.93E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	(Total)												1.59E-02
												Total Hazard Index Across All Exposure Routes/Pathways	4.5E-01

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.9.CT

CALCULATION OF NON-CANCER HAZARDS FOR FUTURE INDUSTRIAL/ COMMERCIAL WORKER EXPOSURE TO SLAG
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Aluminum	1.81E+04	mg/kg	1.81E+04	mg/kg	M	1.55E-02	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	1.55E-02
	Arsenic	6.38E+00	mg/kg	6.38E+00	mg/kg	M	5.47E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.82E-02
	Barium	1.29E+02	mg/kg	1.29E+02	mg/kg	M	1.10E-04	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	1.58E-03
	Beryllium	6.07E-01	mg/kg	6.07E-01	mg/kg	M	5.20E-07	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	2.60E-04
	Cadmium	3.40E+00	mg/kg	3.40E+00	mg/kg	M	2.91E-06	mg/kg-day	5.00E-04	mg/kg-day	N/A	N/A	5.83E-03
	Chromium Total	2.30E+03	mg/kg	2.30E+03	mg/kg	M	1.97E-03	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	1.31E-03
	Chromium VI (Hexavalent)	3.15E+01	mg/kg	3.15E+01	mg/kg	M	2.70E-05	mg/kg-day	3.00E-03	mg/kg-day	N/A	N/A	9.00E-03
	Cobalt	1.29E+01	mg/kg	1.29E+01	mg/kg	M	1.11E-05	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	5.54E-04
	Copper	1.76E+02	mg/kg	1.76E+02	mg/kg	M	1.51E-04	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	3.77E-03
	Iron	1.64E+04	mg/kg	1.64E+04	mg/kg	M	1.40E-02	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	4.68E-02
	Lead	5.67E+01	mg/kg	5.67E+01	mg/kg	M	4.86E-05	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	3.45E+03	mg/kg	3.45E+03	mg/kg	M	2.96E-03	mg/kg-day	4.67E-02	mg/kg-day	N/A	N/A	6.34E-02
	Mercury	7.90E-02	mg/kg	7.90E-02	mg/kg	M	6.77E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	2.26E-04
	Nickel	4.30E+02	mg/kg	4.30E+02	mg/kg	M	3.68E-04	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	1.84E-02
	Selenium	5.80E+00	mg/kg	5.80E+00	mg/kg	M	4.97E-06	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	9.94E-04
	Thallium	5.71E+00	mg/kg	5.71E+00	mg/kg	M	4.89E-06	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	6.99E-02
	Vanadium	6.57E+01	mg/kg	6.57E+01	mg/kg	M	5.63E-05	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	5.63E-02
	Zinc	1.29E+02	mg/kg	1.29E+02	mg/kg	M	1.10E-04	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	3.67E-04
	(Total)												3.12E-01
Dermal	Aluminum	1.81E+04	mg/kg	1.81E+04	mg/kg	M	1.02E-04	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	1.02E-04
	Arsenic	6.38E+00	mg/kg	6.38E+00	mg/kg	M	1.08E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	3.61E-04
	Barium	1.29E+02	ng/g	1.29E-01	mg/kg	M	7.29E-10	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	1.49E-07
	Beryllium	6.07E-01	mg/kg	6.07E-01	mg/kg	M	3.43E-09	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	2.45E-04
	Cadmium	3.40E+00	mg/kg	3.40E+00	mg/kg	M	1.92E-09	mg/kg-day	2.50E-05	mg/kg-day	N/A	N/A	7.69E-05
	Chromium Total	2.30E+03	mg/kg	2.30E+03	mg/kg	M	1.30E-05	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	6.67E-04
	Chromium VI (Hexavalent)	3.15E+01	mg/kg	3.15E+01	mg/kg	M	1.78E-07	mg/kg-day	7.50E-05	mg/kg-day	N/A	N/A	2.38E-03
	Cobalt	1.29E+01	mg/kg	1.29E+01	mg/kg	M	7.31E-08	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	3.66E-06
	Copper	1.76E+02	mg/kg	1.76E+02	mg/kg	M	9.96E-07	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	2.49E-05
	Iron	1.64E+04	mg/kg	1.64E+04	mg/kg	M	9.27E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	3.09E-04
	Lead	5.67E+01	mg/kg	5.67E+01	mg/kg	M	3.21E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	3.45E+03	mg/kg	3.45E+03	mg/kg	M	1.95E-05	mg/kg-day	1.87E-03	mg/kg-day	N/A	N/A	1.04E-02
	Mercury	7.90E-02	mg/kg	7.90E-02	mg/kg	M	4.47E-10	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.49E-06
	Nickel	4.30E+02	mg/kg	4.30E+02	mg/kg	M	2.43E-06	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	3.04E-03
	Selenium	5.80E+00	mg/kg	5.80E+00	mg/kg	M	3.28E-08	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	6.56E-06
	Thallium	5.71E+00	mg/kg	5.71E+00	mg/kg	M	3.23E-08	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	4.61E-04
	Vanadium	6.57E+01	mg/kg	6.57E+01	mg/kg	M	3.72E-07	mg/kg-day	2.60E-05	mg/kg-day	N/A	N/A	1.43E-02
	Zinc	1.29E+02	mg/kg	1.29E+02	mg/kg	M	7.27E-07	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	2.42E-06
	(Total)												3.24E-02

TABLE B.1.9.CT

CALCULATION OF NON-CANCER HAZARDS FOR FUTURE INDUSTRIAL/ COMMERCIAL WORKER EXPOSURE TO SLAG
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Inhalation	Aluminum	1.81E+04	mg/kg	1.81E+04	mg/kg	M	7.57E-07	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	7.57E-04
	Arsenic	6.38E+00	mg/kg	6.38E+00	mg/kg	M	2.67E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Barium	1.29E+02	mg/kg	1.29E+02	mg/kg	M	5.39E-09	mg/kg-day	1.40E-04	mg/kg-day	N/A	N/A	3.85E-05
	Beryllium	6.07E-01	mg/kg	6.07E-01	mg/kg	M	2.54E-11	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	4.46E-06
	Cadmium	3.40E+00	mg/kg	3.40E+00	mg/kg	M	1.42E-10	mg/kg-day	5.70E-05	mg/kg-day	N/A	N/A	2.50E-06
	Chromium Total	2.30E+03	mg/kg	2.30E+03	mg/kg	M	9.62E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Chromium VI (Hexavalent)	3.15E+01	mg/kg	3.15E+01	mg/kg	M	1.32E-09	mg/kg-day	2.80E-05	mg/kg-day	N/A	N/A	4.71E-05
	Cobalt	1.29E+01	mg/kg	1.29E+01	mg/kg	M	5.41E-10	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	9.49E-05
	Copper	1.76E+02	mg/kg	1.76E+02	mg/kg	M	7.37E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Iron	1.64E+04	mg/kg	1.64E+04	mg/kg	M	6.86E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Lead	5.67E+01	mg/kg	5.67E+01	mg/kg	M	2.37E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	3.45E+03	mg/kg	3.45E+03	mg/kg	M	1.44E-07	mg/kg-day	1.43E-05	mg/kg-day	N/A	N/A	1.01E-02
	Mercury	7.90E-02	mg/kg	7.90E-02	mg/kg	M	3.31E-12	mg/kg-day	8.60E-05	mg/kg-day	N/A	N/A	3.84E-08
	Nickel	4.30E+02	mg/kg	4.30E+02	mg/kg	M	1.80E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Selenium	5.80E+00	mg/kg	5.80E+00	mg/kg	M	2.43E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Thallium	5.71E+00	mg/kg	5.71E+00	mg/kg	M	2.39E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Vanadium	6.57E+01	mg/kg	6.57E+01	mg/kg	M	2.75E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Zinc	1.29E+02	mg/kg	1.29E+02	mg/kg	M	5.38E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	(Total)												1.10E-02
												Total Hazard Index Across All Exposure Routes/Pathways	3.6E-01

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.9.RME

CALCULATION OF NON-CANCER HAZARDS FOR FUTURE INDUSTRIAL/ COMMERCIAL WORKER EXPOSURE TO SLAG
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Aluminum	3.45E+04	mg/kg	3.45E+04	mg/kg	M	3.37E-02	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	3.37E-02
	Arsenic	1.08E+01	mg/kg	1.08E+01	mg/kg	M	1.06E-05	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	3.52E-02
	Barium	1.72E+02	mg/kg	1.72E+02	mg/kg	M	1.68E-04	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	2.40E-03
	Beryllium	8.09E-01	mg/kg	8.09E-01	mg/kg	M	7.92E-07	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	3.96E-04
	Cadmium	7.37E+00	mg/kg	7.37E+00	mg/kg	M	7.21E-06	mg/kg-day	5.00E-04	mg/kg-day	N/A	N/A	1.44E-02
	Chromium Total	3.02E+03	mg/kg	3.02E+03	mg/kg	M	2.95E-03	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	1.97E-03
	Chromium VI (Hexavalent)	1.07E+02	mg/kg	1.07E+02	mg/kg	M	1.04E-04	mg/kg-day	3.00E-03	mg/kg-day	N/A	N/A	3.48E-02
	Cobalt	1.90E+01	mg/kg	1.90E+01	mg/kg	M	1.86E-05	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	9.30E-04
	Copper	9.75E+02	mg/kg	9.75E+02	mg/kg	M	9.54E-04	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	2.39E-02
	Iron	2.54E+04	mg/kg	2.54E+04	mg/kg	M	2.48E-02	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	8.28E-02
	Lead	1.33E+02	mg/kg	1.33E+02	mg/kg	M	1.30E-04	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.85E+04	mg/kg	1.85E+04	mg/kg	M	1.81E-02	mg/kg-day	4.67E-02	mg/kg-day	N/A	N/A	3.87E-01
	Mercury	9.32E-02	mg/kg	9.32E-02	mg/kg	M	9.12E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	3.04E-04
	Nickel	1.10E+03	mg/kg	1.10E+03	mg/kg	M	1.07E-03	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	5.37E-02
	Selenium	8.39E+00	mg/kg	8.39E+00	mg/kg	M	8.21E-06	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	1.64E-03
	Thallium	8.76E+00	mg/kg	8.76E+00	mg/kg	M	8.57E-06	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	1.22E-01
	Vanadium	8.16E+01	mg/kg	8.16E+01	mg/kg	M	7.98E-05	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	7.98E-02
	Zinc	2.15E+02	mg/kg	2.15E+02	mg/kg	M	2.10E-04	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	7.01E-04
	(Total)												8.76E-01
Dermal	Aluminum	3.45E+04	mg/kg	3.45E+04	mg/kg	M	2.23E-03	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	2.23E-03
	Arsenic	1.08E+01	mg/kg	1.08E+01	mg/kg	M	2.09E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	6.97E-03
	Barium	1.72E+02	ng/g	1.72E-01	mg/kg	M	1.11E-08	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	2.26E-06
	Beryllium	8.09E-01	mg/kg	8.09E-01	mg/kg	M	5.22E-08	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	3.73E-03
	Cadmium	7.37E+00	mg/kg	7.37E+00	mg/kg	M	4.76E-08	mg/kg-day	2.50E-05	mg/kg-day	N/A	N/A	1.90E-03
	Chromium Total	3.02E+03	mg/kg	3.02E+03	mg/kg	M	1.95E-04	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	9.99E-03
	Chromium VI (Hexavalent)	1.07E+02	mg/kg	1.07E+02	mg/kg	M	6.89E-06	mg/kg-day	7.50E-05	mg/kg-day	N/A	N/A	9.19E-02
	Cobalt	1.90E+01	mg/kg	1.90E+01	mg/kg	M	1.23E-06	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	6.14E-05
	Copper	9.75E+02	mg/kg	9.75E+02	mg/kg	M	6.30E-05	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	1.57E-03
	Iron	2.54E+04	mg/kg	2.54E+04	mg/kg	M	1.64E-03	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	5.46E-03
	Lead	1.33E+02	mg/kg	1.33E+02	mg/kg	M	8.60E-06	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.85E+04	mg/kg	1.85E+04	mg/kg	M	1.19E-03	mg/kg-day	1.87E-03	mg/kg-day	N/A	N/A	6.38E-01
	Mercury	9.32E-02	mg/kg	9.32E-02	mg/kg	M	6.02E-09	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	2.01E-05
	Nickel	1.10E+03	mg/kg	1.10E+03	mg/kg	M	7.08E-05	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	8.85E-02
	Selenium	8.39E+00	mg/kg	8.39E+00	mg/kg	M	5.42E-07	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	1.08E-04
	Thallium	8.76E+00	mg/kg	8.76E+00	mg/kg	M	5.66E-07	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	8.08E-03
	Vanadium	8.16E+01	mg/kg	8.16E+01	mg/kg	M	5.27E-06	mg/kg-day	2.60E-05	mg/kg-day	N/A	N/A	2.03E-01
	Zinc	2.15E+02	mg/kg	2.15E+02	mg/kg	M	1.39E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	4.63E-05
	(Total)												1.06E+00

TABLE B.1.9.RME

CALCULATION OF NON-CANCER HAZARDS FOR FUTURE INDUSTRIAL/ COMMERCIAL WORKER EXPOSURE TO SLAG
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Inhalation	Aluminum	3.45E+04	mg/kg	3.45E+04	mg/kg	M	1.65E-06	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	1.65E-03
	Arsenic	1.08E+01	mg/kg	1.08E+01	mg/kg	M	5.16E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Barium	1.72E+02	mg/kg	1.72E+02	mg/kg	M	8.21E-09	mg/kg-day	1.40E-04	mg/kg-day	N/A	N/A	5.86E-05
	Beryllium	8.09E-01	mg/kg	8.09E-01	mg/kg	M	3.86E-11	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	6.78E-06
	Cadmium	7.37E+00	mg/kg	7.37E+00	mg/kg	M	3.52E-10	mg/kg-day	5.70E-05	mg/kg-day	N/A	N/A	6.18E-06
	Chromium Total	3.02E+03	mg/kg	3.02E+03	mg/kg	M	1.44E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Chromium VI (Hexavalent)	1.07E+02	mg/kg	1.07E+02	mg/kg	M	5.10E-09	mg/kg-day	2.80E-05	mg/kg-day	N/A	N/A	1.82E-04
	Cobalt	1.90E+01	mg/kg	1.90E+01	mg/kg	M	9.08E-10	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	1.59E-04
	Copper	9.75E+02	mg/kg	9.75E+02	mg/kg	M	4.66E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Iron	2.54E+04	mg/kg	2.54E+04	mg/kg	M	1.21E-06	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Lead	1.33E+02	mg/kg	1.33E+02	mg/kg	M	6.37E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.85E+04	mg/kg	1.85E+04	mg/kg	M	8.82E-07	mg/kg-day	1.43E-05	mg/kg-day	N/A	N/A	6.17E-02
	Mercury	9.32E-02	mg/kg	9.32E-02	mg/kg	M	4.45E-12	mg/kg-day	8.60E-05	mg/kg-day	N/A	N/A	5.18E-08
	Nickel	1.10E+03	mg/kg	1.10E+03	mg/kg	M	5.24E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Selenium	8.39E+00	mg/kg	8.39E+00	mg/kg	M	4.01E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Thallium	8.76E+00	mg/kg	8.76E+00	mg/kg	M	4.18E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Vanadium	8.16E+01	mg/kg	8.16E+01	mg/kg	M	3.90E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Zinc	2.15E+02	mg/kg	2.15E+02	mg/kg	M	1.03E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	(Total)												6.37E-02
												Total Hazard Index Across All Exposure Routes/Pathways	2.0E+00

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.10.CT

CALCULATION OF NON-CANCER HAZARDS FOR FUTURE CONSTRUCTION/ UTILITY WORKER EXPOSURE TO SOIL AND SLAG
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Soil and Slag (0-10 ftbgs)
Exposure Medium: Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Aluminum	1.80E+04	mg/kg	1.80E+04	mg/kg	M	2.32E-03	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	2.32E-03
	Arsenic	6.94E+00	mg/kg	6.94E+00	mg/kg	M	8.96E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	2.99E-03
	Barium	1.45E+02	mg/kg	1.45E+02	mg/kg	M	1.87E-05	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	2.67E-04
	Beryllium	7.66E-01	mg/kg	7.66E-01	mg/kg	M	9.90E-08	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	4.95E-05
	Cadmium	2.41E+00	mg/kg	2.41E+00	mg/kg	M	3.11E-07	mg/kg-day	5.00E-04	mg/kg-day	N/A	N/A	6.23E-04
	Chromium Total	1.24E+03	mg/kg	1.24E+03	mg/kg	M	1.60E-04	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	1.07E-04
	Chromium VI (Hexavalent)	1.70E+01	mg/kg	1.70E+01	mg/kg	M	2.20E-06	mg/kg-day	3.00E-03	mg/kg-day	N/A	N/A	7.32E-04
	Cobalt	1.78E+01	mg/kg	1.78E+01	mg/kg	M	2.30E-06	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	1.15E-04
	Copper	1.16E+02	mg/kg	1.16E+02	mg/kg	M	1.50E-05	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	3.74E-04
	Iron	2.29E+04	mg/kg	2.29E+04	mg/kg	M	2.96E-03	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	9.87E-03
	Lead	5.67E+01	mg/kg	5.67E+01	mg/kg	M	7.32E-06	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.43E+03	mg/kg	1.43E+03	mg/kg	M	1.84E-04	mg/kg-day	4.67E-02	mg/kg-day	N/A	N/A	3.95E-03
	Mercury	3.60E-01	mg/kg	3.60E-01	mg/kg	M	4.65E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.55E-04
	Nickel	1.74E+02	mg/kg	1.74E+02	mg/kg	M	2.25E-05	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	1.12E-03
	Selenium	4.30E+00	mg/kg	4.30E+00	mg/kg	M	5.55E-07	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	1.11E-04
	Thallium	3.75E+00	mg/kg	3.75E+00	mg/kg	M	4.84E-07	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	6.92E-03
	Vanadium	5.07E+01	mg/kg	5.07E+01	mg/kg	M	6.55E-06	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	6.55E-03
	Zinc	1.70E+02	mg/kg	1.70E+02	mg/kg	M	2.19E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	7.30E-05
	(Total)												3.63E-02
Dermal	Aluminum	1.80E+04	mg/kg	1.80E+04	mg/kg	M	2.32E-05	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	2.32E-05
	Arsenic	6.94E+00	mg/kg	6.94E+00	mg/kg	M	2.69E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	8.96E-05
	Barium	1.45E+02	ng/g	1.45E-01	mg/kg	M	1.87E-10	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	3.82E-08
	Beryllium	7.66E-01	mg/kg	7.66E-01	mg/kg	M	9.90E-10	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	7.07E-05
	Cadmium	2.41E+00	mg/kg	2.41E+00	mg/kg	M	3.11E-10	mg/kg-day	2.50E-05	mg/kg-day	N/A	N/A	1.25E-05
	Chromium Total	1.24E+03	mg/kg	1.24E+03	mg/kg	M	1.60E-06	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	8.20E-05
	Chromium VI (Hexavalent)	1.70E+01	mg/kg	1.70E+01	mg/kg	M	2.20E-08	mg/kg-day	7.50E-05	mg/kg-day	N/A	N/A	2.93E-04
	Cobalt	1.78E+01	mg/kg	1.78E+01	mg/kg	M	2.30E-08	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	1.15E-06
	Copper	1.16E+02	mg/kg	1.16E+02	mg/kg	M	1.50E-07	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	3.74E-06
	Iron	2.29E+04	mg/kg	2.29E+04	mg/kg	M	2.96E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	9.87E-05
	Lead	5.67E+01	mg/kg	5.67E+01	mg/kg	M	7.32E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.43E+03	mg/kg	1.43E+03	mg/kg	M	1.84E-06	mg/kg-day	1.87E-03	mg/kg-day	N/A	N/A	9.85E-04
	Mercury	3.60E-01	mg/kg	3.60E-01	mg/kg	M	4.65E-10	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.55E-06
	Nickel	1.74E+02	mg/kg	1.74E+02	mg/kg	M	2.25E-07	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	2.81E-04
	Selenium	4.30E+00	mg/kg	4.30E+00	mg/kg	M	5.55E-09	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	1.11E-06
	Thallium	3.75E+00	mg/kg	3.75E+00	mg/kg	M	4.84E-09	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	6.92E-05
	Vanadium	5.07E+01	mg/kg	5.07E+01	mg/kg	M	6.55E-08	mg/kg-day	2.60E-05	mg/kg-day	N/A	N/A	2.52E-03
	Zinc	1.70E+02	mg/kg	1.70E+02	mg/kg	M	2.19E-07	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	7.30E-07
	(Total)												4.53E-03

TABLE B.1.10.CT

CALCULATION OF NON-CANCER HAZARDS FOR FUTURE CONSTRUCTION/ UTILITY WORKER EXPOSURE TO SOIL AND SLAG
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Soil and Slag (0-10 ftbgs)
Exposure Medium: Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Inhalation	Aluminum	1.80E+04	mg/kg	1.80E+04	mg/kg	M	9.91E-07	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	9.91E-04
	Arsenic	6.94E+00	mg/kg	6.94E+00	mg/kg	M	3.82E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Barium	1.45E+02	mg/kg	1.45E+02	mg/kg	M	7.97E-09	mg/kg-day	1.40E-04	mg/kg-day	N/A	N/A	5.69E-05
	Beryllium	7.66E-01	mg/kg	7.66E-01	mg/kg	M	4.22E-11	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	7.40E-06
	Cadmium	2.41E+00	mg/kg	2.41E+00	mg/kg	M	1.33E-10	mg/kg-day	5.70E-05	mg/kg-day	N/A	N/A	2.33E-06
	Chromium Total	1.24E+03	mg/kg	1.24E+03	mg/kg	M	6.81E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Chromium VI (Hexavalent)	1.70E+01	mg/kg	1.70E+01	mg/kg	M	9.36E-10	mg/kg-day	2.80E-05	mg/kg-day	N/A	N/A	3.34E-05
	Cobalt	1.78E+01	mg/kg	1.78E+01	mg/kg	M	9.80E-10	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	1.72E-04
	Copper	1.16E+02	mg/kg	1.16E+02	mg/kg	M	6.38E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Iron	2.29E+04	mg/kg	2.29E+04	mg/kg	M	1.26E-06	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Lead	5.67E+01	mg/kg	5.67E+01	mg/kg	M	3.12E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.43E+03	mg/kg	1.43E+03	mg/kg	M	7.86E-08	mg/kg-day	1.43E-05	mg/kg-day	N/A	N/A	5.49E-03
	Mercury	3.60E-01	mg/kg	3.60E-01	mg/kg	M	1.98E-11	mg/kg-day	8.60E-05	mg/kg-day	N/A	N/A	2.30E-07
	Nickel	1.74E+02	mg/kg	1.74E+02	mg/kg	M	9.58E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Selenium	4.30E+00	mg/kg	4.30E+00	mg/kg	M	2.37E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Thallium	3.75E+00	mg/kg	3.75E+00	mg/kg	M	2.06E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Vanadium	5.07E+01	mg/kg	5.07E+01	mg/kg	M	2.79E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Zinc	1.70E+02	mg/kg	1.70E+02	mg/kg	M	9.34E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	(Total)												6.76E-03

Total Hazard Index Across All Exposure Routes/Pathways 4.8E-02

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.10.RME

CALCULATION OF NON-CANCER HAZARDS FOR FUTURE CONSTRUCTION/ UTILITY WORKER EXPOSURE TO SOIL AND SLAG
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Soil and Slag (0-10 ftbgs)
Exposure Medium: Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Aluminum	2.89E+04	mg/kg	2.89E+04	mg/kg	M	7.46E-03	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	7.46E-03
	Arsenic	9.68E+00	mg/kg	9.68E+00	mg/kg	M	2.50E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	8.33E-03
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M	4.40E-05	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	6.28E-04
	Beryllium	9.71E-01	mg/kg	9.71E-01	mg/kg	M	2.51E-07	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	1.25E-04
	Cadmium	1.34E+01	mg/kg	1.34E+01	mg/kg	M	3.46E-06	mg/kg-day	5.00E-04	mg/kg-day	N/A	N/A	6.92E-03
	Chromium Total	1.59E+03	mg/kg	1.59E+03	mg/kg	M	4.11E-04	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	2.74E-04
	Chromium VI (Hexavalent)	5.82E+01	mg/kg	5.82E+01	mg/kg	M	1.50E-05	mg/kg-day	3.00E-03	mg/kg-day	N/A	N/A	5.01E-03
	Cobalt	5.70E+01	mg/kg	5.70E+01	mg/kg	M	1.47E-05	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	7.36E-04
	Copper	5.37E+02	mg/kg	5.37E+02	mg/kg	M	1.39E-04	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	3.47E-03
	Iron	2.83E+04	mg/kg	2.83E+04	mg/kg	M	7.32E-03	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	2.44E-02
	Lead	8.16E+01	mg/kg	8.16E+01	mg/kg	M	2.11E-05	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.81E+03	mg/kg	1.81E+03	mg/kg	M	4.68E-04	mg/kg-day	4.67E-02	mg/kg-day	N/A	N/A	1.00E-02
	Mercury	3.56E+00	mg/kg	3.56E+00	mg/kg	M	9.19E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	3.06E-03
	Nickel	6.17E+02	mg/kg	6.17E+02	mg/kg	M	1.59E-04	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	7.97E-03
	Selenium	5.41E+00	mg/kg	5.41E+00	mg/kg	M	1.40E-06	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	2.79E-04
	Thallium	5.40E+00	mg/kg	5.40E+00	mg/kg	M	1.39E-06	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	1.99E-02
	Vanadium	5.84E+01	mg/kg	5.84E+01	mg/kg	M	1.51E-05	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	1.51E-02
	Zinc	2.08E+02	mg/kg	2.08E+02	mg/kg	M	5.38E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	1.79E-04
	(Total)												1.14E-01
Dermal	Aluminum	2.89E+04	mg/kg	2.89E+04	mg/kg	M	2.24E-04	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	2.24E-04
	Arsenic	9.68E+00	mg/kg	9.68E+00	mg/kg	M	2.25E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	7.50E-04
	Barium	1.70E+02	ng/g	1.70E-01	mg/kg	M	1.32E-09	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	2.69E-07
	Beryllium	9.71E-01	mg/kg	9.71E-01	mg/kg	M	7.53E-09	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	5.38E-04
	Cadmium	1.34E+01	mg/kg	1.34E+01	mg/kg	M	1.04E-08	mg/kg-day	2.50E-05	mg/kg-day	N/A	N/A	4.15E-04
	Chromium Total	1.59E+03	mg/kg	1.59E+03	mg/kg	M	1.23E-05	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	6.33E-04
	Chromium VI (Hexavalent)	5.82E+01	mg/kg	5.82E+01	mg/kg	M	4.51E-07	mg/kg-day	7.50E-05	mg/kg-day	N/A	N/A	6.02E-03
	Cobalt	5.70E+01	mg/kg	5.70E+01	mg/kg	M	4.42E-07	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	2.21E-05
	Copper	5.37E+02	mg/kg	5.37E+02	mg/kg	M	4.16E-06	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	1.04E-04
	Iron	2.83E+04	mg/kg	2.83E+04	mg/kg	M	2.20E-04	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	7.32E-04
	Lead	8.16E+01	mg/kg	8.16E+01	mg/kg	M	6.32E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.81E+03	mg/kg	1.81E+03	mg/kg	M	1.40E-05	mg/kg-day	1.87E-03	mg/kg-day	N/A	N/A	7.51E-03
	Mercury	3.56E+00	mg/kg	3.56E+00	mg/kg	M	2.76E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	9.19E-05
	Nickel	6.17E+02	mg/kg	6.17E+02	mg/kg	M	4.78E-06	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	5.98E-03
	Selenium	5.41E+00	mg/kg	5.41E+00	mg/kg	M	4.19E-08	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	8.38E-06
	Thallium	5.40E+00	mg/kg	5.40E+00	mg/kg	M	4.18E-08	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	5.98E-04
	Vanadium	5.84E+01	mg/kg	5.84E+01	mg/kg	M	4.53E-07	mg/kg-day	2.60E-05	mg/kg-day	N/A	N/A	1.74E-02
	Zinc	2.08E+02	mg/kg	2.08E+02	mg/kg	M	1.61E-06	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	5.38E-06
	(Total)												4.10E-02

TABLE B.1.10.RME

CALCULATION OF NON-CANCER HAZARDS FOR FUTURE CONSTRUCTION/ UTILITY WORKER EXPOSURE TO SOIL AND SLAG
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Soil and Slag (0-10 ftbgs)
Exposure Medium: Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Inhalation	Aluminum	2.89E+04	mg/kg	2.89E+04	mg/kg	M	3.18E-06	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	3.18E-03
	Arsenic	9.68E+00	mg/kg	9.68E+00	mg/kg	M	1.07E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M	1.87E-08	mg/kg-day	1.40E-04	mg/kg-day	N/A	N/A	1.34E-04
	Beryllium	9.71E-01	mg/kg	9.71E-01	mg/kg	M	1.07E-10	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	1.88E-05
	Cadmium	1.34E+01	mg/kg	1.34E+01	mg/kg	M	1.48E-09	mg/kg-day	5.70E-05	mg/kg-day	N/A	N/A	2.59E-05
	Chromium Total	1.59E+03	mg/kg	1.59E+03	mg/kg	M	1.75E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Chromium VI (Hexavalent)	5.82E+01	mg/kg	5.82E+01	mg/kg	M	6.41E-09	mg/kg-day	2.80E-05	mg/kg-day	N/A	N/A	2.29E-04
	Cobalt	5.70E+01	mg/kg	5.70E+01	mg/kg	M	6.28E-09	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	1.10E-03
	Copper	5.37E+02	mg/kg	5.37E+02	mg/kg	M	5.91E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Iron	2.83E+04	mg/kg	2.83E+04	mg/kg	M	3.12E-06	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Lead	8.16E+01	mg/kg	8.16E+01	mg/kg	M	8.99E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.81E+03	mg/kg	1.81E+03	mg/kg	M	2.00E-07	mg/kg-day	1.43E-05	mg/kg-day	N/A	N/A	1.40E-02
	Mercury	3.56E+00	mg/kg	3.56E+00	mg/kg	M	3.92E-10	mg/kg-day	8.60E-05	mg/kg-day	N/A	N/A	4.56E-06
	Nickel	6.17E+02	mg/kg	6.17E+02	mg/kg	M	6.80E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Selenium	5.41E+00	mg/kg	5.41E+00	mg/kg	M	5.95E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Thallium	5.40E+00	mg/kg	5.40E+00	mg/kg	M	5.94E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Vanadium	5.84E+01	mg/kg	5.84E+01	mg/kg	M	6.43E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Zinc	2.08E+02	mg/kg	2.08E+02	mg/kg	M	2.29E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	(Total)												1.87E-02
												Total Hazard Index Across All Exposure Routes/Pathways	1.7E-01

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.11.CT

CALCULATION OF NON-CANCER HAZARDS FOR FUTURE CONSTRUCTION/ UTILITY WORKER EXPOSURE TO SOIL
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Arsenic	6.16E+00	mg/kg	6.16E+00	mg/kg	M	7.96E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	2.65E-03
	Barium	1.48E+02	mg/kg	1.48E+02	mg/kg	M	1.91E-05	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	2.73E-04
	Beryllium	6.90E-01	mg/kg	6.90E-01	mg/kg	M	8.91E-08	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	4.46E-05
	Cadmium	1.22E+00	mg/kg	1.22E+00	mg/kg	M	1.58E-07	mg/kg-day	5.00E-04	mg/kg-day	N/A	N/A	3.15E-04
	Chromium Total	1.65E+02	mg/kg	1.65E+02	mg/kg	M	2.13E-05	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	1.42E-05
	Cobalt	1.79E+01	mg/kg	1.79E+01	mg/kg	M	2.31E-06	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	1.16E-04
	Copper	3.34E+01	mg/kg	3.34E+01	mg/kg	M	4.31E-06	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	1.08E-04
	Iron	2.42E+04	mg/kg	2.42E+04	mg/kg	M	3.13E-03	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	1.04E-02
	Lead	5.41E+01	mg/kg	5.41E+01	mg/kg	M	6.99E-06	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.05E+03	mg/kg	1.05E+03	mg/kg	M	1.36E-04	mg/kg-day	4.67E-02	mg/kg-day	N/A	N/A	2.90E-03
	Mercury	4.40E-01	mg/kg	4.40E-01	mg/kg	M	5.68E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.89E-04
	Nickel	2.62E+01	mg/kg	2.62E+01	mg/kg	M	3.38E-06	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	1.69E-04
	Selenium	2.35E+00	mg/kg	2.35E+00	mg/kg	M	3.04E-07	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	6.07E-05
	Zinc	1.64E+02	mg/kg	1.64E+02	mg/kg	M	2.11E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	7.04E-05
	(Total)												1.73E-02
Dermal	Arsenic	6.16E+00	mg/kg	6.16E+00	mg/kg	M	2.39E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	7.96E-05
	Barium	1.48E+02	ng/g	1.48E-01	mg/kg	M	1.91E-10	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	3.89E-08
	Beryllium	6.90E-01	mg/kg	6.90E-01	mg/kg	M	8.91E-10	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	6.37E-05
	Cadmium	1.22E+00	mg/kg	1.22E+00	mg/kg	M	1.58E-10	mg/kg-day	2.50E-05	mg/kg-day	N/A	N/A	6.30E-06
	Chromium Total	1.65E+02	mg/kg	1.65E+02	mg/kg	M	2.13E-07	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	1.09E-05
	Cobalt	1.79E+01	mg/kg	1.79E+01	mg/kg	M	2.31E-08	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	1.16E-06
	Copper	3.34E+01	mg/kg	3.34E+01	mg/kg	M	4.31E-08	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	1.08E-06
	Iron	2.42E+04	mg/kg	2.42E+04	mg/kg	M	3.13E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	1.04E-04
	Lead	5.41E+01	mg/kg	5.41E+01	mg/kg	M	6.99E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.05E+03	mg/kg	1.05E+03	mg/kg	M	1.36E-06	mg/kg-day	1.87E-03	mg/kg-day	N/A	N/A	7.25E-04
	Mercury	4.40E-01	mg/kg	4.40E-01	mg/kg	M	5.68E-10	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.89E-06
	Nickel	2.62E+01	mg/kg	2.62E+01	mg/kg	M	3.38E-08	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	4.23E-05
	Selenium	2.35E+00	mg/kg	2.35E+00	mg/kg	M	3.04E-09	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	6.07E-07
	Zinc	1.64E+02	mg/kg	1.64E+02	mg/kg	M	2.11E-07	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	7.04E-07
	(Total)												1.04E-03

TABLE B.1.11.CT

CALCULATION OF NON-CANCER HAZARDS FOR FUTURE CONSTRUCTION/ UTILITY WORKER EXPOSURE TO SOIL
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Inhalation	Arsenic	6.16E+00	mg/kg	6.16E+00	mg/kg	M	3.39E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Barium	1.48E+02	mg/kg	1.48E+02	mg/kg	M	8.13E-09	mg/kg-day	1.40E-04	mg/kg-day	N/A	N/A	5.81E-05
	Beryllium	6.90E-01	mg/kg	6.90E-01	mg/kg	M	3.80E-11	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	6.67E-06
	Cadmium	1.22E+00	mg/kg	1.22E+00	mg/kg	M	6.72E-11	mg/kg-day	5.70E-05	mg/kg-day	N/A	N/A	1.18E-06
	Chromium Total	1.65E+02	mg/kg	1.65E+02	mg/kg	M	9.09E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Cobalt	1.79E+01	mg/kg	1.79E+01	mg/kg	M	9.86E-10	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	1.73E-04
	Copper	3.34E+01	mg/kg	3.34E+01	mg/kg	M	1.84E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Iron	2.42E+04	mg/kg	2.42E+04	mg/kg	M	1.33E-06	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Lead	5.41E+01	mg/kg	5.41E+01	mg/kg	M	2.98E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.05E+03	mg/kg	1.05E+03	mg/kg	M	5.78E-08	mg/kg-day	1.43E-05	mg/kg-day	N/A	N/A	4.04E-03
	Mercury	4.40E-01	mg/kg	4.40E-01	mg/kg	M	2.42E-11	mg/kg-day	8.60E-05	mg/kg-day	N/A	N/A	2.82E-07
	Nickel	2.62E+01	mg/kg	2.62E+01	mg/kg	M	1.44E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Selenium	2.35E+00	mg/kg	2.35E+00	mg/kg	M	1.29E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Zinc	1.64E+02	mg/kg	1.64E+02	mg/kg	M	9.00E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	(Total)												4.28E-03
												Total Hazard Index Across All Exposure Routes/Pathways	2.3E-02

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.11.RME

CALCULATION OF NON-CANCER HAZARDS FOR FUTURE CONSTRUCTION/ UTILITY WORKER EXPOSURE TO SOIL
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Arsenic	7.06E+00	mg/kg	7.06E+00	mg/kg	M	1.82E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	6.08E-03
	Barium	3.36E+02	mg/kg	3.36E+02	mg/kg	M	8.69E-05	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	1.24E-03
	Beryllium	7.90E-01	mg/kg	7.90E-01	mg/kg	M	2.04E-07	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	1.02E-04
	Cadmium	1.52E+00	mg/kg	1.52E+00	mg/kg	M	3.93E-07	mg/kg-day	5.00E-04	mg/kg-day	N/A	N/A	7.86E-04
	Chromium Total	2.58E+02	mg/kg	2.58E+02	mg/kg	M	6.67E-05	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	4.45E-05
	Cobalt	8.89E+01	mg/kg	8.89E+01	mg/kg	M	2.30E-05	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	1.15E-03
	Copper	4.68E+01	mg/kg	4.68E+01	mg/kg	M	1.21E-05	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	3.02E-04
	Iron	3.85E+04	mg/kg	3.85E+04	mg/kg	M	9.95E-03	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	3.32E-02
	Lead	2.26E+02	mg/kg	2.26E+02	mg/kg	M	5.85E-05	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	4.49E+03	mg/kg	4.49E+03	mg/kg	M	1.16E-03	mg/kg-day	4.67E-02	mg/kg-day	N/A	N/A	2.48E-02
	Mercury	8.44E-01	mg/kg	8.44E-01	mg/kg	M	2.18E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	7.27E-04
	Nickel	2.82E+01	mg/kg	2.82E+01	mg/kg	M	7.29E-06	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	3.64E-04
	Selenium	2.88E+00	mg/kg	2.88E+00	mg/kg	M	7.45E-07	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	1.49E-04
	Zinc	2.08E+02	mg/kg	2.08E+02	mg/kg	M	5.37E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	1.79E-04
	(Total)												6.91E-02
Dermal	Arsenic	7.06E+00	mg/kg	7.06E+00	mg/kg	M	1.64E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	5.47E-04
	Barium	3.36E+02	ng/g	3.36E-01	mg/kg	M	2.61E-09	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	5.32E-07
	Beryllium	7.90E-01	mg/kg	7.90E-01	mg/kg	M	6.12E-09	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	4.37E-04
	Cadmium	1.52E+00	mg/kg	1.52E+00	mg/kg	M	1.18E-09	mg/kg-day	2.50E-05	mg/kg-day	N/A	N/A	4.72E-05
	Chromium Total	2.58E+02	mg/kg	2.58E+02	mg/kg	M	2.00E-06	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	1.03E-04
	Cobalt	8.89E+01	mg/kg	8.89E+01	mg/kg	M	6.89E-07	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	3.44E-05
	Copper	4.68E+01	mg/kg	4.68E+01	mg/kg	M	3.62E-07	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	9.06E-06
	Iron	3.85E+04	mg/kg	3.85E+04	mg/kg	M	2.98E-04	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	9.95E-04
	Lead	2.26E+02	mg/kg	2.26E+02	mg/kg	M	1.75E-06	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	4.49E+03	mg/kg	4.49E+03	mg/kg	M	3.48E-05	mg/kg-day	1.87E-03	mg/kg-day	N/A	N/A	1.86E-02
	Mercury	8.44E-01	mg/kg	8.44E-01	mg/kg	M	6.54E-09	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	2.18E-05
	Nickel	2.82E+01	mg/kg	2.82E+01	mg/kg	M	2.19E-07	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	2.73E-04
	Selenium	2.88E+00	mg/kg	2.88E+00	mg/kg	M	2.24E-08	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	4.47E-06
	Zinc	2.08E+02	mg/kg	2.08E+02	mg/kg	M	1.61E-06	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	5.37E-06
	(Total)												2.11E-02

TABLE B.1.11.RME

CALCULATION OF NON-CANCER HAZARDS FOR FUTURE CONSTRUCTION/ UTILITY WORKER EXPOSURE TO SOIL
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Inhalation	Arsenic	7.06E+00	mg/kg	7.06E+00	mg/kg	M	7.78E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Barium	3.36E+02	mg/kg	3.36E+02	mg/kg	M	3.70E-08	mg/kg-day	1.40E-04	mg/kg-day	N/A	N/A	2.65E-04
	Beryllium	7.90E-01	mg/kg	7.90E-01	mg/kg	M	8.70E-11	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	1.53E-05
	Cadmium	1.52E+00	mg/kg	1.52E+00	mg/kg	M	1.68E-10	mg/kg-day	5.70E-05	mg/kg-day	N/A	N/A	2.94E-06
	Chromium Total	2.58E+02	mg/kg	2.58E+02	mg/kg	M	2.84E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Cobalt	8.89E+01	mg/kg	8.89E+01	mg/kg	M	9.79E-09	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	1.72E-03
	Copper	4.68E+01	mg/kg	4.68E+01	mg/kg	M	5.15E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Iron	3.85E+04	mg/kg	3.85E+04	mg/kg	M	4.24E-06	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Lead	2.26E+02	mg/kg	2.26E+02	mg/kg	M	2.49E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	4.49E+03	mg/kg	4.49E+03	mg/kg	M	4.94E-07	mg/kg-day	1.43E-05	mg/kg-day	N/A	N/A	3.46E-02
	Mercury	8.44E-01	mg/kg	8.44E-01	mg/kg	M	9.29E-11	mg/kg-day	8.60E-05	mg/kg-day	N/A	N/A	1.08E-06
	Nickel	2.82E+01	mg/kg	2.82E+01	mg/kg	M	3.11E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Selenium	2.88E+00	mg/kg	2.88E+00	mg/kg	M	3.18E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Zinc	2.08E+02	mg/kg	2.08E+02	mg/kg	M	2.29E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	(Total)												3.66E-02
												Total Hazard Index Across All Exposure Routes/Pathways	1.3E-01

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.12.CT

CALCULATION OF NON-CANCER HAZARDS FOR FUTURE CONSTRUCTION/ UTILITY WORKER EXPOSURE TO SLAG
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Slag
Exposure Medium: Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Aluminum	1.81E+04	mg/kg	1.81E+04	mg/kg	M	2.34E-03	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	2.34E-03
	Arsenic	6.38E+00	mg/kg	6.38E+00	mg/kg	M	8.24E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	2.75E-03
	Barium	1.29E+02	mg/kg	1.29E+02	mg/kg	M	1.66E-05	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	2.38E-04
	Beryllium	6.07E-01	mg/kg	6.07E-01	mg/kg	M	7.84E-08	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	3.92E-05
	Cadmium	3.40E+00	mg/kg	3.40E+00	mg/kg	M	4.39E-07	mg/kg-day	5.00E-04	mg/kg-day	N/A	N/A	8.78E-04
	Chromium Total	2.30E+03	mg/kg	2.30E+03	mg/kg	M	2.97E-04	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	1.98E-04
	Chromium VI (Hexavalent)	3.15E+01	mg/kg	3.15E+01	mg/kg	M	4.07E-06	mg/kg-day	3.00E-03	mg/kg-day	N/A	N/A	1.36E-03
	Cobalt	1.29E+01	mg/kg	1.29E+01	mg/kg	M	1.67E-06	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	8.35E-05
	Copper	1.76E+02	mg/kg	1.76E+02	mg/kg	M	2.27E-05	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	5.68E-04
	Iron	1.64E+04	mg/kg	1.64E+04	mg/kg	M	2.12E-03	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	7.06E-03
	Lead	5.67E+01	mg/kg	5.67E+01	mg/kg	M	7.33E-06	mg/kg-day	–	mg/kg-day	N/A	N/A	NC
	Manganese	3.45E+03	mg/kg	3.45E+03	mg/kg	M	4.46E-04	mg/kg-day	4.67E-02	mg/kg-day	N/A	N/A	9.55E-03
	Mercury	7.90E-02	mg/kg	7.90E-02	mg/kg	M	1.02E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	3.40E-05
	Nickel	4.30E+02	mg/kg	4.30E+02	mg/kg	M	5.55E-05	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	2.77E-03
	Selenium	5.80E+00	mg/kg	5.80E+00	mg/kg	M	7.49E-07	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	1.50E-04
	Thallium	5.71E+00	mg/kg	5.71E+00	mg/kg	M	7.37E-07	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	1.05E-02
	Vanadium	6.57E+01	mg/kg	6.57E+01	mg/kg	M	8.48E-06	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	8.48E-03
	Zinc	1.29E+02	mg/kg	1.29E+02	mg/kg	M	1.66E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	5.53E-05
	(Total)												4.71E-02
Dermal	Aluminum	1.81E+04	mg/kg	1.81E+04	mg/kg	M	2.34E-05	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	2.34E-05
	Arsenic	6.38E+00	mg/kg	6.38E+00	mg/kg	M	2.47E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	8.24E-05
	Barium	1.29E+02	ng/g	1.29E-01	mg/kg	M	1.66E-10	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	3.40E-08
	Beryllium	6.07E-01	mg/kg	6.07E-01	mg/kg	M	7.84E-10	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	5.60E-05
	Cadmium	3.40E+00	mg/kg	3.40E+00	mg/kg	M	4.39E-10	mg/kg-day	2.50E-05	mg/kg-day	N/A	N/A	1.76E-05
	Chromium Total	2.30E+03	mg/kg	2.30E+03	mg/kg	M	2.97E-06	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	1.52E-04
	Chromium VI (Hexavalent)	3.15E+01	mg/kg	3.15E+01	mg/kg	M	4.07E-08	mg/kg-day	7.50E-05	mg/kg-day	N/A	N/A	5.42E-04
	Cobalt	1.29E+01	mg/kg	1.29E+01	mg/kg	M	1.67E-08	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	8.35E-07
	Copper	1.76E+02	mg/kg	1.76E+02	mg/kg	M	2.27E-07	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	5.68E-06
	Iron	1.64E+04	mg/kg	1.64E+04	mg/kg	M	2.12E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	7.06E-05
	Lead	5.67E+01	mg/kg	5.67E+01	mg/kg	M	7.33E-08	mg/kg-day	–	mg/kg-day	N/A	N/A	NC
	Manganese	3.45E+03	mg/kg	3.45E+03	mg/kg	M	4.46E-06	mg/kg-day	1.87E-03	mg/kg-day	N/A	N/A	2.38E-03
	Mercury	7.90E-02	mg/kg	7.90E-02	mg/kg	M	1.02E-10	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	3.40E-07
	Nickel	4.30E+02	mg/kg	4.30E+02	mg/kg	M	5.55E-07	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	6.94E-04
	Selenium	5.80E+00	mg/kg	5.80E+00	mg/kg	M	7.49E-09	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	1.50E-06
	Thallium	5.71E+00	mg/kg	5.71E+00	mg/kg	M	7.37E-09	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	1.05E-04
	Vanadium	6.57E+01	mg/kg	6.57E+01	mg/kg	M	8.48E-08	mg/kg-day	2.60E-05	mg/kg-day	N/A	N/A	3.26E-03
	Zinc	1.29E+02	mg/kg	1.29E+02	mg/kg	M	1.66E-07	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	5.53E-07
	(Total)												7.40E-03

TABLE B.1.12.CT

CALCULATION OF NON-CANCER HAZARDS FOR FUTURE CONSTRUCTION/ UTILITY WORKER EXPOSURE TO SLAG
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Slag
Exposure Medium: Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Inhalation	Aluminum	1.81E+04	mg/kg	1.81E+04	mg/kg	M	9.95E-07	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	9.95E-04
	Arsenic	6.38E+00	mg/kg	6.38E+00	mg/kg	M	3.51E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Barium	1.29E+02	mg/kg	1.29E+02	mg/kg	M	7.09E-09	mg/kg-day	1.40E-04	mg/kg-day	N/A	N/A	5.07E-05
	Beryllium	6.07E-01	mg/kg	6.07E-01	mg/kg	M	3.34E-11	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	5.86E-06
	Cadmium	3.40E+00	mg/kg	3.40E+00	mg/kg	M	1.87E-10	mg/kg-day	5.70E-05	mg/kg-day	N/A	N/A	3.28E-06
	Chromium Total	2.30E+03	mg/kg	2.30E+03	mg/kg	M	1.27E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Chromium VI (Hexavalent)	3.15E+01	mg/kg	3.15E+01	mg/kg	M	1.73E-09	mg/kg-day	2.80E-05	mg/kg-day	N/A	N/A	6.19E-05
	Cobalt	1.29E+01	mg/kg	1.29E+01	mg/kg	M	7.12E-10	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	1.25E-04
	Copper	1.76E+02	mg/kg	1.76E+02	mg/kg	M	9.69E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Iron	1.64E+04	mg/kg	1.64E+04	mg/kg	M	9.02E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Lead	5.67E+01	mg/kg	5.67E+01	mg/kg	M	3.12E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	3.45E+03	mg/kg	3.45E+03	mg/kg	M	1.90E-07	mg/kg-day	1.43E-05	mg/kg-day	N/A	N/A	1.33E-02
	Mercury	7.90E-02	mg/kg	7.90E-02	mg/kg	M	4.35E-12	mg/kg-day	8.60E-05	mg/kg-day	N/A	N/A	5.06E-08
	Nickel	4.30E+02	mg/kg	4.30E+02	mg/kg	M	2.37E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Selenium	5.80E+00	mg/kg	5.80E+00	mg/kg	M	3.19E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Thallium	5.71E+00	mg/kg	5.71E+00	mg/kg	M	3.14E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Vanadium	6.57E+01	mg/kg	6.57E+01	mg/kg	M	3.62E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Zinc	1.29E+02	mg/kg	1.29E+02	mg/kg	M	7.08E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	(Total)												1.45E-02
												Total Hazard Index Across All Exposure Routes/Pathways	6.9E-02

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.12.RME

CALCULATION OF NON-CANCER HAZARDS FOR FUTURE CONSTRUCTION/ UTILITY WORKER EXPOSURE TO SLAG
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Slag
Exposure Medium: Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Aluminum	3.45E+04	mg/kg	3.45E+04	mg/kg	M	8.91E-03	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	8.91E-03
	Arsenic	1.08E+01	mg/kg	1.08E+01	mg/kg	M	2.79E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	9.29E-03
	Barium	1.72E+02	mg/kg	1.72E+02	mg/kg	M	4.44E-05	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	6.34E-04
	Beryllium	8.09E-01	mg/kg	8.09E-01	mg/kg	M	2.09E-07	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	1.04E-04
	Cadmium	7.37E+00	mg/kg	7.37E+00	mg/kg	M	1.90E-06	mg/kg-day	5.00E-04	mg/kg-day	N/A	N/A	3.81E-03
	Chromium Total	3.02E+03	mg/kg	3.02E+03	mg/kg	M	7.79E-04	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	5.20E-04
	Chromium VI (Hexavalent)	1.07E+02	mg/kg	1.07E+02	mg/kg	M	2.76E-05	mg/kg-day	3.00E-03	mg/kg-day	N/A	N/A	9.19E-03
	Cobalt	1.90E+01	mg/kg	1.90E+01	mg/kg	M	4.91E-06	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	2.46E-04
	Copper	9.75E+02	mg/kg	9.75E+02	mg/kg	M	2.52E-04	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	6.30E-03
	Iron	2.54E+04	mg/kg	2.54E+04	mg/kg	M	6.56E-03	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	2.19E-02
	Lead	1.33E+02	mg/kg	1.33E+02	mg/kg	M	3.44E-05	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.85E+04	mg/kg	1.85E+04	mg/kg	M	4.77E-03	mg/kg-day	4.67E-02	mg/kg-day	N/A	N/A	1.02E-01
	Mercury	9.32E-02	mg/kg	9.32E-02	mg/kg	M	2.41E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	8.02E-05
	Nickel	1.10E+03	mg/kg	1.10E+03	mg/kg	M	2.83E-04	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	1.42E-02
	Selenium	8.39E+00	mg/kg	8.39E+00	mg/kg	M	2.17E-06	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	4.33E-04
	Thallium	8.76E+00	mg/kg	8.76E+00	mg/kg	M	2.26E-06	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	3.23E-02
	Vanadium	8.16E+01	mg/kg	8.16E+01	mg/kg	M	2.11E-05	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	2.11E-02
	Zinc	2.15E+02	mg/kg	2.15E+02	mg/kg	M	5.55E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	1.85E-04
	(Total)												2.31E-01
Dermal	Aluminum	3.45E+04	mg/kg	3.45E+04	mg/kg	M	2.67E-04	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	2.67E-04
	Arsenic	1.08E+01	mg/kg	1.08E+01	mg/kg	M	2.51E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	8.36E-04
	Barium	1.72E+02	ng/g	1.72E-01	mg/kg	M	1.33E-09	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	2.72E-07
	Beryllium	8.09E-01	mg/kg	8.09E-01	mg/kg	M	6.27E-09	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	4.48E-04
	Cadmium	7.37E+00	mg/kg	7.37E+00	mg/kg	M	5.71E-09	mg/kg-day	2.50E-05	mg/kg-day	N/A	N/A	2.28E-04
	Chromium Total	3.02E+03	mg/kg	3.02E+03	mg/kg	M	2.34E-05	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	1.20E-03
	Chromium VI (Hexavalent)	1.07E+02	mg/kg	1.07E+02	mg/kg	M	8.27E-07	mg/kg-day	7.50E-05	mg/kg-day	N/A	N/A	1.10E-02
	Cobalt	1.90E+01	mg/kg	1.90E+01	mg/kg	M	1.47E-07	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	7.37E-06
	Copper	9.75E+02	mg/kg	9.75E+02	mg/kg	M	7.56E-06	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	1.89E-04
	Iron	2.54E+04	mg/kg	2.54E+04	mg/kg	M	1.97E-04	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	6.56E-04
	Lead	1.33E+02	mg/kg	1.33E+02	mg/kg	M	1.03E-06	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.85E+04	mg/kg	1.85E+04	mg/kg	M	1.43E-04	mg/kg-day	1.87E-03	mg/kg-day	N/A	N/A	7.65E-02
	Mercury	9.32E-02	mg/kg	9.32E-02	mg/kg	M	7.22E-10	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	2.41E-06
	Nickel	1.10E+03	mg/kg	1.10E+03	mg/kg	M	8.50E-06	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	1.06E-02
	Selenium	8.39E+00	mg/kg	8.39E+00	mg/kg	M	6.50E-08	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	1.30E-05
	Thallium	8.76E+00	mg/kg	8.76E+00	mg/kg	M	6.79E-08	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	9.70E-04
	Vanadium	8.16E+01	mg/kg	8.16E+01	mg/kg	M	6.32E-07	mg/kg-day	2.60E-05	mg/kg-day	N/A	N/A	2.43E-02
	Zinc	2.15E+02	mg/kg	2.15E+02	mg/kg	M	1.67E-06	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	5.55E-06
	(Total)												1.27E-01

TABLE B.1.12.RME

CALCULATION OF NON-CANCER HAZARDS FOR FUTURE CONSTRUCTION/ UTILITY WORKER EXPOSURE TO SLAG
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Slag
Exposure Medium: Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Inhalation	Aluminum	3.45E+04	mg/kg	3.45E+04	mg/kg	M	3.80E-06	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	3.80E-03
	Arsenic	1.08E+01	mg/kg	1.08E+01	mg/kg	M	1.19E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Barium	1.72E+02	mg/kg	1.72E+02	mg/kg	M	1.89E-08	mg/kg-day	1.40E-04	mg/kg-day	N/A	N/A	1.35E-04
	Beryllium	8.09E-01	mg/kg	8.09E-01	mg/kg	M	8.91E-11	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	1.56E-05
	Cadmium	7.37E+00	mg/kg	7.37E+00	mg/kg	M	8.12E-10	mg/kg-day	5.70E-05	mg/kg-day	N/A	N/A	1.42E-05
	Chromium Total	3.02E+03	mg/kg	3.02E+03	mg/kg	M	3.32E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Chromium VI (Hexavalent)	1.07E+02	mg/kg	1.07E+02	mg/kg	M	1.18E-08	mg/kg-day	2.80E-05	mg/kg-day	N/A	N/A	4.20E-04
	Cobalt	1.90E+01	mg/kg	1.90E+01	mg/kg	M	2.09E-09	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	3.67E-04
	Copper	9.75E+02	mg/kg	9.75E+02	mg/kg	M	1.07E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Iron	2.54E+04	mg/kg	2.54E+04	mg/kg	M	2.80E-06	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Lead	1.33E+02	mg/kg	1.33E+02	mg/kg	M	1.47E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.85E+04	mg/kg	1.85E+04	mg/kg	M	2.03E-06	mg/kg-day	1.43E-05	mg/kg-day	N/A	N/A	1.42E-01
	Mercury	9.32E-02	mg/kg	9.32E-02	mg/kg	M	1.03E-11	mg/kg-day	8.60E-05	mg/kg-day	N/A	N/A	1.19E-07
	Nickel	1.10E+03	mg/kg	1.10E+03	mg/kg	M	1.21E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Selenium	8.39E+00	mg/kg	8.39E+00	mg/kg	M	9.24E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Thallium	8.76E+00	mg/kg	8.76E+00	mg/kg	M	9.65E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Vanadium	8.16E+01	mg/kg	8.16E+01	mg/kg	M	8.98E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Zinc	2.15E+02	mg/kg	2.15E+02	mg/kg	M	2.37E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	(Total)												1.47E-01
												Total Hazard Index Across All Exposure Routes/Pathways	5.1E-01

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.13.CT

CALCULATION OF NON-CANCER HAZARDS FOR FUTURE CONSTRUCTION/ UTILITY WORKER EXPOSURE TO GROUNDWATER
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Ingestion and Dermal
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Aluminum	9.21E+00	mg/L	9.21E+00	mg/L	M	1.80E-05	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	1.80E-05
	Antimony	1.00E-02	mg/L	1.00E-02	mg/L	M	1.96E-08	mg/kg-day	4.00E-04	mg/kg-day	N/A	N/A	4.89E-05
	Arsenic	2.21E-02	mg/L	2.21E-02	mg/L	M	4.32E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.44E-04
	Chromium	5.10E-02	mg/L	5.10E-02	mg/L	M	9.98E-08	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	6.65E-08
	Chromium VI (Hexavalent)	2.50E-02	mg/L	2.50E-02	mg/L	M	4.89E-08	mg/kg-day	3.00E-03	mg/kg-day	N/A	N/A	1.63E-05
	Iron	9.50E+00	mg/L	9.50E+00	mg/L	M	1.86E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	6.20E-05
	Lead	3.90E-02	mg/L	3.90E-02	mg/L	M	7.63E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	4.76E-01	mg/L	4.76E-01	mg/L	M	9.32E-07	mg/kg-day	4.67E-02	mg/kg-day	N/A	N/A	2.00E-05
	Selenium	2.77E-02	mg/L	2.77E-02	mg/L	M	5.42E-08	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	1.08E-05
	Thallium	1.58E-02	mg/L	1.58E-02	mg/L	M	3.09E-08	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	4.42E-04
	Vanadium	2.31E-02	mg/L	2.31E-02	mg/L	M	4.52E-08	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	4.52E-05
	Zinc	2.14E-01	mg/L	2.14E-01	mg/L	M	4.19E-07	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	1.40E-06
	(Total)												8.09E-04
Dermal	Aluminum	9.21E+00	mg/L	9.21E+00	mg/L	M	1.19E-05	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	1.19E-05
	Antimony	1.00E-02	mg/L	1.00E-02	mg/L	M	1.29E-08	mg/kg-day	6.00E-05	mg/kg-day	N/A	N/A	2.15E-04
	Arsenic	2.21E-02	mg/L	2.21E-02	mg/L	M	2.85E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	9.51E-05
	Chromium	5.10E-02	mg/L	5.10E-02	mg/L	M	6.59E-08	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	3.38E-06
	Chromium VI (Hexavalent)	2.50E-02	mg/L	2.50E-02	mg/L	M	6.46E-08	mg/kg-day	7.50E-05	mg/kg-day	N/A	N/A	8.61E-04
	Iron	9.50E+00	mg/L	9.50E+00	mg/L	M	1.23E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	4.09E-05
	Lead	3.90E-02	mg/L	3.90E-02	mg/L	M	5.04E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	4.76E-01	mg/L	4.76E-01	mg/L	M	6.15E-07	mg/kg-day	1.87E-03	mg/kg-day	N/A	N/A	3.29E-04
	Selenium	2.77E-02	mg/L	2.77E-02	mg/L	M	3.58E-08	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	7.16E-06
	Thallium	1.58E-02	mg/L	1.58E-02	mg/L	M	2.04E-08	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	2.92E-04
	Vanadium	2.31E-02	mg/L	2.31E-02	mg/L	M	2.98E-08	mg/kg-day	2.60E-05	mg/kg-day	N/A	N/A	1.15E-03
	Zinc	2.14E-01	mg/L	2.14E-01	mg/L	M	1.66E-07	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	5.53E-07
	(Total)												3.00E-03
												Total Hazard Index Across All Exposure Routes/Pathways	3.8E-03

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.13.RME

CALCULATION OF NON-CANCER HAZARDS FOR FUTURE CONSTRUCTION/ UTILITY WORKER EXPOSURE TO GROUNDWATER
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Ingestion and Dermal
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Aluminum	2.33E+01	mg/L	2.33E+01	mg/L	M	1.83E-04	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	1.83E-04
	Antimony	1.07E-02	mg/L	1.07E-02	mg/L	M	8.34E-08	mg/kg-day	4.00E-04	mg/kg-day	N/A	N/A	2.09E-04
	Arsenic	2.57E-02	mg/L	2.57E-02	mg/L	M	2.01E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	6.71E-04
	Chromium	1.53E-01	mg/L	1.53E-01	mg/L	M	1.20E-06	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	8.00E-07
	Chromium VI (Hexavalent)	3.52E-02	mg/L	3.52E-02	mg/L	M	2.75E-07	mg/kg-day	3.00E-03	mg/kg-day	N/A	N/A	9.18E-05
	Iron	1.58E+01	mg/L	1.58E+01	mg/L	M	1.24E-04	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	4.13E-04
	Lead	6.12E-02	mg/L	6.12E-02	mg/L	M	4.79E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	7.06E-01	mg/L	7.06E-01	mg/L	M	5.52E-06	mg/kg-day	4.67E-02	mg/kg-day	N/A	N/A	1.18E-04
	Selenium	3.33E-02	mg/L	3.33E-02	mg/L	M	2.61E-07	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	5.21E-05
	Thallium	1.58E-02	mg/L	1.58E-02	mg/L	M	1.24E-07	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	1.77E-03
	Vanadium	6.44E-02	mg/L	6.44E-02	mg/L	M	5.04E-07	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	5.04E-04
	Zinc	3.45E-01	mg/L	3.45E-01	mg/L	M	2.70E-06	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	8.99E-06
	(Total)												4.02E-03
Dermal	Aluminum	2.33E+01	mg/L	2.33E+01	mg/L	M	1.21E-04	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	1.21E-04
	Antimony	1.07E-02	mg/L	1.07E-02	mg/L	M	5.51E-08	mg/kg-day	6.00E-05	mg/kg-day	N/A	N/A	9.18E-04
	Arsenic	2.57E-02	mg/L	2.57E-02	mg/L	M	1.33E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	4.43E-04
	Chromium	1.53E-01	mg/L	1.53E-01	mg/L	M	7.92E-07	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	4.06E-05
	Chromium VI (Hexavalent)	3.52E-02	mg/L	3.52E-02	mg/L	M	3.63E-07	mg/kg-day	7.50E-05	mg/kg-day	N/A	N/A	4.85E-03
	Iron	1.58E+01	mg/L	1.58E+01	mg/L	M	8.18E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	2.73E-04
	Lead	6.12E-02	mg/L	6.12E-02	mg/L	M	3.16E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	7.06E-01	mg/L	7.06E-01	mg/L	M	3.64E-06	mg/kg-day	1.87E-03	mg/kg-day	N/A	N/A	1.95E-03
	Selenium	3.33E-02	mg/L	3.33E-02	mg/L	M	1.72E-07	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	3.44E-05
	Thallium	1.58E-02	mg/L	1.58E-02	mg/L	M	8.16E-08	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	1.17E-03
	Vanadium	6.44E-02	mg/L	6.44E-02	mg/L	M	3.33E-07	mg/kg-day	2.60E-05	mg/kg-day	N/A	N/A	1.28E-02
	Zinc	3.45E-01	mg/L	3.45E-01	mg/L	M	1.07E-06	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	3.56E-06
	(Total)												2.26E-02
												Total Hazard Index Across All Exposure Routes/Pathways	2.7E-02

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.14.CT

CALCULATION OF NON-CANCER HAZARDS FOR CURRENT MAINTENANCE WORKER EXPOSURE TO SURFACE WATER
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Ingestion and Dermal
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Aluminum	2.39E+00	mg/L	2.39E+00	mg/L	M	1.87E-06	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	1.87E-06
	Antimony	1.50E-02	mg/L	1.50E-02	mg/L	M	1.17E-08	mg/kg-day	4.00E-04	mg/kg-day	N/A	N/A	2.94E-05
	Arsenic	1.96E-02	mg/L	1.96E-02	mg/L	M	1.53E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	5.10E-05
	Barium	1.90E-01	mg/L	1.90E-01	mg/L	M	1.49E-07	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	2.12E-06
	Beryllium	3.04E-03	mg/L	3.04E-03	mg/L	M	2.38E-09	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	1.19E-06
	Chromium	2.80E-01	mg/L	2.80E-01	mg/L	M	2.19E-07	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	1.46E-07
	Chromium VI (Hexavalent)	6.30E-02	mg/L	6.30E-02	mg/L	M	4.93E-08	mg/kg-day	3.00E-03	mg/kg-day	N/A	N/A	1.64E-05
	Copper	4.20E-02	mg/L	4.20E-02	mg/L	M	3.29E-08	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	8.22E-07
	Iron	5.30E+00	mg/L	5.30E+00	mg/L	M	4.15E-06	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	1.38E-05
	Lead	3.00E-02	mg/L	3.00E-02	mg/L	M	2.35E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	7.19E-01	mg/L	7.19E-01	mg/L	M	5.63E-07	mg/kg-day	4.67E-02	mg/kg-day	N/A	N/A	1.21E-05
	Mercury	3.60E-04	mg/L	3.60E-04	mg/L	M	2.82E-10	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	9.39E-07
	Nickel	2.40E-02	mg/L	2.40E-02	mg/L	M	1.88E-08	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	9.39E-07
	Selenium	2.30E-02	mg/L	2.30E-02	mg/L	M	1.80E-08	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	3.60E-06
	Thallium	2.90E-02	mg/L	2.90E-02	mg/L	M	2.27E-08	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	3.24E-04
	Vanadium	2.10E-02	mg/L	2.10E-02	mg/L	M	1.64E-08	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	1.64E-05
	Zinc	9.93E-02	mg/L	9.93E-02	mg/L	M	7.77E-08	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	2.59E-07
	(Total)												4.75E-04
Dermal	Aluminum	2.39E+00	mg/L	2.39E+00	mg/L	M	1.23E-06	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	1.23E-06
	Antimony	1.50E-02	mg/L	1.50E-02	mg/L	M	7.75E-09	mg/kg-day	6.00E-05	mg/kg-day	N/A	N/A	1.29E-04
	Arsenic	1.96E-02	mg/L	1.96E-02	mg/L	M	1.01E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	3.37E-05
	Barium	1.90E-01	mg/L	1.90E-01	mg/L	M	9.81E-08	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	2.00E-05
	Beryllium	3.04E-03	mg/L	3.04E-03	mg/L	M	1.57E-09	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	1.12E-04
	Chromium	2.80E-01	mg/L	2.80E-01	mg/L	M	1.45E-07	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	7.42E-06
	Chromium VI (Hexavalent)	6.30E-02	mg/L	6.30E-02	mg/L	M	6.51E-08	mg/kg-day	7.50E-05	mg/kg-day	N/A	N/A	8.68E-04
	Copper	4.20E-02	mg/L	4.20E-02	mg/L	M	2.17E-08	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	5.42E-07
	Iron	5.30E+00	mg/L	5.30E+00	mg/L	M	2.74E-06	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	9.13E-06
	Lead	3.00E-02	mg/L	3.00E-02	mg/L	M	1.55E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	7.19E-01	mg/L	7.19E-01	mg/L	M	3.72E-07	mg/kg-day	1.87E-03	mg/kg-day	N/A	N/A	1.99E-04
	Mercury	3.60E-04	mg/L	3.60E-04	mg/L	M	1.86E-10	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	6.20E-07
	Nickel	2.40E-02	mg/L	2.40E-02	mg/L	M	2.48E-09	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	3.10E-06
	Selenium	2.30E-02	mg/L	2.30E-02	mg/L	M	1.19E-08	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	2.38E-06
	Thallium	2.90E-02	mg/L	2.90E-02	mg/L	M	1.50E-08	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	2.14E-04
	Vanadium	2.10E-02	mg/L	2.10E-02	mg/L	M	1.08E-08	mg/kg-day	2.60E-05	mg/kg-day	N/A	N/A	4.17E-04
	Zinc	9.93E-02	mg/L	9.93E-02	mg/L	M	3.08E-08	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	1.03E-07
	(Total)												2.02E-03

Total Hazard Index Across All Exposure Routes/Pathways 2.5E-03

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.14.RME

CALCULATION OF NON-CANCER HAZARDS FOR CURRENT MAINTENANCE WORKER EXPOSURE TO SURFACE WATER
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Ingestion and Dermal
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Aluminum	5.74E+00	mg/L	5.74E+00	mg/L	M	1.80E-05	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	1.80E-05
	Antimony	1.69E-02	mg/L	1.69E-02	mg/L	M	5.29E-08	mg/kg-day	4.00E-04	mg/kg-day	N/A	N/A	1.32E-04
	Arsenic	2.26E-02	mg/L	2.26E-02	mg/L	M	7.07E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	2.36E-04
	Barium	3.37E-01	mg/L	3.37E-01	mg/L	M	1.05E-06	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	1.51E-05
	Beryllium	3.04E-03	mg/L	3.04E-03	mg/L	M	9.52E-09	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	4.76E-06
	Chromium	6.84E-01	mg/L	6.84E-01	mg/L	M	2.14E-06	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	1.43E-06
	Chromium VI (Hexavalent)	1.02E-01	mg/L	1.02E-01	mg/L	M	3.20E-07	mg/kg-day	3.00E-03	mg/kg-day	N/A	N/A	1.07E-04
	Copper	2.66E-01	mg/L	2.66E-01	mg/L	M	8.33E-07	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	2.08E-05
	Iron	3.15E+01	mg/L	3.15E+01	mg/L	M	9.87E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	3.29E-04
	Lead	1.84E-01	mg/L	1.84E-01	mg/L	M	5.77E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.91E+00	mg/L	1.91E+00	mg/L	M	5.98E-06	mg/kg-day	4.67E-02	mg/kg-day	N/A	N/A	1.28E-04
	Mercury	4.00E-04	mg/L	4.00E-04	mg/L	M	1.25E-09	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	4.17E-06
	Nickel	1.44E-01	mg/L	1.44E-01	mg/L	M	4.50E-07	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	2.25E-05
	Selenium	2.58E-02	mg/L	2.58E-02	mg/L	M	8.07E-08	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	1.61E-05
	Thallium	3.42E-02	mg/L	3.42E-02	mg/L	M	1.07E-07	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	1.53E-03
	Vanadium	2.84E-02	mg/L	2.84E-02	mg/L	M	8.90E-08	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	8.90E-05
	Zinc	2.66E-01	mg/L	2.66E-01	mg/L	M	8.33E-07	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	2.78E-06
	(Total)												2.66E-03
Dermal	Aluminum	5.74E+00	mg/L	5.74E+00	mg/L	M	1.19E-05	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	1.19E-05
	Antimony	1.69E-02	mg/L	1.69E-02	mg/L	M	3.49E-08	mg/kg-day	6.00E-05	mg/kg-day	N/A	N/A	5.82E-04
	Arsenic	2.26E-02	mg/L	2.26E-02	mg/L	M	4.66E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.55E-04
	Barium	3.37E-01	mg/L	3.37E-01	mg/L	M	6.96E-07	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	1.42E-04
	Beryllium	3.04E-03	mg/L	3.04E-03	mg/L	M	6.28E-09	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	4.49E-04
	Chromium	6.84E-01	mg/L	6.84E-01	mg/L	M	1.41E-06	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	7.25E-05
	Chromium VI (Hexavalent)	1.02E-01	mg/L	1.02E-01	mg/L	M	4.23E-07	mg/kg-day	7.50E-05	mg/kg-day	N/A	N/A	5.64E-03
	Copper	2.66E-01	mg/L	2.66E-01	mg/L	M	5.50E-07	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	1.37E-05
	Iron	3.15E+01	mg/L	3.15E+01	mg/L	M	6.52E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	2.17E-04
	Lead	1.84E-01	mg/L	1.84E-01	mg/L	M	3.81E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.91E+00	mg/L	1.91E+00	mg/L	M	3.95E-06	mg/kg-day	1.87E-03	mg/kg-day	N/A	N/A	2.11E-03
	Mercury	4.00E-04	mg/L	4.00E-04	mg/L	M	8.27E-10	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	2.76E-06
	Nickel	1.44E-01	mg/L	1.44E-01	mg/L	M	5.94E-08	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	7.43E-05
	Selenium	2.58E-02	mg/L	2.58E-02	mg/L	M	5.33E-08	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	1.07E-05
	Thallium	3.42E-02	mg/L	3.42E-02	mg/L	M	7.07E-08	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	1.01E-03
	Vanadium	2.84E-02	mg/L	2.84E-02	mg/L	M	5.87E-08	mg/kg-day	2.60E-05	mg/kg-day	N/A	N/A	2.26E-03
	Zinc	2.66E-01	mg/L	2.66E-01	mg/L	M	3.30E-07	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	1.10E-06
	(Total)												1.28E-02
												Total Hazard Index Across All Exposure Routes/Pathways	1.5E-02

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.15.CT

CALCULATION OF NON-CANCER HAZARDS FOR CURRENT/FUTURE TRESPASSER EXPOSURE TO SURFACE WATER
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Ingestion and Dermal
Receptor Population: Trespasser
Receptor Age: Adolescent

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Aluminum	2.39E+00	mg/L	2.39E+00	mg/L	M	8.38E-05	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	8.38E-05
	Antimony	1.50E-02	mg/L	1.50E-02	mg/L	M	5.26E-07	mg/kg-day	4.00E-04	mg/kg-day	N/A	N/A	1.32E-03
	Arsenic	1.96E-02	mg/L	1.96E-02	mg/L	M	6.86E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	2.29E-03
	Barium	1.90E-01	mg/L	1.90E-01	mg/L	M	6.66E-06	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	9.51E-05
	Beryllium	3.04E-03	mg/L	3.04E-03	mg/L	M	1.07E-07	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	5.33E-05
	Chromium	2.80E-01	mg/L	2.80E-01	mg/L	M	9.83E-06	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	6.55E-06
	Chromium VI (Hexavalent)	6.30E-02	mg/L	6.30E-02	mg/L	M	2.21E-06	mg/kg-day	3.00E-03	mg/kg-day	N/A	N/A	7.36E-04
	Copper	4.20E-02	mg/L	4.20E-02	mg/L	M	1.47E-06	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	3.68E-05
	Iron	5.30E+00	mg/L	5.30E+00	mg/L	M	1.86E-04	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	6.20E-04
	Lead	3.00E-02	mg/L	3.00E-02	mg/L	M	1.05E-06	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	7.19E-01	mg/L	7.19E-01	mg/L	M	2.52E-05	mg/kg-day	4.67E-02	mg/kg-day	N/A	N/A	5.40E-04
	Mercury	3.60E-04	mg/L	3.60E-04	mg/L	M	1.26E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	4.21E-05
	Nickel	2.40E-02	mg/L	2.40E-02	mg/L	M	8.42E-07	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	4.21E-05
	Selenium	2.30E-02	mg/L	2.30E-02	mg/L	M	8.07E-07	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	1.61E-04
	Thallium	2.90E-02	mg/L	2.90E-02	mg/L	M	1.02E-06	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	1.45E-02
	Vanadium	2.10E-02	mg/L	2.10E-02	mg/L	M	7.36E-07	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	7.36E-04
	Zinc	9.93E-02	mg/L	9.93E-02	mg/L	M	3.48E-06	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	1.16E-05
	(Total)												2.13E-02
Dermal	Aluminum	2.39E+00	mg/L	2.39E+00	mg/L	M	7.37E-05	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	7.37E-05
	Antimony	1.50E-02	mg/L	1.50E-02	mg/L	M	4.63E-07	mg/kg-day	6.00E-05	mg/kg-day	N/A	N/A	7.72E-03
	Arsenic	1.96E-02	mg/L	1.96E-02	mg/L	M	6.04E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	2.01E-03
	Barium	1.90E-01	mg/L	1.90E-01	mg/L	M	5.86E-06	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	1.20E-03
	Beryllium	3.04E-03	mg/L	3.04E-03	mg/L	M	9.38E-08	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	6.70E-03
	Chromium	2.80E-01	mg/L	2.80E-01	mg/L	M	8.65E-06	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	4.43E-04
	Chromium VI (Hexavalent)	6.30E-02	mg/L	6.30E-02	mg/L	M	3.89E-06	mg/kg-day	7.50E-05	mg/kg-day	N/A	N/A	5.18E-02
	Copper	4.20E-02	mg/L	4.20E-02	mg/L	M	1.30E-06	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	3.24E-05
	Iron	5.30E+00	mg/L	5.30E+00	mg/L	M	1.64E-04	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	5.45E-04
	Lead	3.00E-02	mg/L	3.00E-02	mg/L	M	9.26E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	7.19E-01	mg/L	7.19E-01	mg/L	M	2.22E-05	mg/kg-day	1.87E-03	mg/kg-day	N/A	N/A	1.19E-02
	Mercury	3.60E-04	mg/L	3.60E-04	mg/L	M	1.11E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	3.70E-05
	Nickel	2.40E-02	mg/L	2.40E-02	mg/L	M	1.48E-07	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	1.85E-04
	Selenium	2.30E-02	mg/L	2.30E-02	mg/L	M	7.10E-07	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	1.42E-04
	Thallium	2.90E-02	mg/L	2.90E-02	mg/L	M	8.95E-07	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	1.28E-02
	Vanadium	2.10E-02	mg/L	2.10E-02	mg/L	M	6.48E-07	mg/kg-day	2.60E-05	mg/kg-day	N/A	N/A	2.49E-02
	Zinc	9.93E-02	mg/L	9.93E-02	mg/L	M	1.84E-06	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	6.13E-06
	(Total)												1.21E-01
												Total Hazard Index Across All Exposure Routes/Pathways	1.4E-01

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.15.RME

CALCULATION OF NON-CANCER HAZARDS FOR CURRENT/FUTURE TRESPASSER EXPOSURE TO SURFACE WATER
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Ingestion and Dermal
Receptor Population: Trespasser
Receptor Age: Adolescent

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Aluminum	5.74E+00	mg/L	5.74E+00	mg/L	M	8.06E-04	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	8.06E-04
	Antimony	1.69E-02	mg/L	1.69E-02	mg/L	M	2.37E-06	mg/kg-day	4.00E-04	mg/kg-day	N/A	N/A	5.93E-03
	Arsenic	2.26E-02	mg/L	2.26E-02	mg/L	M	3.17E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.06E-02
	Barium	3.37E-01	mg/L	3.37E-01	mg/L	M	4.72E-05	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	6.75E-04
	Beryllium	3.04E-03	mg/L	3.04E-03	mg/L	M	4.26E-07	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	2.13E-04
	Chromium	6.84E-01	mg/L	6.84E-01	mg/L	M	9.60E-05	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	6.40E-05
	Chromium VI (Hexavalent)	1.02E-01	mg/L	1.02E-01	mg/L	M	1.44E-05	mg/kg-day	3.00E-03	mg/kg-day	N/A	N/A	4.78E-03
	Copper	2.66E-01	mg/L	2.66E-01	mg/L	M	3.73E-05	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	9.33E-04
	Iron	3.15E+01	mg/L	3.15E+01	mg/L	M	4.42E-03	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	1.47E-02
	Lead	1.84E-01	mg/L	1.84E-01	mg/L	M	2.59E-05	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.91E+00	mg/L	1.91E+00	mg/L	M	2.68E-04	mg/kg-day	4.67E-02	mg/kg-day	N/A	N/A	5.74E-03
	Mercury	4.00E-04	mg/L	4.00E-04	mg/L	M	5.61E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.87E-04
	Nickel	1.44E-01	mg/L	1.44E-01	mg/L	M	2.02E-05	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	1.01E-03
	Selenium	2.58E-02	mg/L	2.58E-02	mg/L	M	3.62E-06	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	7.23E-04
	Thallium	3.42E-02	mg/L	3.42E-02	mg/L	M	4.80E-06	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	6.85E-02
	Vanadium	2.84E-02	mg/L	2.84E-02	mg/L	M	3.99E-06	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	3.99E-03
	Zinc	2.66E-01	mg/L	2.66E-01	mg/L	M	3.73E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	1.24E-04
	(Total)												1.19E-01
Dermal	Aluminum	5.74E+00	mg/L	5.74E+00	mg/L	M	7.09E-04	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	7.09E-04
	Antimony	1.69E-02	mg/L	1.69E-02	mg/L	M	2.09E-06	mg/kg-day	6.00E-05	mg/kg-day	N/A	N/A	3.48E-02
	Arsenic	2.26E-02	mg/L	2.26E-02	mg/L	M	2.79E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	9.29E-03
	Barium	3.37E-01	mg/L	3.37E-01	mg/L	M	4.16E-05	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	8.48E-03
	Beryllium	3.04E-03	mg/L	3.04E-03	mg/L	M	3.75E-07	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	2.68E-02
	Chromium	6.84E-01	mg/L	6.84E-01	mg/L	M	8.45E-05	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	4.33E-03
	Chromium VI (Hexavalent)	1.02E-01	mg/L	1.02E-01	mg/L	M	2.53E-05	mg/kg-day	7.50E-05	mg/kg-day	N/A	N/A	3.37E-01
	Copper	2.66E-01	mg/L	2.66E-01	mg/L	M	3.28E-05	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	8.21E-04
	Iron	3.15E+01	mg/L	3.15E+01	mg/L	M	3.89E-03	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	1.30E-02
	Lead	1.84E-01	mg/L	1.84E-01	mg/L	M	2.28E-05	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.91E+00	mg/L	1.91E+00	mg/L	M	2.36E-04	mg/kg-day	1.87E-03	mg/kg-day	N/A	N/A	1.26E-01
	Mercury	4.00E-04	mg/L	4.00E-04	mg/L	M	4.94E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.65E-04
	Nickel	1.44E-01	mg/L	1.44E-01	mg/L	M	3.55E-06	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	4.44E-03
	Selenium	2.58E-02	mg/L	2.58E-02	mg/L	M	3.18E-06	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	6.36E-04
	Thallium	3.42E-02	mg/L	3.42E-02	mg/L	M	4.22E-06	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	6.03E-02
	Vanadium	2.84E-02	mg/L	2.84E-02	mg/L	M	3.51E-06	mg/kg-day	2.60E-05	mg/kg-day	N/A	N/A	1.35E-01
	Zinc	2.66E-01	mg/L	2.66E-01	mg/L	M	1.97E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	6.57E-05
	(Total)												7.62E-01
												Total Hazard Index Across All Exposure Routes/Pathways	8.8E-01

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1:16.CT

CALCULATION OF NON-CANCER HAZARDS FOR FUTURE INDUSTRIAL/ COMMERCIAL WORKER EXPOSURE TO SURFACE WATER
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Ingestion and Dermal
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Aluminum	2.39E+00	mg/L	2.39E+00	mg/L	M	5.12E-05	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	5.12E-05
	Antimony	1.50E-02	mg/L	1.50E-02	mg/L	M	3.21E-07	mg/kg-day	4.00E-04	mg/kg-day	N/A	N/A	8.04E-04
	Arsenic	1.96E-02	mg/L	1.96E-02	mg/L	M	4.19E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.40E-03
	Barium	1.90E-01	mg/L	1.90E-01	mg/L	M	4.07E-06	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	5.81E-05
	Beryllium	3.04E-03	mg/L	3.04E-03	mg/L	M	6.51E-08	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	3.26E-05
	Chromium	2.80E-01	mg/L	2.80E-01	mg/L	M	6.00E-06	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	4.00E-06
	Chromium VI (Hexavalent)	6.30E-02	mg/L	6.30E-02	mg/L	M	1.35E-06	mg/kg-day	3.00E-03	mg/kg-day	N/A	N/A	4.50E-04
	Copper	4.20E-02	mg/L	4.20E-02	mg/L	M	9.00E-07	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	2.25E-05
	Iron	5.30E+00	mg/L	5.30E+00	mg/L	M	1.14E-04	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	3.79E-04
	Lead	3.00E-02	mg/L	3.00E-02	mg/L	M	6.43E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	7.19E-01	mg/L	7.19E-01	mg/L	M	1.54E-05	mg/kg-day	4.67E-02	mg/kg-day	N/A	N/A	3.30E-04
	Mercury	3.60E-04	mg/L	3.60E-04	mg/L	M	7.71E-09	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	2.57E-05
	Nickel	2.40E-02	mg/L	2.40E-02	mg/L	M	5.14E-07	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	2.57E-05
	Selenium	2.30E-02	mg/L	2.30E-02	mg/L	M	4.93E-07	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	9.86E-05
	Thallium	2.90E-02	mg/L	2.90E-02	mg/L	M	6.21E-07	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	8.88E-03
	Vanadium	2.10E-02	mg/L	2.10E-02	mg/L	M	4.50E-07	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	4.50E-04
	Zinc	9.93E-02	mg/L	9.93E-02	mg/L	M	2.13E-06	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	7.09E-06
	(Total)												1.30E-02
Dermal	Aluminum	2.39E+00	mg/L	2.39E+00	mg/L	M	3.38E-05	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	3.38E-05
	Antimony	1.50E-02	mg/L	1.50E-02	mg/L	M	2.12E-07	mg/kg-day	6.00E-05	mg/kg-day	N/A	N/A	3.54E-03
	Arsenic	1.96E-02	mg/L	1.96E-02	mg/L	M	2.77E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	9.22E-04
	Barium	1.90E-01	mg/L	1.90E-01	mg/L	M	2.68E-06	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	5.48E-04
	Beryllium	3.04E-03	mg/L	3.04E-03	mg/L	M	4.30E-08	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	3.07E-03
	Chromium	2.80E-01	mg/L	2.80E-01	mg/L	M	3.96E-06	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	2.03E-04
	Chromium VI (Hexavalent)	6.30E-02	mg/L	6.30E-02	mg/L	M	1.78E-06	mg/kg-day	7.50E-05	mg/kg-day	N/A	N/A	2.38E-02
	Copper	4.20E-02	mg/L	4.20E-02	mg/L	M	5.94E-07	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	1.49E-05
	Iron	5.30E+00	mg/L	5.30E+00	mg/L	M	7.50E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	2.50E-04
	Lead	3.00E-02	mg/L	3.00E-02	mg/L	M	4.24E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	7.19E-01	mg/L	7.19E-01	mg/L	M	1.02E-05	mg/kg-day	1.87E-03	mg/kg-day	N/A	N/A	5.45E-03
	Mercury	3.60E-04	mg/L	3.60E-04	mg/L	M	5.09E-09	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.70E-05
	Nickel	2.40E-02	mg/L	2.40E-02	mg/L	M	6.79E-08	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	8.49E-05
	Selenium	2.30E-02	mg/L	2.30E-02	mg/L	M	3.25E-07	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	6.51E-05
	Thallium	2.90E-02	mg/L	2.90E-02	mg/L	M	4.10E-07	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	5.86E-03
	Vanadium	2.10E-02	mg/L	2.10E-02	mg/L	M	2.97E-07	mg/kg-day	2.60E-05	mg/kg-day	N/A	N/A	1.14E-02
	Zinc	9.93E-02	mg/L	9.93E-02	mg/L	M	8.42E-07	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	2.81E-06
	(Total)												5.52E-02
												Total Hazard Index Across All Exposure Routes/Pathways	6.8E-02

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.16.RME

CALCULATION OF NON-CANCER HAZARDS FOR FUTURE INDUSTRIAL/ COMMERCIAL WORKER EXPOSURE TO SURFACE WATER
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Ingestion and Dermal
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Aluminum	5.74E+00	mg/L	5.74E+00	mg/L	M	2.81E-04	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	2.81E-04
	Antimony	1.69E-02	mg/L	1.69E-02	mg/L	M	8.27E-07	mg/kg-day	4.00E-04	mg/kg-day	N/A	N/A	2.07E-03
	Arsenic	2.26E-02	mg/L	2.26E-02	mg/L	M	1.10E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	3.68E-03
	Barium	3.37E-01	mg/L	3.37E-01	mg/L	M	1.65E-05	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	2.35E-04
	Beryllium	3.04E-03	mg/L	3.04E-03	mg/L	M	1.49E-07	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	7.44E-05
	Chromium	6.84E-01	mg/L	6.84E-01	mg/L	M	3.35E-05	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	2.23E-05
	Chromium VI (Hexavalent)	1.02E-01	mg/L	1.02E-01	mg/L	M	5.01E-06	mg/kg-day	3.00E-03	mg/kg-day	N/A	N/A	1.67E-03
	Copper	2.66E-01	mg/L	2.66E-01	mg/L	M	1.30E-05	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	3.25E-04
	Iron	3.15E+01	mg/L	3.15E+01	mg/L	M	1.54E-03	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	5.14E-03
	Lead	1.84E-01	mg/L	1.84E-01	mg/L	M	9.02E-06	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.91E+00	mg/L	1.91E+00	mg/L	M	9.35E-05	mg/kg-day	4.67E-02	mg/kg-day	N/A	N/A	2.00E-03
	Mercury	4.00E-04	mg/L	4.00E-04	mg/L	M	1.96E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	6.52E-05
	Nickel	1.44E-01	mg/L	1.44E-01	mg/L	M	7.04E-06	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	3.52E-04
	Selenium	2.58E-02	mg/L	2.58E-02	mg/L	M	1.26E-06	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	2.52E-04
	Thallium	3.42E-02	mg/L	3.42E-02	mg/L	M	1.67E-06	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	2.39E-02
	Vanadium	2.84E-02	mg/L	2.84E-02	mg/L	M	1.39E-06	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	1.39E-03
	Zinc	2.66E-01	mg/L	2.66E-01	mg/L	M	1.30E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	4.34E-05
	(Total)												4.15E-02
Dermal	Aluminum	5.74E+00	mg/L	5.74E+00	mg/L	M	1.85E-04	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	1.85E-04
	Antimony	1.69E-02	mg/L	1.69E-02	mg/L	M	5.46E-07	mg/kg-day	6.00E-05	mg/kg-day	N/A	N/A	9.09E-03
	Arsenic	2.26E-02	mg/L	2.26E-02	mg/L	M	7.29E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	2.43E-03
	Barium	3.37E-01	mg/L	3.37E-01	mg/L	M	1.09E-05	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	2.22E-03
	Beryllium	3.04E-03	mg/L	3.04E-03	mg/L	M	9.82E-08	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	7.01E-03
	Chromium	6.84E-01	mg/L	6.84E-01	mg/L	M	2.21E-05	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	1.13E-03
	Chromium VI (Hexavalent)	1.02E-01	mg/L	1.02E-01	mg/L	M	6.61E-06	mg/kg-day	7.50E-05	mg/kg-day	N/A	N/A	8.81E-02
	Copper	2.66E-01	mg/L	2.66E-01	mg/L	M	8.59E-06	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	2.15E-04
	Iron	3.15E+01	mg/L	3.15E+01	mg/L	M	1.02E-03	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	3.39E-03
	Lead	1.84E-01	mg/L	1.84E-01	mg/L	M	5.95E-06	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.91E+00	mg/L	1.91E+00	mg/L	M	6.17E-05	mg/kg-day	1.87E-03	mg/kg-day	N/A	N/A	3.30E-02
	Mercury	4.00E-04	mg/L	4.00E-04	mg/L	M	1.29E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	4.31E-05
	Nickel	1.44E-01	mg/L	1.44E-01	mg/L	M	9.29E-07	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	1.16E-03
	Selenium	2.58E-02	mg/L	2.58E-02	mg/L	M	8.32E-07	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	1.66E-04
	Thallium	3.42E-02	mg/L	3.42E-02	mg/L	M	1.10E-06	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	1.58E-02
	Vanadium	2.84E-02	mg/L	2.84E-02	mg/L	M	9.18E-07	mg/kg-day	2.60E-05	mg/kg-day	N/A	N/A	3.53E-02
	Zinc	2.66E-01	mg/L	2.66E-01	mg/L	M	5.15E-06	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	1.72E-05
	(Total)												1.99E-01
												Total Hazard Index Across All Exposure Routes/Pathways	2.4E-01

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.17.CT

CALCULATION OF NON-CANCER HAZARDS FOR FUTURE CONSTRUCTION/ UTILITY WORKER EXPOSURE TO SURFACE WATER
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Ingestion and Dermal
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Aluminum	2.39E+00	mg/L	2.39E+00	mg/L	M	4.68E-06	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	4.68E-06
	Antimony	1.50E-02	mg/L	1.50E-02	mg/L	M	2.94E-08	mg/kg-day	4.00E-04	mg/kg-day	N/A	N/A	7.34E-05
	Arsenic	1.96E-02	mg/L	1.96E-02	mg/L	M	3.83E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.28E-04
	Barium	1.90E-01	mg/L	1.90E-01	mg/L	M	3.71E-07	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	5.31E-06
	Beryllium	3.04E-03	mg/L	3.04E-03	mg/L	M	5.95E-09	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	2.97E-06
	Chromium	2.80E-01	mg/L	2.80E-01	mg/L	M	5.48E-07	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	3.66E-07
	Chromium VI (Hexavalent)	6.30E-02	mg/L	6.30E-02	mg/L	M	1.23E-07	mg/kg-day	3.00E-03	mg/kg-day	N/A	N/A	4.11E-05
	Copper	4.20E-02	mg/L	4.20E-02	mg/L	M	8.22E-08	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	2.05E-06
	Iron	5.30E+00	mg/L	5.30E+00	mg/L	M	1.04E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	3.46E-05
	Lead	3.00E-02	mg/L	3.00E-02	mg/L	M	5.87E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	7.19E-01	mg/L	7.19E-01	mg/L	M	1.41E-06	mg/kg-day	4.67E-02	mg/kg-day	N/A	N/A	3.01E-05
	Mercury	3.60E-04	mg/L	3.60E-04	mg/L	M	7.05E-10	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	2.35E-06
	Nickel	2.40E-02	mg/L	2.40E-02	mg/L	M	4.70E-08	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	2.35E-06
	Selenium	2.30E-02	mg/L	2.30E-02	mg/L	M	4.50E-08	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	9.00E-06
	Thallium	2.90E-02	mg/L	2.90E-02	mg/L	M	5.68E-08	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	8.11E-04
	Vanadium	2.10E-02	mg/L	2.10E-02	mg/L	M	4.11E-08	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	4.11E-05
	Zinc	9.93E-02	mg/L	9.93E-02	mg/L	M	1.94E-07	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	6.47E-07
	(Total)												1.19E-03
Dermal	Aluminum	2.39E+00	mg/L	2.39E+00	mg/L	M	3.09E-06	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	3.09E-06
	Antimony	1.50E-02	mg/L	1.50E-02	mg/L	M	1.94E-08	mg/kg-day	6.00E-05	mg/kg-day	N/A	N/A	3.23E-04
	Arsenic	1.96E-02	mg/L	1.96E-02	mg/L	M	2.53E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	8.42E-05
	Barium	1.90E-01	mg/L	1.90E-01	mg/L	M	2.45E-07	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	5.00E-05
	Beryllium	3.04E-03	mg/L	3.04E-03	mg/L	M	3.93E-09	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	2.80E-04
	Chromium	2.80E-01	mg/L	2.80E-01	mg/L	M	3.62E-07	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	1.86E-05
	Chromium VI (Hexavalent)	6.30E-02	mg/L	6.30E-02	mg/L	M	1.63E-07	mg/kg-day	7.50E-05	mg/kg-day	N/A	N/A	2.17E-03
	Copper	4.20E-02	mg/L	4.20E-02	mg/L	M	5.42E-08	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	1.36E-06
	Iron	5.30E+00	mg/L	5.30E+00	mg/L	M	6.85E-06	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	2.28E-05
	Lead	3.00E-02	mg/L	3.00E-02	mg/L	M	3.87E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	7.19E-01	mg/L	7.19E-01	mg/L	M	9.29E-07	mg/kg-day	1.87E-03	mg/kg-day	N/A	N/A	4.97E-04
	Mercury	3.60E-04	mg/L	3.60E-04	mg/L	M	4.65E-10	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.55E-06
	Nickel	2.40E-02	mg/L	2.40E-02	mg/L	M	6.20E-09	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	7.75E-06
	Selenium	2.30E-02	mg/L	2.30E-02	mg/L	M	2.97E-08	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	5.94E-06
	Thallium	2.90E-02	mg/L	2.90E-02	mg/L	M	3.75E-08	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	5.35E-04
	Vanadium	2.10E-02	mg/L	2.10E-02	mg/L	M	2.71E-08	mg/kg-day	2.60E-05	mg/kg-day	N/A	N/A	1.04E-03
	Zinc	9.93E-02	mg/L	9.93E-02	mg/L	M	7.69E-08	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	2.56E-07
	(Total)												5.04E-03
												Total Hazard Index Across All Exposure Routes/Pathways	6.2E-03

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.17.RME

CALCULATION OF NON-CANCER HAZARDS FOR FUTURE CONSTRUCTION/ UTILITY WORKER EXPOSURE TO SURFACE WATER
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Ingestion and Dermal
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Aluminum	5.74E+00	mg/L	5.74E+00	mg/L	M	4.50E-05	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	4.50E-05
	Antimony	1.69E-02	mg/L	1.69E-02	mg/L	M	1.32E-07	mg/kg-day	4.00E-04	mg/kg-day	N/A	N/A	3.31E-04
	Arsenic	2.26E-02	mg/L	2.26E-02	mg/L	M	1.77E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	5.89E-04
	Barium	3.37E-01	mg/L	3.37E-01	mg/L	M	2.63E-06	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	3.76E-05
	Beryllium	3.04E-03	mg/L	3.04E-03	mg/L	M	2.38E-08	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	1.19E-05
	Chromium	6.84E-01	mg/L	6.84E-01	mg/L	M	5.36E-06	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	3.57E-06
	Chromium VI (Hexavalent)	1.02E-01	mg/L	1.02E-01	mg/L	M	8.01E-07	mg/kg-day	3.00E-03	mg/kg-day	N/A	N/A	2.67E-04
	Copper	2.66E-01	mg/L	2.66E-01	mg/L	M	2.08E-06	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	5.21E-05
	Iron	3.15E+01	mg/L	3.15E+01	mg/L	M	2.47E-04	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	8.23E-04
	Lead	1.84E-01	mg/L	1.84E-01	mg/L	M	1.44E-06	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.91E+00	mg/L	1.91E+00	mg/L	M	1.50E-05	mg/kg-day	4.67E-02	mg/kg-day	N/A	N/A	3.20E-04
	Mercury	4.00E-04	mg/L	4.00E-04	mg/L	M	3.13E-09	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.04E-05
	Nickel	1.44E-01	mg/L	1.44E-01	mg/L	M	1.13E-06	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	5.63E-05
	Selenium	2.58E-02	mg/L	2.58E-02	mg/L	M	2.02E-07	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	4.04E-05
	Thallium	3.42E-02	mg/L	3.42E-02	mg/L	M	2.68E-07	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	3.82E-03
	Vanadium	2.84E-02	mg/L	2.84E-02	mg/L	M	2.22E-07	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	2.22E-04
	Zinc	2.66E-01	mg/L	2.66E-01	mg/L	M	2.08E-06	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	6.94E-06
	(Total)												6.64E-03
Dermal	Aluminum	5.74E+00	mg/L	5.74E+00	mg/L	M	2.97E-05	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	2.97E-05
	Antimony	1.69E-02	mg/L	1.69E-02	mg/L	M	8.73E-08	mg/kg-day	6.00E-05	mg/kg-day	N/A	N/A	1.46E-03
	Arsenic	2.26E-02	mg/L	2.26E-02	mg/L	M	1.17E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	3.89E-04
	Barium	3.37E-01	mg/L	3.37E-01	mg/L	M	1.74E-06	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	3.55E-04
	Beryllium	3.04E-03	mg/L	3.04E-03	mg/L	M	1.57E-08	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	1.12E-03
	Chromium	6.84E-01	mg/L	6.84E-01	mg/L	M	3.54E-06	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	1.81E-04
	Chromium VI (Hexavalent)	1.02E-01	mg/L	1.02E-01	mg/L	M	1.06E-06	mg/kg-day	7.50E-05	mg/kg-day	N/A	N/A	1.41E-02
	Copper	2.66E-01	mg/L	2.66E-01	mg/L	M	1.37E-06	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	3.44E-05
	Iron	3.15E+01	mg/L	3.15E+01	mg/L	M	1.63E-04	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	5.43E-04
	Lead	1.84E-01	mg/L	1.84E-01	mg/L	M	9.52E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	NC
	Manganese	1.91E+00	mg/L	1.91E+00	mg/L	M	9.87E-06	mg/kg-day	1.87E-03	mg/kg-day	N/A	N/A	5.28E-03
	Mercury	4.00E-04	mg/L	4.00E-04	mg/L	M	2.07E-09	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	6.89E-06
	Nickel	1.44E-01	mg/L	1.44E-01	mg/L	M	1.49E-07	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	1.86E-04
	Selenium	2.58E-02	mg/L	2.58E-02	mg/L	M	1.33E-07	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	2.66E-05
	Thallium	3.42E-02	mg/L	3.42E-02	mg/L	M	1.77E-07	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	2.52E-03
	Vanadium	2.84E-02	mg/L	2.84E-02	mg/L	M	1.47E-07	mg/kg-day	2.60E-05	mg/kg-day	N/A	N/A	5.65E-03
	Zinc	2.66E-01	mg/L	2.66E-01	mg/L	M	8.25E-07	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	2.75E-06
	(Total)												3.19E-02
												Total Hazard Index Across All Exposure Routes/Pathways	3.9E-02

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.18.CT

CALCULATION OF NON-CANCER HAZARDS FOR CURRENT MAINTENANCE WORKER EXPOSURE TO SEDIMENT
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Ingestion and Dermal
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Arsenic	7.94E+00	mg/kg	7.94E+00	mg/kg	M	2.49E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	8.29E-04
	Barium	1.92E+02	mg/kg	1.92E+02	mg/kg	M	6.02E-06	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	8.60E-05
	Beryllium	5.06E-01	mg/kg	5.06E-01	mg/kg	M	1.58E-08	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	7.92E-06
	Cadmium	7.52E-01	mg/kg	7.52E-01	mg/kg	M	2.35E-08	mg/kg-day	5.00E-04	mg/kg-day	N/A	N/A	4.71E-05
	Chromium	4.09E+02	mg/kg	4.09E+02	mg/kg	M	1.28E-05	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	8.54E-06
	Copper	5.42E+01	mg/kg	5.42E+01	mg/kg	M	1.70E-06	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	4.25E-05
	Iron	1.88E+04	mg/kg	1.88E+04	mg/kg	M	5.89E-04	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	1.96E-03
	Mercury	9.75E-02	mg/kg	9.75E-02	mg/kg	M	3.05E-09	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.02E-05
	Nickel	5.81E+01	mg/kg	5.81E+01	mg/kg	M	1.82E-06	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	9.10E-05
	Selenium	1.01E+01	mg/kg	1.01E+01	mg/kg	M	3.16E-07	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	6.31E-05
	Zinc	1.95E+02	mg/kg	1.95E+02	mg/kg	M	6.12E-06	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	2.04E-05
	(Total)												3.17E-03
Dermal	Arsenic	7.94E+00	mg/kg	7.94E+00	mg/kg	M	4.92E-09	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.64E-05
	Barium	1.92E+02	mg/kg	1.92E+02	mg/kg	M	3.97E-08	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	8.11E-06
	Beryllium	5.06E-01	mg/kg	5.06E-01	mg/kg	M	1.05E-10	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	7.47E-06
	Cadmium	7.52E-01	mg/kg	7.52E-01	mg/kg	M	1.55E-11	mg/kg-day	2.50E-05	mg/kg-day	N/A	N/A	6.22E-07
	Chromium	4.09E+02	mg/kg	4.09E+02	mg/kg	M	8.46E-08	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	4.34E-06
	Copper	5.42E+01	mg/kg	5.42E+01	mg/kg	M	1.12E-08	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	2.80E-07
	Iron	1.88E+04	mg/kg	1.88E+04	mg/kg	M	3.89E-06	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	1.30E-05
	Mercury	9.75E-02	mg/kg	9.75E-02	mg/kg	M	2.01E-11	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	6.72E-08
	Nickel	5.81E+01	mg/kg	5.81E+01	mg/kg	M	1.20E-08	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	1.50E-05
	Selenium	1.01E+01	mg/kg	1.01E+01	mg/kg	M	2.08E-09	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	4.17E-07
	Zinc	1.95E+02	mg/kg	1.95E+02	mg/kg	M	4.04E-08	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	1.35E-07
	(Total)												6.58E-05
												Total Hazard Index Across All Exposure Routes/Pathways	3.2E-03

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.18.RME

CALCULATION OF NON-CANCER HAZARDS FOR CURRENT MAINTENANCE WORKER EXPOSURE TO SEDIMENT
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Ingestion and Dermal
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Arsenic	1.34E+01	mg/kg	1.34E+01	mg/kg	M	8.37E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	2.79E-03
	Barium	4.89E+02	mg/kg	4.89E+02	mg/kg	M	3.06E-05	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	4.38E-04
	Beryllium	6.30E-01	mg/kg	6.30E-01	mg/kg	M	3.95E-08	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	1.97E-05
	Cadmium	9.08E-01	mg/kg	9.08E-01	mg/kg	M	5.69E-08	mg/kg-day	5.00E-04	mg/kg-day	N/A	N/A	1.14E-04
	Chromium	1.02E+03	mg/kg	1.02E+03	mg/kg	M	6.39E-05	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	4.26E-05
	Copper	1.28E+02	mg/kg	1.28E+02	mg/kg	M	8.04E-06	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	2.01E-04
	Iron	2.39E+04	mg/kg	2.39E+04	mg/kg	M	1.50E-03	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	4.98E-03
	Mercury	1.59E-01	mg/kg	1.59E-01	mg/kg	M	9.93E-09	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	3.31E-05
	Nickel	1.41E+02	mg/kg	1.41E+02	mg/kg	M	8.81E-06	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	4.40E-04
	Selenium	1.28E+01	mg/kg	1.28E+01	mg/kg	M	8.04E-07	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	1.61E-04
	Zinc	3.48E+02	mg/kg	3.48E+02	mg/kg	M	2.18E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	7.26E-05
	(Total)												9.30E-03
Dermal	Arsenic	1.34E+01	mg/kg	1.34E+01	mg/kg	M	1.66E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	5.53E-04
	Barium	4.89E+02	mg/kg	4.89E+02	mg/kg	M	2.02E-06	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	4.13E-04
	Beryllium	6.30E-01	mg/kg	6.30E-01	mg/kg	M	2.60E-09	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	1.86E-04
	Cadmium	9.08E-01	mg/kg	9.08E-01	mg/kg	M	3.75E-10	mg/kg-day	2.50E-05	mg/kg-day	N/A	N/A	1.50E-05
	Chromium	1.02E+03	mg/kg	1.02E+03	mg/kg	M	4.22E-06	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	2.16E-04
	Copper	1.28E+02	mg/kg	1.28E+02	mg/kg	M	5.30E-07	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	1.33E-05
	Iron	2.39E+04	mg/kg	2.39E+04	mg/kg	M	9.87E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	3.29E-04
	Mercury	1.59E-01	mg/kg	1.59E-01	mg/kg	M	6.55E-10	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	2.18E-06
	Nickel	1.41E+02	mg/kg	1.41E+02	mg/kg	M	5.81E-07	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	7.27E-04
	Selenium	1.28E+01	mg/kg	1.28E+01	mg/kg	M	5.31E-08	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	1.06E-05
	Zinc	3.48E+02	mg/kg	3.48E+02	mg/kg	M	1.44E-06	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	4.79E-06
	(Total)												2.47E-03
												Total Hazard Index Across All Exposure Routes/Pathways	1.2E-02

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.19.CT

CALCULATION OF NON-CANCER HAZARDS FOR CURRENT/FUTURE TRESPASSER EXPOSURE TO SEDIMENT
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Ingestion and Dermal
Receptor Population: Trespasser
Receptor Age: Adolescent

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Arsenic	7.94E+00	mg/kg	7.94E+00	mg/kg	M	2.78E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	9.28E-03
	Barium	1.92E+02	mg/kg	1.92E+02	mg/kg	M	6.74E-05	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	9.63E-04
	Beryllium	5.06E-01	mg/kg	5.06E-01	mg/kg	M	1.77E-07	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	8.87E-05
	Cadmium	7.52E-01	mg/kg	7.52E-01	mg/kg	M	2.64E-07	mg/kg-day	5.00E-04	mg/kg-day	N/A	N/A	5.27E-04
	Chromium	4.09E+02	mg/kg	4.09E+02	mg/kg	M	1.44E-04	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	9.57E-05
	Copper	5.42E+01	mg/kg	5.42E+01	mg/kg	M	1.90E-05	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	4.75E-04
	Iron	1.88E+04	mg/kg	1.88E+04	mg/kg	M	6.59E-03	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	2.20E-02
	Mercury	9.75E-02	mg/kg	9.75E-02	mg/kg	M	3.42E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.14E-04
	Nickel	5.81E+01	mg/kg	5.81E+01	mg/kg	M	2.04E-05	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	1.02E-03
	Selenium	1.01E+01	mg/kg	1.01E+01	mg/kg	M	3.53E-06	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	7.07E-04
	Zinc	1.95E+02	mg/kg	1.95E+02	mg/kg	M	6.85E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	2.28E-04
	(Total)												3.55E-02
Dermal	Arsenic	7.94E+00	mg/kg	7.94E+00	mg/kg	M	1.47E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	4.90E-04
	Barium	1.92E+02	mg/kg	1.92E+02	mg/kg	M	1.19E-06	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	2.42E-04
	Beryllium	5.06E-01	mg/kg	5.06E-01	mg/kg	M	3.12E-09	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	2.23E-04
	Cadmium	7.52E-01	mg/kg	7.52E-01	mg/kg	M	4.64E-10	mg/kg-day	2.50E-05	mg/kg-day	N/A	N/A	1.86E-05
	Chromium	4.09E+02	mg/kg	4.09E+02	mg/kg	M	2.53E-06	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	1.30E-04
	Copper	5.42E+01	mg/kg	5.42E+01	mg/kg	M	3.35E-07	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	8.37E-06
	Iron	1.88E+04	mg/kg	1.88E+04	mg/kg	M	1.16E-04	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	3.87E-04
	Mercury	9.75E-02	mg/kg	9.75E-02	mg/kg	M	6.02E-10	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	2.01E-06
	Nickel	5.81E+01	mg/kg	5.81E+01	mg/kg	M	3.59E-07	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	4.48E-04
	Selenium	1.01E+01	mg/kg	1.01E+01	mg/kg	M	6.22E-08	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	1.24E-05
	Zinc	1.95E+02	mg/kg	1.95E+02	mg/kg	M	1.21E-06	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	4.02E-06
	(Total)												1.97E-03
												Total Hazard Index Across All Exposure Routes/Pathways	3.7E-02

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.19.RME

CALCULATION OF NON-CANCER HAZARDS FOR CURRENT/FUTURE TRESPASSER EXPOSURE TO SEDIMENT
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Ingestion and Dermal
Receptor Population: Trespasser
Receptor Age: Adolescent

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Arsenic	1.34E+01	mg/kg	1.34E+01	mg/kg	M	9.38E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	3.13E-02
	Barium	4.89E+02	mg/kg	4.89E+02	mg/kg	M	3.43E-04	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	4.90E-03
	Beryllium	6.30E-01	mg/kg	6.30E-01	mg/kg	M	4.42E-07	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	2.21E-04
	Cadmium	9.08E-01	mg/kg	9.08E-01	mg/kg	M	6.37E-07	mg/kg-day	5.00E-04	mg/kg-day	N/A	N/A	1.27E-03
	Chromium	1.02E+03	mg/kg	1.02E+03	mg/kg	M	7.16E-04	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	4.77E-04
	Copper	1.28E+02	mg/kg	1.28E+02	mg/kg	M	9.00E-05	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	2.25E-03
	Iron	2.39E+04	mg/kg	2.39E+04	mg/kg	M	1.67E-02	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	5.58E-02
	Mercury	1.59E-01	mg/kg	1.59E-01	mg/kg	M	1.11E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	3.71E-04
	Nickel	1.41E+02	mg/kg	1.41E+02	mg/kg	M	9.86E-05	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	4.93E-03
	Selenium	1.28E+01	mg/kg	1.28E+01	mg/kg	M	9.01E-06	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	1.80E-03
	Zinc	3.48E+02	mg/kg	3.48E+02	mg/kg	M	2.44E-04	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	8.13E-04
	(Total)												1.04E-01
Dermal	Arsenic	1.34E+01	mg/kg	1.34E+01	mg/kg	M	2.48E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	8.25E-03
	Barium	4.89E+02	mg/kg	4.89E+02	mg/kg	M	3.02E-05	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	6.16E-03
	Beryllium	6.30E-01	mg/kg	6.30E-01	mg/kg	M	3.89E-08	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	2.78E-03
	Cadmium	9.08E-01	mg/kg	9.08E-01	mg/kg	M	5.61E-09	mg/kg-day	2.50E-05	mg/kg-day	N/A	N/A	2.24E-04
	Chromium	1.02E+03	mg/kg	1.02E+03	mg/kg	M	6.30E-05	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	3.23E-03
	Copper	1.28E+02	mg/kg	1.28E+02	mg/kg	M	7.92E-06	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	1.98E-04
	Iron	2.39E+04	mg/kg	2.39E+04	mg/kg	M	1.47E-03	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	4.91E-03
	Mercury	1.59E-01	mg/kg	1.59E-01	mg/kg	M	9.78E-09	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	3.26E-05
	Nickel	1.41E+02	mg/kg	1.41E+02	mg/kg	M	8.68E-06	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	1.08E-02
	Selenium	1.28E+01	mg/kg	1.28E+01	mg/kg	M	7.92E-07	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	1.58E-04
	Zinc	3.48E+02	mg/kg	3.48E+02	mg/kg	M	2.15E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	7.15E-05
	(Total)												3.69E-02
												Total Hazard Index Across All Exposure Routes/Pathways	1.4E-01

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.20.CT

CALCULATION OF NON-CANCER HAZARDS FOR FUTURE INDUSTRIAL/ COMMERCIAL WORKER EXPOSURE TO SEDIMENT
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Ingestion and Dermal
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Arsenic	7.94E+00	mg/kg	7.94E+00	mg/kg	M	6.81E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	2.27E-02
	Barium	1.92E+02	mg/kg	1.92E+02	mg/kg	M	1.65E-04	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	2.35E-03
	Beryllium	5.06E-01	mg/kg	5.06E-01	mg/kg	M	4.34E-07	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	2.17E-04
	Cadmium	7.52E-01	mg/kg	7.52E-01	mg/kg	M	6.45E-07	mg/kg-day	5.00E-04	mg/kg-day	N/A	N/A	1.29E-03
	Chromium	4.09E+02	mg/kg	4.09E+02	mg/kg	M	3.51E-04	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	2.34E-04
	Copper	5.42E+01	mg/kg	5.42E+01	mg/kg	M	4.65E-05	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	1.16E-03
	Iron	1.88E+04	mg/kg	1.88E+04	mg/kg	M	1.61E-02	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	5.37E-02
	Mercury	9.75E-02	mg/kg	9.75E-02	mg/kg	M	8.36E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	2.79E-04
	Nickel	5.81E+01	mg/kg	5.81E+01	mg/kg	M	4.98E-05	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	2.49E-03
	Selenium	1.01E+01	mg/kg	1.01E+01	mg/kg	M	8.64E-06	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	1.73E-03
	Zinc	1.95E+02	mg/kg	1.95E+02	mg/kg	M	1.67E-04	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	5.58E-04
	(Total)												8.67E-02
Dermal	Arsenic	7.94E+00	mg/kg	7.94E+00	mg/kg	M	1.35E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	4.49E-04
	Barium	1.92E+02	mg/kg	1.92E+02	mg/kg	M	1.09E-06	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	2.22E-04
	Beryllium	5.06E-01	mg/kg	5.06E-01	mg/kg	M	2.86E-09	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	2.04E-04
	Cadmium	7.52E-01	mg/kg	7.52E-01	mg/kg	M	4.25E-10	mg/kg-day	2.50E-05	mg/kg-day	N/A	N/A	1.70E-05
	Chromium	4.09E+02	mg/kg	4.09E+02	mg/kg	M	2.31E-06	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	1.19E-04
	Copper	5.42E+01	mg/kg	5.42E+01	mg/kg	M	3.07E-07	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	7.67E-06
	Iron	1.88E+04	mg/kg	1.88E+04	mg/kg	M	1.06E-04	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	3.55E-04
	Mercury	9.75E-02	mg/kg	9.75E-02	mg/kg	M	5.52E-10	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.84E-06
	Nickel	5.81E+01	mg/kg	5.81E+01	mg/kg	M	3.29E-07	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	4.11E-04
	Selenium	1.01E+01	mg/kg	1.01E+01	mg/kg	M	5.70E-08	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	1.14E-05
	Zinc	1.95E+02	mg/kg	1.95E+02	mg/kg	M	1.11E-06	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	3.68E-06
	(Total)												1.80E-03
												Total Hazard Index Across All Exposure Routes/Pathways	8.9E-02

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.20.RME

CALCULATION OF NON-CANCER HAZARDS FOR FUTURE INDUSTRIAL/ COMMERCIAL WORKER EXPOSURE TO SEDIMENT
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Ingestion and Dermal
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Arsenic	1.34E+01	mg/kg	1.34E+01	mg/kg	M	1.31E-05	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	4.36E-02
	Barium	4.89E+02	mg/kg	4.89E+02	mg/kg	M	4.79E-04	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	6.84E-03
	Beryllium	6.30E-01	mg/kg	6.30E-01	mg/kg	M	6.16E-07	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	3.08E-04
	Cadmium	9.08E-01	mg/kg	9.08E-01	mg/kg	M	8.89E-07	mg/kg-day	5.00E-04	mg/kg-day	N/A	N/A	1.78E-03
	Chromium	1.02E+03	mg/kg	1.02E+03	mg/kg	M	9.98E-04	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	6.65E-04
	Copper	1.28E+02	mg/kg	1.28E+02	mg/kg	M	1.26E-04	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	3.14E-03
	Iron	2.39E+04	mg/kg	2.39E+04	mg/kg	M	2.34E-02	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	7.79E-02
	Mercury	1.59E-01	mg/kg	1.59E-01	mg/kg	M	1.55E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	5.17E-04
	Nickel	1.41E+02	mg/kg	1.41E+02	mg/kg	M	1.38E-04	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	6.88E-03
	Selenium	1.28E+01	mg/kg	1.28E+01	mg/kg	M	1.26E-05	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	2.51E-03
	Zinc	3.48E+02	mg/kg	3.48E+02	mg/kg	M	3.40E-04	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	1.13E-03
	(Total)												1.45E-01
Dermal	Arsenic	1.34E+01	mg/kg	1.34E+01	mg/kg	M	2.59E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	8.63E-03
	Barium	4.89E+02	mg/kg	4.89E+02	mg/kg	M	3.16E-05	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	6.45E-03
	Beryllium	6.30E-01	mg/kg	6.30E-01	mg/kg	M	4.07E-08	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	2.91E-03
	Cadmium	9.08E-01	mg/kg	9.08E-01	mg/kg	M	5.87E-09	mg/kg-day	2.50E-05	mg/kg-day	N/A	N/A	2.35E-04
	Chromium	1.02E+03	mg/kg	1.02E+03	mg/kg	M	6.59E-05	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	3.38E-03
	Copper	1.28E+02	mg/kg	1.28E+02	mg/kg	M	8.29E-06	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	2.07E-04
	Iron	2.39E+04	mg/kg	2.39E+04	mg/kg	M	1.54E-03	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	5.14E-03
	Mercury	1.59E-01	mg/kg	1.59E-01	mg/kg	M	1.02E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	3.41E-05
	Nickel	1.41E+02	mg/kg	1.41E+02	mg/kg	M	9.08E-06	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	1.14E-02
	Selenium	1.28E+01	mg/kg	1.28E+01	mg/kg	M	8.29E-07	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	1.66E-04
	Zinc	3.48E+02	mg/kg	3.48E+02	mg/kg	M	2.25E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	7.48E-05
	(Total)												3.86E-02
												Total Hazard Index Across All Exposure Routes/Pathways	1.8E-01

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.21.CT

CALCULATION OF NON-CANCER HAZARDS FOR FUTURE CONSTRUCTION/ UTILITY WORKER EXPOSURE TO SEDIMENT
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Ingestion and Dermal
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Arsenic	7.94E+00	mg/kg	7.94E+00	mg/kg	M	1.03E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	3.42E-03
	Barium	1.92E+02	mg/kg	1.92E+02	mg/kg	M	2.48E-05	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	3.55E-04
	Beryllium	5.06E-01	mg/kg	5.06E-01	mg/kg	M	6.54E-08	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	3.27E-05
	Cadmium	7.52E-01	mg/kg	7.52E-01	mg/kg	M	9.71E-08	mg/kg-day	5.00E-04	mg/kg-day	N/A	N/A	1.94E-04
	Chromium	4.09E+02	mg/kg	4.09E+02	mg/kg	M	5.29E-05	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	3.52E-05
	Copper	5.42E+01	mg/kg	5.42E+01	mg/kg	M	7.00E-06	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	1.75E-04
	Iron	1.88E+04	mg/kg	1.88E+04	mg/kg	M	2.43E-03	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	8.10E-03
	Mercury	9.75E-02	mg/kg	9.75E-02	mg/kg	M	1.26E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	4.20E-05
	Nickel	5.81E+01	mg/kg	5.81E+01	mg/kg	M	7.51E-06	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	3.75E-04
	Selenium	1.01E+01	mg/kg	1.01E+01	mg/kg	M	1.30E-06	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	2.60E-04
	Zinc	1.95E+02	mg/kg	1.95E+02	mg/kg	M	2.52E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	8.41E-05
	(Total)												1.31E-02
Dermal	Arsenic	7.94E+00	mg/kg	7.94E+00	mg/kg	M	3.08E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.03E-04
	Barium	1.92E+02	mg/kg	1.92E+02	mg/kg	M	2.48E-07	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	5.07E-05
	Beryllium	5.06E-01	mg/kg	5.06E-01	mg/kg	M	6.54E-10	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	4.67E-05
	Cadmium	7.52E-01	mg/kg	7.52E-01	mg/kg	M	9.71E-11	mg/kg-day	2.50E-05	mg/kg-day	N/A	N/A	3.89E-06
	Chromium	4.09E+02	mg/kg	4.09E+02	mg/kg	M	5.29E-07	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	2.71E-05
	Copper	5.42E+01	mg/kg	5.42E+01	mg/kg	M	7.00E-08	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	1.75E-06
	Iron	1.88E+04	mg/kg	1.88E+04	mg/kg	M	2.43E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	8.10E-05
	Mercury	9.75E-02	mg/kg	9.75E-02	mg/kg	M	1.26E-10	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	4.20E-07
	Nickel	5.81E+01	mg/kg	5.81E+01	mg/kg	M	7.51E-08	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	9.38E-05
	Selenium	1.01E+01	mg/kg	1.01E+01	mg/kg	M	1.30E-08	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	2.60E-06
	Zinc	1.95E+02	mg/kg	1.95E+02	mg/kg	M	2.52E-07	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	8.41E-07
	(Total)												4.11E-04
												Total Hazard Index Across All Exposure Routes/Pathways	1.3E-02

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.1.21.RME

CALCULATION OF NON-CANCER HAZARDS FOR FUTURE CONSTRUCTION/ UTILITY WORKER EXPOSURE TO SEDIMENT
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Ingestion and Dermal
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Non-Cancer)*	*Intake (Non-Cancer) Units*	*Reference Dose*	*Reference Dose Units*	*Reference Concentration*	*Reference Concentration Units*	*Hazard Quotient*
Ingestion	Arsenic	1.34E+01	mg/kg	1.34E+01	mg/kg	M	3.45E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.15E-02
	Barium	4.89E+02	mg/kg	4.89E+02	mg/kg	M	1.26E-04	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	1.81E-03
	Beryllium	6.30E-01	mg/kg	6.30E-01	mg/kg	M	1.63E-07	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	8.14E-05
	Cadmium	9.08E-01	mg/kg	9.08E-01	mg/kg	M	2.35E-07	mg/kg-day	5.00E-04	mg/kg-day	N/A	N/A	4.69E-04
	Chromium	1.02E+03	mg/kg	1.02E+03	mg/kg	M	2.64E-04	mg/kg-day	1.50E+00	mg/kg-day	N/A	N/A	1.76E-04
	Copper	1.28E+02	mg/kg	1.28E+02	mg/kg	M	3.31E-05	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	8.29E-04
	Iron	2.39E+04	mg/kg	2.39E+04	mg/kg	M	6.17E-03	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	2.06E-02
	Mercury	1.59E-01	mg/kg	1.59E-01	mg/kg	M	4.09E-08	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.36E-04
	Nickel	1.41E+02	mg/kg	1.41E+02	mg/kg	M	3.63E-05	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	1.82E-03
	Selenium	1.28E+01	mg/kg	1.28E+01	mg/kg	M	3.32E-06	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	6.63E-04
	Zinc	3.48E+02	mg/kg	3.48E+02	mg/kg	M	8.98E-05	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	2.99E-04
	(Total)												3.83E-02
Dermal	Arsenic	1.34E+01	mg/kg	1.34E+01	mg/kg	M	3.11E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.04E-03
	Barium	4.89E+02	mg/kg	4.89E+02	mg/kg	M	3.79E-06	mg/kg-day	4.90E-03	mg/kg-day	N/A	N/A	7.74E-04
	Beryllium	6.30E-01	mg/kg	6.30E-01	mg/kg	M	4.88E-09	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	3.49E-04
	Cadmium	9.08E-01	mg/kg	9.08E-01	mg/kg	M	7.04E-10	mg/kg-day	2.50E-05	mg/kg-day	N/A	N/A	2.82E-05
	Chromium	1.02E+03	mg/kg	1.02E+03	mg/kg	M	7.91E-06	mg/kg-day	1.95E-02	mg/kg-day	N/A	N/A	4.05E-04
	Copper	1.28E+02	mg/kg	1.28E+02	mg/kg	M	9.94E-07	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	2.49E-05
	Iron	2.39E+04	mg/kg	2.39E+04	mg/kg	M	1.85E-04	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	6.17E-04
	Mercury	1.59E-01	mg/kg	1.59E-01	mg/kg	M	1.23E-09	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	4.09E-06
	Nickel	1.41E+02	mg/kg	1.41E+02	mg/kg	M	1.09E-06	mg/kg-day	8.00E-04	mg/kg-day	N/A	N/A	1.36E-03
	Selenium	1.28E+01	mg/kg	1.28E+01	mg/kg	M	9.95E-08	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	1.99E-05
	Zinc	3.48E+02	mg/kg	3.48E+02	mg/kg	M	2.69E-06	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	8.98E-06
	(Total)												4.63E-03
												Total Hazard Index Across All Exposure Routes/Pathways	4.3E-02

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for hazard calculation.

TABLE B.2.1.CT

CALCULATION OF CANCER RISKS FOR CURRENT MAINTENANCE WORKER EXPOSURE TO SURFACE SOIL AND SLAG
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Medium: Surface Soil and Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Aluminum	1.87E+04	mg/kg	1.87E+04	mg/kg	M	7.52E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Antimony	2.32E+01	mg/kg	2.32E+01	mg/kg	M	9.34E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Arsenic	6.43E+00	mg/kg	6.43E+00	mg/kg	M	2.59E-08	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	3.88E-08
	Barium	1.66E+02	mg/kg	1.66E+02	mg/kg	M	6.67E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	5.85E-01	mg/kg	5.85E-01	mg/kg	M	2.36E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cadmium	3.35E+00	mg/kg	3.35E+00	mg/kg	M	1.35E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium Total	1.24E+03	mg/kg	1.24E+03	mg/kg	M	5.00E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium VI (Hexavalent)	6.80E+00	mg/kg	6.80E+00	mg/kg	M	2.74E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cobalt	2.24E+01	mg/kg	2.24E+01	mg/kg	M	9.02E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Copper	1.65E+02	mg/kg	1.65E+02	mg/kg	M	6.64E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	1.92E+04	mg/kg	1.92E+04	mg/kg	M	7.72E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Lead	7.23E+01	mg/kg	7.23E+01	mg/kg	M	2.91E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Manganese	1.76E+03	mg/kg	1.76E+03	mg/kg	M	7.09E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	3.00E-01	mg/kg	3.00E-01	mg/kg	M	1.21E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	2.54E+02	mg/kg	2.54E+02	mg/kg	M	1.02E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	4.87E+00	mg/kg	4.87E+00	mg/kg	M	1.96E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Thallium	2.62E+00	mg/kg	2.62E+00	mg/kg	M	1.05E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Vanadium	5.22E+01	mg/kg	5.22E+01	mg/kg	M	2.10E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	1.74E+02	mg/kg	1.74E+02	mg/kg	M	7.02E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										3.88E-08
Dermal	Aluminum	1.87E+04	mg/kg	1.87E+04	mg/kg	M	4.96E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Antimony	2.32E+01	mg/kg	2.32E+01	mg/kg	M	6.16E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Arsenic	6.43E+00	mg/kg	6.43E+00	mg/kg	M	5.13E-10	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	7.69E-10
	Barium	1.66E+02	mg/kg	1.66E+02	mg/kg	M	4.41E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	5.85E-01	mg/kg	5.85E-01	mg/kg	M	1.55E-11	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cadmium	3.35E+00	mg/kg	3.35E+00	mg/kg	M	8.90E-12	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium Total	1.24E+03	mg/kg	1.24E+03	mg/kg	M	3.30E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium VI (Hexavalent)	6.80E+00	mg/kg	6.80E+00	mg/kg	M	1.81E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cobalt	2.24E+01	mg/kg	2.24E+01	mg/kg	M	5.95E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Copper	1.65E+02	mg/kg	1.65E+02	mg/kg	M	4.38E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	1.92E+04	mg/kg	1.92E+04	mg/kg	M	5.09E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Lead	7.23E+01	mg/kg	7.23E+01	mg/kg	M	1.92E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Manganese	1.76E+03	mg/kg	1.76E+03	mg/kg	M	4.68E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	3.00E-01	mg/kg	3.00E-01	mg/kg	M	7.97E-12	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	2.54E+02	mg/kg	2.54E+02	mg/kg	M	6.74E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	4.87E+00	mg/kg	4.87E+00	mg/kg	M	1.29E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Thallium	2.62E+00	mg/kg	2.62E+00	mg/kg	M	6.96E-11	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Vanadium	5.22E+01	mg/kg	5.22E+01	mg/kg	M	1.39E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	1.74E+02	mg/kg	1.74E+02	mg/kg	M	4.63E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										7.69E-10

TABLE B.2.1.CT

CALCULATION OF CANCER RISKS FOR CURRENT MAINTENANCE WORKER EXPOSURE TO SURFACE SOIL AND SLAG
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Medium: Surface Soil and Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Inhalation	Aluminum	1.87E+04	mg/kg	1.87E+04	mg/kg	M	3.67E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Antimony	2.32E+01	mg/kg	2.32E+01	mg/kg	M	4.56E-12	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Arsenic	6.43E+00	mg/kg	6.43E+00	mg/kg	M	1.26E-12	mg/kg-day	1.50E+01	$(mg/kg\text{-}day)^{-1}$	1.90E-11
	Barium	1.66E+02	mg/kg	1.66E+02	mg/kg	M	3.26E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	5.85E-01	mg/kg	5.85E-01	mg/kg	M	1.15E-13	mg/kg-day	8.40E+00	$(mg/kg\text{-}day)^{-1}$	9.66E-13
	Cadmium	3.35E+00	mg/kg	3.35E+00	mg/kg	M	6.58E-13	mg/kg-day	6.30E+00	$(mg/kg\text{-}day)^{-1}$	4.15E-12
	Chromium Total	1.24E+03	mg/kg	1.24E+03	mg/kg	M	2.44E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium VI (Hexavalent)	6.80E+00	mg/kg	6.80E+00	mg/kg	M	1.34E-12	mg/kg-day	4.20E+01	$(mg/kg\text{-}day)^{-1}$	5.61E-11
	Cobalt	2.24E+01	mg/kg	2.24E+01	mg/kg	M	4.40E-12	mg/kg-day	9.80E+00	$(mg/kg\text{-}day)^{-1}$	4.31E-11
	Copper	1.65E+02	mg/kg	1.65E+02	mg/kg	M	3.24E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	1.92E+04	mg/kg	1.92E+04	mg/kg	M	3.77E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Lead	7.23E+01	mg/kg	7.23E+01	mg/kg	M	1.42E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	1.76E+03	mg/kg	1.76E+03	mg/kg	M	3.46E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	3.00E-01	mg/kg	3.00E-01	mg/kg	M	5.90E-14	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	2.54E+02	mg/kg	2.54E+02	mg/kg	M	4.99E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	4.87E+00	mg/kg	4.87E+00	mg/kg	M	9.57E-13	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Thallium	2.62E+00	mg/kg	2.62E+00	mg/kg	M	5.15E-13	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Vanadium	5.22E+01	mg/kg	5.22E+01	mg/kg	M	1.03E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	1.74E+02	mg/kg	1.74E+02	mg/kg	M	3.43E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										1.23E-10

Total Risk Across All Exposure Routes/Pathways 4.0E-08

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.1.RME

CALCULATION OF CANCER RISKS FOR CURRENT MAINTENANCE WORKER EXPOSURE TO SURFACE SOIL AND SLAG
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Medium: Surface Soil and Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Trespasser
Receptor Age: Adolescent

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Aluminum	3.69E+04	mg/kg	3.69E+04	mg/kg	M	8.26E-04	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Antimony	3.82E+01	mg/kg	3.82E+01	mg/kg	M	8.54E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Arsenic	1.81E+01	mg/kg	1.81E+01	mg/kg	M	4.04E-07	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	6.06E-07
	Barium	3.77E+02	mg/kg	3.77E+02	mg/kg	M	8.44E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Beryllium	1.21E+00	mg/kg	1.21E+00	mg/kg	M	2.70E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Cadmium	2.62E+01	mg/kg	2.62E+01	mg/kg	M	5.85E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Chromium Total	1.97E+03	mg/kg	1.97E+03	mg/kg	M	4.41E-05	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Chromium VI (Hexavalent)	9.95E+00	mg/kg	9.95E+00	mg/kg	M	2.22E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Cobalt	9.15E+01	mg/kg	9.15E+01	mg/kg	M	2.05E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Copper	1.27E+03	mg/kg	1.27E+03	mg/kg	M	2.85E-05	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Iron	2.16E+04	mg/kg	2.16E+04	mg/kg	M	4.83E-04	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Lead	3.09E+02	mg/kg	3.09E+02	mg/kg	M	6.90E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Manganese	5.39E+03	mg/kg	5.39E+03	mg/kg	M	1.21E-04	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Mercury	2.49E+00	mg/kg	2.49E+00	mg/kg	M	5.56E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Nickel	1.04E+03	mg/kg	1.04E+03	mg/kg	M	2.32E-05	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Selenium	6.61E+00	mg/kg	6.61E+00	mg/kg	M	1.48E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Thallium	3.89E+00	mg/kg	3.89E+00	mg/kg	M	8.69E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Vanadium	6.60E+01	mg/kg	6.60E+01	mg/kg	M	1.48E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Zinc	4.17E+02	mg/kg	4.17E+02	mg/kg	M	9.32E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	(Total)										6.06E-07
Dermal	Aluminum	3.69E+04	mg/kg	3.69E+04	mg/kg	M	5.45E-05	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Antimony	3.82E+01	mg/kg	3.82E+01	mg/kg	M	5.64E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Arsenic	1.81E+01	mg/kg	1.81E+01	mg/kg	M	8.00E-08	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	1.20E-07
	Barium	3.77E+02	mg/kg	3.77E+02	mg/kg	M	5.57E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Beryllium	1.21E+00	mg/kg	1.21E+00	mg/kg	M	1.78E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Cadmium	2.62E+01	mg/kg	2.62E+01	mg/kg	M	3.86E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Chromium Total	1.97E+03	mg/kg	1.97E+03	mg/kg	M	2.91E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Chromium VI (Hexavalent)	9.95E+00	mg/kg	9.95E+00	mg/kg	M	1.47E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Cobalt	9.15E+01	mg/kg	9.15E+01	mg/kg	M	1.35E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Copper	1.27E+03	mg/kg	1.27E+03	mg/kg	M	1.88E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Iron	2.16E+04	mg/kg	2.16E+04	mg/kg	M	3.19E-05	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Lead	3.09E+02	mg/kg	3.09E+02	mg/kg	M	4.56E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Manganese	5.39E+03	mg/kg	5.39E+03	mg/kg	M	7.96E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Mercury	2.49E+00	mg/kg	2.49E+00	mg/kg	M	3.67E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Nickel	1.04E+03	mg/kg	1.04E+03	mg/kg	M	1.53E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Selenium	6.61E+00	mg/kg	6.61E+00	mg/kg	M	9.76E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Thallium	3.89E+00	mg/kg	3.89E+00	mg/kg	M	5.74E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Vanadium	6.60E+01	mg/kg	6.60E+01	mg/kg	M	9.74E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Zinc	4.17E+02	mg/kg	4.17E+02	mg/kg	M	6.15E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	(Total)										1.20E-07

TABLE B.2.1.RME

CALCULATION OF CANCER RISKS FOR CURRENT MAINTENANCE WORKER EXPOSURE TO SURFACE SOIL AND SLAG
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Medium: Surface Soil and Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Trespasser
Receptor Age: Adolescent

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Inhalation	Aluminum	3.69E+04	mg/kg	3.69E+04	mg/kg	M	4.03E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Antimony	3.82E+01	mg/kg	3.82E+01	mg/kg	M	4.17E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Arsenic	1.81E+01	mg/kg	1.81E+01	mg/kg	M	1.97E-11	mg/kg-day	1.50E+01	$(mg/kg\text{-}day)^{-1}$	2.96E-10
	Barium	3.77E+02	mg/kg	3.77E+02	mg/kg	M	4.12E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	1.21E+00	mg/kg	1.21E+00	mg/kg	M	1.32E-12	mg/kg-day	8.40E+00	$(mg/kg\text{-}day)^{-1}$	1.11E-11
	Cadmium	2.62E+01	mg/kg	2.62E+01	mg/kg	M	2.86E-11	mg/kg-day	6.30E+00	$(mg/kg\text{-}day)^{-1}$	1.80E-10
	Chromium Total	1.97E+03	mg/kg	1.97E+03	mg/kg	M	2.15E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium VI (Hexavalent)	9.95E+00	mg/kg	9.95E+00	mg/kg	M	1.09E-11	mg/kg-day	4.20E+01	$(mg/kg\text{-}day)^{-1}$	4.56E-10
	Cobalt	9.15E+01	mg/kg	9.15E+01	mg/kg	M	9.99E-11	mg/kg-day	9.80E+00	$(mg/kg\text{-}day)^{-1}$	9.79E-10
	Copper	1.27E+03	mg/kg	1.27E+03	mg/kg	M	1.39E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	2.16E+04	mg/kg	2.16E+04	mg/kg	M	2.36E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Lead	3.09E+02	mg/kg	3.09E+02	mg/kg	M	3.37E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	5.39E+03	mg/kg	5.39E+03	mg/kg	M	5.89E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	2.49E+00	mg/kg	2.49E+00	mg/kg	M	2.71E-12	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	1.04E+03	mg/kg	1.04E+03	mg/kg	M	1.13E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	6.61E+00	mg/kg	6.61E+00	mg/kg	M	7.22E-12	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Thallium	3.89E+00	mg/kg	3.89E+00	mg/kg	M	4.24E-12	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Vanadium	6.60E+01	mg/kg	6.60E+01	mg/kg	M	7.21E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	4.17E+02	mg/kg	4.17E+02	mg/kg	M	4.55E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										1.92E-09
										Total Risk Across All Exposure Routes/Pathways	7.3E-07

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.2.CT

CALCULATION OF CANCER RISKS FOR CURRENT MAINTENANCE WORKER EXPOSURE TO SURFACE SOIL
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Antimony	1.06E+01	mg/kg	1.06E+01	mg/kg	M	4.27E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Arsenic	6.27E+00	mg/kg	6.27E+00	mg/kg	M	2.52E-08	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	3.79E-08
	Barium	1.65E+02	mg/kg	1.65E+02	mg/kg	M	6.64E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	6.07E-01	mg/kg	6.07E-01	mg/kg	M	2.44E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cadmium	9.43E-01	mg/kg	9.43E-01	mg/kg	M	3.80E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium Total	2.90E+02	mg/kg	2.90E+02	mg/kg	M	1.17E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cobalt	2.43E+01	mg/kg	2.43E+01	mg/kg	M	9.78E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Copper	3.10E+01	mg/kg	3.10E+01	mg/kg	M	1.25E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	1.92E+04	mg/kg	1.92E+04	mg/kg	M	7.72E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	1.45E+03	mg/kg	1.45E+03	mg/kg	M	5.84E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	4.20E-01	mg/kg	4.20E-01	mg/kg	M	1.69E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	2.46E+01	mg/kg	2.46E+01	mg/kg	M	9.92E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	2.76E+00	mg/kg	2.76E+00	mg/kg	M	1.11E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Thallium	1.54E+00	mg/kg	1.54E+00	mg/kg	M	6.20E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	1.55E+02	mg/kg	1.55E+02	mg/kg	M	6.23E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										3.79E-08
Dermal	Antimony	1.06E+01	mg/kg	1.06E+01	mg/kg	M	2.82E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Arsenic	6.27E+00	mg/kg	6.27E+00	mg/kg	M	5.00E-10	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	7.50E-10
	Barium	1.65E+02	mg/kg	1.65E+02	mg/kg	M	4.38E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	6.07E-01	mg/kg	6.07E-01	mg/kg	M	1.61E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cadmium	9.43E-01	mg/kg	9.43E-01	mg/kg	M	2.51E-12	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium Total	2.90E+02	mg/kg	2.90E+02	mg/kg	M	7.70E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cobalt	2.43E+01	mg/kg	2.43E+01	mg/kg	M	6.46E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Copper	3.10E+01	mg/kg	3.10E+01	mg/kg	M	8.22E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	1.92E+04	mg/kg	1.92E+04	mg/kg	M	5.09E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	1.45E+03	mg/kg	1.45E+03	mg/kg	M	3.86E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	4.20E-01	mg/kg	4.20E-01	mg/kg	M	1.12E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	2.46E+01	mg/kg	2.46E+01	mg/kg	M	6.55E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	2.76E+00	mg/kg	2.76E+00	mg/kg	M	7.33E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Thallium	1.54E+00	mg/kg	1.54E+00	mg/kg	M	4.09E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	1.55E+02	mg/kg	1.55E+02	mg/kg	M	4.11E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										7.50E-10

TABLE B.2.2.CT

CALCULATION OF CANCER RISKS FOR CURRENT MAINTENANCE WORKER EXPOSURE TO SURFACE SOIL
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Inhalation	Antimony	1.06E+01	mg/kg	1.06E+01	mg/kg	M	2.08E-12	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Arsenic	6.27E+00	mg/kg	6.27E+00	mg/kg	M	1.23E-12	mg/kg-day	1.50E+01	$(mg/kg\text{-}day)^{-1}$	1.85E-11
	Barium	1.65E+02	mg/kg	1.65E+02	mg/kg	M	3.24E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	6.07E-01	mg/kg	6.07E-01	mg/kg	M	1.19E-13	mg/kg-day	8.40E+00	$(mg/kg\text{-}day)^{-1}$	1.00E-12
	Cadmium	9.43E-01	mg/kg	9.43E-01	mg/kg	M	1.85E-13	mg/kg-day	6.30E+00	$(mg/kg\text{-}day)^{-1}$	1.17E-12
	Chromium Total	2.90E+02	mg/kg	2.90E+02	mg/kg	M	5.69E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cobalt	2.43E+01	mg/kg	2.43E+01	mg/kg	M	4.78E-12	mg/kg-day	9.80E+00	$(mg/kg\text{-}day)^{-1}$	4.68E-11
	Copper	3.10E+01	mg/kg	3.10E+01	mg/kg	M	6.08E-12	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	1.92E+04	mg/kg	1.92E+04	mg/kg	M	3.77E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	1.45E+03	mg/kg	1.45E+03	mg/kg	M	2.85E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	4.20E-01	mg/kg	4.20E-01	mg/kg	M	8.26E-14	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	2.46E+01	mg/kg	2.46E+01	mg/kg	M	4.84E-12	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	2.76E+00	mg/kg	2.76E+00	mg/kg	M	5.42E-13	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Thallium	1.54E+00	mg/kg	1.54E+00	mg/kg	M	3.03E-13	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	1.55E+02	mg/kg	1.55E+02	mg/kg	M	3.04E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										6.75E-11

Total Risk Across All Exposure Routes/Pathways 3.9E-08

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.2.RME

CALCULATION OF CANCER RISKS FOR CURRENT MAINTENANCE WORKER EXPOSURE TO SURFACE SOIL
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Antimony	1.54E+01	mg/kg	1.54E+01	mg/kg	M	3.46E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Arsenic	7.90E+00	mg/kg	7.90E+00	mg/kg	M	1.77E-07	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	2.65E-07
	Barium	5.40E+02	mg/kg	5.40E+02	mg/kg	M	1.21E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	8.12E-01	mg/kg	8.12E-01	mg/kg	M	1.82E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cadmium	1.29E+00	mg/kg	1.29E+00	mg/kg	M	2.87E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium Total	4.66E+02	mg/kg	4.66E+02	mg/kg	M	1.04E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cobalt	1.75E+02	mg/kg	1.75E+02	mg/kg	M	3.91E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Copper	3.86E+01	mg/kg	3.86E+01	mg/kg	M	8.63E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	2.16E+04	mg/kg	2.16E+04	mg/kg	M	4.84E-04	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Manganese	8.82E+03	mg/kg	8.82E+03	mg/kg	M	1.97E-04	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	4.86E+00	mg/kg	4.86E+00	mg/kg	M	1.09E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	2.78E+01	mg/kg	2.78E+01	mg/kg	M	6.21E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	3.85E+00	mg/kg	3.85E+00	mg/kg	M	8.61E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Thallium	2.28E+00	mg/kg	2.28E+00	mg/kg	M	5.10E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	2.03E+02	mg/kg	2.03E+02	mg/kg	M	4.53E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										2.65E-07
Dermal	Antimony	1.54E+01	mg/kg	1.54E+01	mg/kg	M	2.28E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Arsenic	7.90E+00	mg/kg	7.90E+00	mg/kg	M	3.50E-08	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	5.25E-08
	Barium	5.40E+02	mg/kg	5.40E+02	mg/kg	M	7.97E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	8.12E-01	mg/kg	8.12E-01	mg/kg	M	1.20E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cadmium	1.29E+00	mg/kg	1.29E+00	mg/kg	M	1.90E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium Total	4.66E+02	mg/kg	4.66E+02	mg/kg	M	6.88E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cobalt	1.75E+02	mg/kg	1.75E+02	mg/kg	M	2.58E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Copper	3.86E+01	mg/kg	3.86E+01	mg/kg	M	5.70E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	2.16E+04	mg/kg	2.16E+04	mg/kg	M	3.19E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Manganese	8.82E+03	mg/kg	8.82E+03	mg/kg	M	1.30E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	4.86E+00	mg/kg	4.86E+00	mg/kg	M	7.17E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	2.78E+01	mg/kg	2.78E+01	mg/kg	M	4.10E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	3.85E+00	mg/kg	3.85E+00	mg/kg	M	5.68E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Thallium	2.28E+00	mg/kg	2.28E+00	mg/kg	M	3.37E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	2.03E+02	mg/kg	2.03E+02	mg/kg	M	2.99E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										5.25E-08

TABLE B.2.2.RME

CALCULATION OF CANCER RISKS FOR CURRENT MAINTENANCE WORKER EXPOSURE TO SURFACE SOIL
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Inhalation	Antimony	1.54E+01	mg/kg	1.54E+01	mg/kg	M	1.69E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Arsenic	7.90E+00	mg/kg	7.90E+00	mg/kg	M	8.62E-12	mg/kg-day	1.50E+01	$(mg/kg\text{-}day)^{-1}$	1.29E-10
	Barium	5.40E+02	mg/kg	5.40E+02	mg/kg	M	5.90E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	8.12E-01	mg/kg	8.12E-01	mg/kg	M	8.86E-13	mg/kg-day	8.40E+00	$(mg/kg\text{-}day)^{-1}$	7.45E-12
	Cadmium	1.29E+00	mg/kg	1.29E+00	mg/kg	M	1.40E-12	mg/kg-day	6.30E+00	$(mg/kg\text{-}day)^{-1}$	8.84E-12
	Chromium Total	4.66E+02	mg/kg	4.66E+02	mg/kg	M	5.09E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cobalt	1.75E+02	mg/kg	1.75E+02	mg/kg	M	1.91E-10	mg/kg-day	9.80E+00	$(mg/kg\text{-}day)^{-1}$	1.87E-09
	Copper	3.86E+01	mg/kg	3.86E+01	mg/kg	M	4.21E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	2.16E+04	mg/kg	2.16E+04	mg/kg	M	2.36E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	8.82E+03	mg/kg	8.82E+03	mg/kg	M	9.63E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	4.86E+00	mg/kg	4.86E+00	mg/kg	M	5.30E-12	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	2.78E+01	mg/kg	2.78E+01	mg/kg	M	3.03E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	3.85E+00	mg/kg	3.85E+00	mg/kg	M	4.21E-12	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Thallium	2.28E+00	mg/kg	2.28E+00	mg/kg	M	2.49E-12	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	2.03E+02	mg/kg	2.03E+02	mg/kg	M	2.21E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										2.02E-09

Total Risk Across All Exposure Routes/Pathways 3.2E-07

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.3.CT

CALCULATION OF CANCER RISKS FOR CURRENT MAINTENANCE WORKER EXPOSURE TO SLAG
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Medium: Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Aluminum	2.07E+04	mg/kg	2.07E+04	mg/kg	M	8.35E-05	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Antimony	9.77E+01	mg/kg	9.77E+01	mg/kg	M	3.93E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Arsenic	4.60E+00	mg/kg	4.60E+00	mg/kg	M	1.85E-08	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	2.78E-08
	Barium	1.75E+02	mg/kg	1.75E+02	mg/kg	M	7.04E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Beryllium	4.36E-01	mg/kg	4.36E-01	mg/kg	M	1.75E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Cadmium	8.90E+00	mg/kg	8.90E+00	mg/kg	M	3.58E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Chromium Total	3.86E+03	mg/kg	3.86E+03	mg/kg	M	1.56E-05	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Chromium VI (Hexavalent)	1.40E+01	mg/kg	1.40E+01	mg/kg	M	5.64E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Cobalt	2.02E+01	mg/kg	2.02E+01	mg/kg	M	8.11E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Copper	3.44E+02	mg/kg	3.44E+02	mg/kg	M	1.38E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Iron	1.93E+04	mg/kg	1.93E+04	mg/kg	M	7.77E-05	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Lead	1.35E+02	mg/kg	1.35E+02	mg/kg	M	5.44E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Manganese	2.68E+03	mg/kg	2.68E+03	mg/kg	M	1.08E-05	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Mercury	7.20E-02	mg/kg	7.20E-02	mg/kg	M	2.90E-10	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Nickel	1.41E+03	mg/kg	1.41E+03	mg/kg	M	5.67E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Selenium	1.29E+01	mg/kg	1.29E+01	mg/kg	M	5.19E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Thallium	5.88E+00	mg/kg	5.88E+00	mg/kg	M	2.37E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Vanadium	1.00E+02	mg/kg	1.00E+02	mg/kg	M	4.04E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Zinc	2.24E+02	mg/kg	2.24E+02	mg/kg	M	9.02E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	(Total)										2.78E-08
Dermal	Aluminum	2.07E+04	mg/kg	2.07E+04	mg/kg	M	5.51E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Antimony	9.77E+01	mg/kg	9.77E+01	mg/kg	M	2.60E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Arsenic	4.60E+00	mg/kg	4.60E+00	mg/kg	M	3.67E-10	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	5.50E-10
	Barium	1.75E+02	mg/kg	1.75E+02	mg/kg	M	4.65E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Beryllium	4.36E-01	mg/kg	4.36E-01	mg/kg	M	1.16E-11	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Cadmium	8.90E+00	mg/kg	8.90E+00	mg/kg	M	2.36E-11	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Chromium Total	3.86E+03	mg/kg	3.86E+03	mg/kg	M	1.03E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Chromium VI (Hexavalent)	1.40E+01	mg/kg	1.40E+01	mg/kg	M	3.72E-10	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Cobalt	2.02E+01	mg/kg	2.02E+01	mg/kg	M	5.36E-10	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Copper	3.44E+02	mg/kg	3.44E+02	mg/kg	M	9.13E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Iron	1.93E+04	mg/kg	1.93E+04	mg/kg	M	5.13E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Lead	1.35E+02	mg/kg	1.35E+02	mg/kg	M	3.59E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Manganese	2.68E+03	mg/kg	2.68E+03	mg/kg	M	7.13E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Mercury	7.20E-02	mg/kg	7.20E-02	mg/kg	M	1.91E-12	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Nickel	1.41E+03	mg/kg	1.41E+03	mg/kg	M	3.74E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Selenium	1.29E+01	mg/kg	1.29E+01	mg/kg	M	3.42E-10	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Thallium	5.88E+00	mg/kg	5.88E+00	mg/kg	M	1.56E-10	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Vanadium	1.00E+02	mg/kg	1.00E+02	mg/kg	M	2.67E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Zinc	2.24E+02	mg/kg	2.24E+02	mg/kg	M	5.95E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	(Total)										5.50E-10

TABLE B.2.3.CT

CALCULATION OF CANCER RISKS FOR CURRENT MAINTENANCE WORKER EXPOSURE TO SLAG
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Medium: Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Inhalation	Aluminum	2.07E+04	mg/kg	2.07E+04	mg/kg	M	4.07E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Antimony	9.77E+01	mg/kg	9.77E+01	mg/kg	M	1.92E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Arsenic	4.60E+00	mg/kg	4.60E+00	mg/kg	M	9.04E-13	mg/kg-day	1.50E+01	$(mg/kg\text{-}day)^{-1}$	1.36E-11
	Barium	1.75E+02	mg/kg	1.75E+02	mg/kg	M	3.44E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	4.36E-01	mg/kg	4.36E-01	mg/kg	M	8.57E-14	mg/kg-day	8.40E+00	$(mg/kg\text{-}day)^{-1}$	7.20E-13
	Cadmium	8.90E+00	mg/kg	8.90E+00	mg/kg	M	1.75E-12	mg/kg-day	6.30E+00	$(mg/kg\text{-}day)^{-1}$	1.10E-11
	Chromium Total	3.86E+03	mg/kg	3.86E+03	mg/kg	M	7.59E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium VI (Hexavalent)	1.40E+01	mg/kg	1.40E+01	mg/kg	M	2.75E-12	mg/kg-day	4.20E+01	$(mg/kg\text{-}day)^{-1}$	1.16E-10
	Cobalt	2.02E+01	mg/kg	2.02E+01	mg/kg	M	3.96E-12	mg/kg-day	9.80E+00	$(mg/kg\text{-}day)^{-1}$	3.88E-11
	Copper	3.44E+02	mg/kg	3.44E+02	mg/kg	M	6.76E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	1.93E+04	mg/kg	1.93E+04	mg/kg	M	3.79E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Lead	1.35E+02	mg/kg	1.35E+02	mg/kg	M	2.66E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	2.68E+03	mg/kg	2.68E+03	mg/kg	M	5.27E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	7.20E-02	mg/kg	7.20E-02	mg/kg	M	1.42E-14	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	1.41E+03	mg/kg	1.41E+03	mg/kg	M	2.77E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	1.29E+01	mg/kg	1.29E+01	mg/kg	M	2.53E-12	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Thallium	5.88E+00	mg/kg	5.88E+00	mg/kg	M	1.16E-12	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Vanadium	1.00E+02	mg/kg	1.00E+02	mg/kg	M	1.97E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	2.24E+02	mg/kg	2.24E+02	mg/kg	M	4.40E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										1.80E-10
										Total Risk Across All Exposure Routes/Pathways	2.9E-08

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.3.RME

CALCULATION OF CANCER RISKS FOR CURRENT MAINTENANCE WORKER EXPOSURE TO SLAG
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Medium: Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Aluminum	7.70E+04	mg/kg	7.70E+04	mg/kg	M	1.72E-03	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Antimony	3.39E+02	mg/kg	3.39E+02	mg/kg	M	7.58E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Arsenic	1.39E+01	mg/kg	1.39E+01	mg/kg	M	3.10E-07	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	4.65E-07
	Barium	2.73E+02	mg/kg	2.73E+02	mg/kg	M	6.11E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Beryllium	5.48E-01	mg/kg	5.48E-01	mg/kg	M	1.23E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Cadmium	2.11E+01	mg/kg	2.11E+01	mg/kg	M	4.73E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Chromium Total	8.38E+03	mg/kg	8.38E+03	mg/kg	M	1.87E-04	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Chromium VI (Hexavalent)	7.93E+01	mg/kg	7.93E+01	mg/kg	M	1.77E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Cobalt	3.65E+01	mg/kg	3.65E+01	mg/kg	M	8.17E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Copper	1.70E+03	mg/kg	1.70E+03	mg/kg	M	3.79E-05	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Iron	2.43E+04	mg/kg	2.43E+04	mg/kg	M	5.42E-04	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Lead	1.22E+03	mg/kg	1.22E+03	mg/kg	M	2.73E-05	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Manganese	5.68E+03	mg/kg	5.68E+03	mg/kg	M	1.27E-04	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Mercury	3.75E-01	mg/kg	3.75E-01	mg/kg	M	8.39E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Nickel	5.16E+03	mg/kg	5.16E+03	mg/kg	M	1.15E-04	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Selenium	2.63E+01	mg/kg	2.63E+01	mg/kg	M	5.88E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Thallium	1.01E+01	mg/kg	1.01E+01	mg/kg	M	2.26E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Vanadium	1.87E+02	mg/kg	1.87E+02	mg/kg	M	4.18E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Zinc	9.94E+02	mg/kg	9.94E+02	mg/kg	M	2.22E-05	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	(Total)										4.65E-07
Dermal	Aluminum	7.70E+04	mg/kg	7.70E+04	mg/kg	M	1.14E-04	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Antimony	3.39E+02	mg/kg	3.39E+02	mg/kg	M	5.00E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Arsenic	1.39E+01	mg/kg	1.39E+01	mg/kg	M	6.14E-08	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	9.21E-08
	Barium	2.73E+02	mg/kg	2.73E+02	mg/kg	M	4.03E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Beryllium	5.48E-01	mg/kg	5.48E-01	mg/kg	M	8.09E-10	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Cadmium	2.11E+01	mg/kg	2.11E+01	mg/kg	M	3.12E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Chromium Total	8.38E+03	mg/kg	8.38E+03	mg/kg	M	1.24E-05	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Chromium VI (Hexavalent)	7.93E+01	mg/kg	7.93E+01	mg/kg	M	1.17E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Cobalt	3.65E+01	mg/kg	3.65E+01	mg/kg	M	5.39E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Copper	1.70E+03	mg/kg	1.70E+03	mg/kg	M	2.50E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Iron	2.43E+04	mg/kg	2.43E+04	mg/kg	M	3.58E-05	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Lead	1.22E+03	mg/kg	1.22E+03	mg/kg	M	1.80E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Manganese	5.68E+03	mg/kg	5.68E+03	mg/kg	M	8.38E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Mercury	3.75E-01	mg/kg	3.75E-01	mg/kg	M	5.54E-10	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Nickel	5.16E+03	mg/kg	5.16E+03	mg/kg	M	7.62E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Selenium	2.63E+01	mg/kg	2.63E+01	mg/kg	M	3.88E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Thallium	1.01E+01	mg/kg	1.01E+01	mg/kg	M	1.49E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Vanadium	1.87E+02	mg/kg	1.87E+02	mg/kg	M	2.76E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Zinc	9.94E+02	mg/kg	9.94E+02	mg/kg	M	1.47E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	(Total)										9.21E-08

TABLE B.2.3.RME

CALCULATION OF CANCER RISKS FOR CURRENT MAINTENANCE WORKER EXPOSURE TO SLAG
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Medium: Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Inhalation	Aluminum	7.70E+04	mg/kg	7.70E+04	mg/kg	M	8.40E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Antimony	3.39E+02	mg/kg	3.39E+02	mg/kg	M	3.70E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Arsenic	1.39E+01	mg/kg	1.39E+01	mg/kg	M	1.51E-11	mg/kg-day	1.50E+01	$(mg/kg\text{-}day)^{-1}$	2.27E-10
	Barium	2.73E+02	mg/kg	2.73E+02	mg/kg	M	2.98E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	5.48E-01	mg/kg	5.48E-01	mg/kg	M	5.98E-13	mg/kg-day	8.40E+00	$(mg/kg\text{-}day)^{-1}$	5.03E-12
	Cadmium	2.11E+01	mg/kg	2.11E+01	mg/kg	M	2.31E-11	mg/kg-day	6.30E+00	$(mg/kg\text{-}day)^{-1}$	1.45E-10
	Chromium Total	8.38E+03	mg/kg	8.38E+03	mg/kg	M	9.15E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium VI (Hexavalent)	7.93E+01	mg/kg	7.93E+01	mg/kg	M	8.66E-11	mg/kg-day	4.20E+01	$(mg/kg\text{-}day)^{-1}$	3.64E-09
	Cobalt	3.65E+01	mg/kg	3.65E+01	mg/kg	M	3.99E-11	mg/kg-day	9.80E+00	$(mg/kg\text{-}day)^{-1}$	3.91E-10
	Copper	1.70E+03	mg/kg	1.70E+03	mg/kg	M	1.85E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	2.43E+04	mg/kg	2.43E+04	mg/kg	M	2.65E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Lead	1.22E+03	mg/kg	1.22E+03	mg/kg	M	1.33E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	5.68E+03	mg/kg	5.68E+03	mg/kg	M	6.20E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	3.75E-01	mg/kg	3.75E-01	mg/kg	M	4.09E-13	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	5.16E+03	mg/kg	5.16E+03	mg/kg	M	5.63E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	2.63E+01	mg/kg	2.63E+01	mg/kg	M	2.87E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Thallium	1.01E+01	mg/kg	1.01E+01	mg/kg	M	1.10E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Vanadium	1.87E+02	mg/kg	1.87E+02	mg/kg	M	2.04E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	9.94E+02	mg/kg	9.94E+02	mg/kg	M	1.09E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										4.40E-09
										Total Risk Across All Exposure Routes/Pathways	5.6E-07

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.4.CT

CALCULATION OF CANCER RISKS FOR CURRENT/FUTURE TRESPASSER EXPOSURE TO SURFACE SOIL AND SLAG
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Medium: Surface Soil and Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Trespasser
Receptor Age: Adolescent

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Aluminum	1.87E+04	mg/kg	1.87E+04	mg/kg	M	1.12E-03	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Antimony	2.32E+01	mg/kg	2.32E+01	mg/kg	M	1.39E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Arsenic	6.43E+00	mg/kg	6.43E+00	mg/kg	M	3.87E-07	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	5.80E-07
	Barium	1.66E+02	mg/kg	1.66E+02	mg/kg	M	9.97E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	5.85E-01	mg/kg	5.85E-01	mg/kg	M	3.52E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cadmium	3.35E+00	mg/kg	3.35E+00	mg/kg	M	2.01E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium Total	1.24E+03	mg/kg	1.24E+03	mg/kg	M	7.47E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium VI (Hexavalent)	6.80E+00	mg/kg	6.80E+00	mg/kg	M	4.09E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cobalt	2.24E+01	mg/kg	2.24E+01	mg/kg	M	1.35E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Copper	1.65E+02	mg/kg	1.65E+02	mg/kg	M	9.92E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	1.92E+04	mg/kg	1.92E+04	mg/kg	M	1.15E-03	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Lead	7.23E+01	mg/kg	7.23E+01	mg/kg	M	4.35E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	1.76E+03	mg/kg	1.76E+03	mg/kg	M	1.06E-04	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	3.00E-01	mg/kg	3.00E-01	mg/kg	M	1.80E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	2.54E+02	mg/kg	2.54E+02	mg/kg	M	1.53E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	4.87E+00	mg/kg	4.87E+00	mg/kg	M	2.93E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Thallium	2.62E+00	mg/kg	2.62E+00	mg/kg	M	1.58E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Vanadium	5.22E+01	mg/kg	5.22E+01	mg/kg	M	3.14E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	1.74E+02	mg/kg	1.74E+02	mg/kg	M	1.05E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										5.80E-07
Dermal	Aluminum	1.87E+04	mg/kg	1.87E+04	mg/kg	M	1.98E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Antimony	2.32E+01	mg/kg	2.32E+01	mg/kg	M	2.45E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Arsenic	6.43E+00	mg/kg	6.43E+00	mg/kg	M	2.04E-08	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	3.06E-08
	Barium	1.66E+02	mg/kg	1.66E+02	mg/kg	M	1.75E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	5.85E-01	mg/kg	5.85E-01	mg/kg	M	6.19E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cadmium	3.35E+00	mg/kg	3.35E+00	mg/kg	M	3.54E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium Total	1.24E+03	mg/kg	1.24E+03	mg/kg	M	1.31E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium VI (Hexavalent)	6.80E+00	mg/kg	6.80E+00	mg/kg	M	7.19E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cobalt	2.24E+01	mg/kg	2.24E+01	mg/kg	M	2.37E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Copper	1.65E+02	mg/kg	1.65E+02	mg/kg	M	1.75E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	1.92E+04	mg/kg	1.92E+04	mg/kg	M	2.03E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Lead	7.23E+01	mg/kg	7.23E+01	mg/kg	M	7.65E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	1.76E+03	mg/kg	1.76E+03	mg/kg	M	1.86E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	3.00E-01	mg/kg	3.00E-01	mg/kg	M	3.17E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	2.54E+02	mg/kg	2.54E+02	mg/kg	M	2.69E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	4.87E+00	mg/kg	4.87E+00	mg/kg	M	5.15E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Thallium	2.62E+00	mg/kg	2.62E+00	mg/kg	M	2.77E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Vanadium	5.22E+01	mg/kg	5.22E+01	mg/kg	M	5.52E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	1.74E+02	mg/kg	1.74E+02	mg/kg	M	1.85E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										3.06E-08

TABLE B.2.4.CT

CALCULATION OF CANCER RISKS FOR CURRENT/FUTURE TRESPASSER EXPOSURE TO SURFACE SOIL AND SLAG
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Medium: Surface Soil and Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Trespasser
Receptor Age: Adolescent

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Inhalation	Aluminum	1.87E+04	mg/kg	1.87E+04	mg/kg	M	1.98E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Antimony	2.32E+01	mg/kg	2.32E+01	mg/kg	M	2.46E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Arsenic	6.43E+00	mg/kg	6.43E+00	mg/kg	M	6.82E-12	mg/kg-day	1.50E+01	$(mg/kg\text{-}day)^{-1}$	1.02E-10
	Barium	1.66E+02	mg/kg	1.66E+02	mg/kg	M	1.76E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	5.85E-01	mg/kg	5.85E-01	mg/kg	M	6.21E-13	mg/kg-day	8.40E+00	$(mg/kg\text{-}day)^{-1}$	5.21E-12
	Cadmium	3.35E+00	mg/kg	3.35E+00	mg/kg	M	3.55E-12	mg/kg-day	6.30E+00	$(mg/kg\text{-}day)^{-1}$	2.24E-11
	Chromium Total	1.24E+03	mg/kg	1.24E+03	mg/kg	M	1.32E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium VI (Hexavalent)	6.80E+00	mg/kg	6.80E+00	mg/kg	M	7.21E-12	mg/kg-day	4.20E+01	$(mg/kg\text{-}day)^{-1}$	3.03E-10
	Cobalt	2.24E+01	mg/kg	2.24E+01	mg/kg	M	2.38E-11	mg/kg-day	9.80E+00	$(mg/kg\text{-}day)^{-1}$	2.33E-10
	Copper	1.65E+02	mg/kg	1.65E+02	mg/kg	M	1.75E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	1.92E+04	mg/kg	1.92E+04	mg/kg	M	2.03E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Lead	7.23E+01	mg/kg	7.23E+01	mg/kg	M	7.67E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	1.76E+03	mg/kg	1.76E+03	mg/kg	M	1.87E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	3.00E-01	mg/kg	3.00E-01	mg/kg	M	3.18E-13	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	2.54E+02	mg/kg	2.54E+02	mg/kg	M	2.69E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	4.87E+00	mg/kg	4.87E+00	mg/kg	M	5.17E-12	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Thallium	2.62E+00	mg/kg	2.62E+00	mg/kg	M	2.78E-12	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Vanadium	5.22E+01	mg/kg	5.22E+01	mg/kg	M	5.54E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	1.74E+02	mg/kg	1.74E+02	mg/kg	M	1.85E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										6.66E-10
										Total Risk Across All Exposure Routes/Pathways	6.1E-07

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.4.RME

CALCULATION OF CANCER RISKS FOR CURRENT/FUTURE TRESPASSER EXPOSURE TO SURFACE SOIL AND SLAG
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Medium: Surface Soil and Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Trespasser
Receptor Age: Adolescent

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Aluminum	3.69E+04	mg/kg	3.69E+04	mg/kg	M	4.44E-03	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Antimony	3.82E+01	mg/kg	3.82E+01	mg/kg	M	4.59E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Arsenic	1.81E+01	mg/kg	1.81E+01	mg/kg	M	2.17E-06	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	3.26E-06
	Barium	3.77E+02	mg/kg	3.77E+02	mg/kg	M	4.54E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	1.21E+00	mg/kg	1.21E+00	mg/kg	M	1.45E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cadmium	2.62E+01	mg/kg	2.62E+01	mg/kg	M	3.15E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium Total	1.97E+03	mg/kg	1.97E+03	mg/kg	M	2.37E-04	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium VI (Hexavalent)	9.95E+00	mg/kg	9.95E+00	mg/kg	M	1.20E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cobalt	9.15E+01	mg/kg	9.15E+01	mg/kg	M	1.10E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Copper	1.27E+03	mg/kg	1.27E+03	mg/kg	M	1.53E-04	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	2.16E+04	mg/kg	2.16E+04	mg/kg	M	2.60E-03	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Lead	3.09E+02	mg/kg	3.09E+02	mg/kg	M	3.71E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	5.39E+03	mg/kg	5.39E+03	mg/kg	M	6.48E-04	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	2.49E+00	mg/kg	2.49E+00	mg/kg	M	2.99E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	1.04E+03	mg/kg	1.04E+03	mg/kg	M	1.25E-04	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	6.61E+00	mg/kg	6.61E+00	mg/kg	M	7.95E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Thallium	3.89E+00	mg/kg	3.89E+00	mg/kg	M	4.67E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Vanadium	6.60E+01	mg/kg	6.60E+01	mg/kg	M	7.94E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	4.17E+02	mg/kg	4.17E+02	mg/kg	M	5.01E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										3.26E-06
Dermal	Aluminum	3.69E+04	mg/kg	3.69E+04	mg/kg	M	3.91E-04	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Antimony	3.82E+01	mg/kg	3.82E+01	mg/kg	M	4.04E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Arsenic	1.81E+01	mg/kg	1.81E+01	mg/kg	M	5.73E-07	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	8.60E-07
	Barium	3.77E+02	mg/kg	3.77E+02	mg/kg	M	3.99E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	1.21E+00	mg/kg	1.21E+00	mg/kg	M	1.28E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cadmium	2.62E+01	mg/kg	2.62E+01	mg/kg	M	2.77E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium Total	1.97E+03	mg/kg	1.97E+03	mg/kg	M	2.09E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium VI (Hexavalent)	9.95E+00	mg/kg	9.95E+00	mg/kg	M	1.05E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cobalt	9.15E+01	mg/kg	9.15E+01	mg/kg	M	9.68E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Copper	1.27E+03	mg/kg	1.27E+03	mg/kg	M	1.35E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	2.16E+04	mg/kg	2.16E+04	mg/kg	M	2.29E-04	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Lead	3.09E+02	mg/kg	3.09E+02	mg/kg	M	3.27E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	5.39E+03	mg/kg	5.39E+03	mg/kg	M	5.71E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	2.49E+00	mg/kg	2.49E+00	mg/kg	M	2.63E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	1.04E+03	mg/kg	1.04E+03	mg/kg	M	1.10E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	6.61E+00	mg/kg	6.61E+00	mg/kg	M	7.00E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Thallium	3.89E+00	mg/kg	3.89E+00	mg/kg	M	4.11E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Vanadium	6.60E+01	mg/kg	6.60E+01	mg/kg	M	6.98E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	4.17E+02	mg/kg	4.17E+02	mg/kg	M	4.41E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										8.60E-07

TABLE B.2.4.RME

CALCULATION OF CANCER RISKS FOR CURRENT/FUTURE TRESPASSER EXPOSURE TO SURFACE SOIL AND SLAG
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Medium: Surface Soil and Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Trespasser
Receptor Age: Adolescent

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Inhalation	Aluminum	3.69E+04	mg/kg	3.69E+04	mg/kg	M	1.57E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Antimony	3.82E+01	mg/kg	3.82E+01	mg/kg	M	1.62E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Arsenic	1.81E+01	mg/kg	1.81E+01	mg/kg	M	7.67E-11	mg/kg-day	1.50E+01	$(mg/kg\text{-}day)^{-1}$	1.15E-09
	Barium	3.77E+02	mg/kg	3.77E+02	mg/kg	M	1.60E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	1.21E+00	mg/kg	1.21E+00	mg/kg	M	5.13E-12	mg/kg-day	8.40E+00	$(mg/kg\text{-}day)^{-1}$	4.31E-11
	Cadmium	2.62E+01	mg/kg	2.62E+01	mg/kg	M	1.11E-10	mg/kg-day	6.30E+00	$(mg/kg\text{-}day)^{-1}$	7.00E-10
	Chromium Total	1.97E+03	mg/kg	1.97E+03	mg/kg	M	8.37E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium VI (Hexavalent)	9.95E+00	mg/kg	9.95E+00	mg/kg	M	4.22E-11	mg/kg-day	4.20E+01	$(mg/kg\text{-}day)^{-1}$	1.77E-09
	Cobalt	9.15E+01	mg/kg	9.15E+01	mg/kg	M	3.88E-10	mg/kg-day	9.80E+00	$(mg/kg\text{-}day)^{-1}$	3.81E-09
	Copper	1.27E+03	mg/kg	1.27E+03	mg/kg	M	5.41E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	2.16E+04	mg/kg	2.16E+04	mg/kg	M	9.17E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Lead	3.09E+02	mg/kg	3.09E+02	mg/kg	M	1.31E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	5.39E+03	mg/kg	5.39E+03	mg/kg	M	2.29E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	2.49E+00	mg/kg	2.49E+00	mg/kg	M	1.05E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	1.04E+03	mg/kg	1.04E+03	mg/kg	M	4.40E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	6.61E+00	mg/kg	6.61E+00	mg/kg	M	2.81E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Thallium	3.89E+00	mg/kg	3.89E+00	mg/kg	M	1.65E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Vanadium	6.60E+01	mg/kg	6.60E+01	mg/kg	M	2.80E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	4.17E+02	mg/kg	4.17E+02	mg/kg	M	1.77E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										7.47E-09
										Total Risk Across All Exposure Routes/Pathways	4.1E-06

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.5.CT

CALCULATION OF CANCER RISKS FOR CURRENT/FUTURE TRESPASSER EXPOSURE TO SURFACE SOIL
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Trespasser
Receptor Age: Adolescent

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Antimony	1.06E+01	mg/kg	1.06E+01	mg/kg	M	6.37E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Arsenic	6.27E+00	mg/kg	6.27E+00	mg/kg	M	3.77E-07	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	5.65E-07
	Barium	1.65E+02	mg/kg	1.65E+02	mg/kg	M	9.92E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	6.07E-01	mg/kg	6.07E-01	mg/kg	M	3.65E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cadmium	9.43E-01	mg/kg	9.43E-01	mg/kg	M	5.67E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium Total	2.90E+02	mg/kg	2.90E+02	mg/kg	M	1.74E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cobalt	2.43E+01	mg/kg	2.43E+01	mg/kg	M	1.46E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Copper	3.10E+01	mg/kg	3.10E+01	mg/kg	M	1.86E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	1.92E+04	mg/kg	1.92E+04	mg/kg	M	1.15E-03	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Manganese	1.45E+03	mg/kg	1.45E+03	mg/kg	M	8.72E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	4.20E-01	mg/kg	4.20E-01	mg/kg	M	2.52E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	2.46E+01	mg/kg	2.46E+01	mg/kg	M	1.48E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	2.76E+00	mg/kg	2.76E+00	mg/kg	M	1.66E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Thallium	1.54E+00	mg/kg	1.54E+00	mg/kg	M	9.26E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	1.55E+02	mg/kg	1.55E+02	mg/kg	M	9.31E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										5.65E-07
Dermal	Antimony	1.06E+01	mg/kg	1.06E+01	mg/kg	M	1.12E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Arsenic	6.27E+00	mg/kg	6.27E+00	mg/kg	M	1.99E-08	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	2.99E-08
	Barium	1.65E+02	mg/kg	1.65E+02	mg/kg	M	1.75E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	6.07E-01	mg/kg	6.07E-01	mg/kg	M	6.42E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cadmium	9.43E-01	mg/kg	9.43E-01	mg/kg	M	9.98E-11	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium Total	2.90E+02	mg/kg	2.90E+02	mg/kg	M	3.07E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cobalt	2.43E+01	mg/kg	2.43E+01	mg/kg	M	2.57E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Copper	3.10E+01	mg/kg	3.10E+01	mg/kg	M	3.27E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	1.92E+04	mg/kg	1.92E+04	mg/kg	M	2.03E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Manganese	1.45E+03	mg/kg	1.45E+03	mg/kg	M	1.54E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	4.20E-01	mg/kg	4.20E-01	mg/kg	M	4.44E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	2.46E+01	mg/kg	2.46E+01	mg/kg	M	2.61E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	2.76E+00	mg/kg	2.76E+00	mg/kg	M	2.92E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Thallium	1.54E+00	mg/kg	1.54E+00	mg/kg	M	1.63E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	1.55E+02	mg/kg	1.55E+02	mg/kg	M	1.64E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										2.99E-08

TABLE B.2.5.CT

CALCULATION OF CANCER RISKS FOR CURRENT/FUTURE TRESPASSER EXPOSURE TO SURFACE SOIL
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Trespasser
Receptor Age: Adolescent

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Inhalation	Antimony	1.06E+01	mg/kg	1.06E+01	mg/kg	M	1.12E-11	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Arsenic	6.27E+00	mg/kg	6.27E+00	mg/kg	M	6.65E-12	mg/kg-day	1.50E+01	(mg/kg-day) $^{-1}$	9.98E-11
	Barium	1.65E+02	mg/kg	1.65E+02	mg/kg	M	1.75E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	6.07E-01	mg/kg	6.07E-01	mg/kg	M	6.44E-13	mg/kg-day	8.40E+00	(mg/kg-day) $^{-1}$	5.41E-12
	Cadmium	9.43E-01	mg/kg	9.43E-01	mg/kg	M	1.00E-12	mg/kg-day	6.30E+00	(mg/kg-day) $^{-1}$	6.30E-12
	Chromium Total	2.90E+02	mg/kg	2.90E+02	mg/kg	M	3.07E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cobalt	2.43E+01	mg/kg	2.43E+01	mg/kg	M	2.58E-11	mg/kg-day	9.80E+00	(mg/kg-day) $^{-1}$	2.53E-10
	Copper	3.10E+01	mg/kg	3.10E+01	mg/kg	M	3.28E-11	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	1.92E+04	mg/kg	1.92E+04	mg/kg	M	2.03E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Manganese	1.45E+03	mg/kg	1.45E+03	mg/kg	M	1.54E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	4.20E-01	mg/kg	4.20E-01	mg/kg	M	4.46E-13	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	2.46E+01	mg/kg	2.46E+01	mg/kg	M	2.61E-11	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	2.76E+00	mg/kg	2.76E+00	mg/kg	M	2.93E-12	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Thallium	1.54E+00	mg/kg	1.54E+00	mg/kg	M	1.63E-12	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	1.55E+02	mg/kg	1.55E+02	mg/kg	M	1.64E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										3.64E-10

Total Risk Across All Exposure Routes/Pathways 6.0E-07

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.5.RME

CALCULATION OF CANCER RISKS FOR CURRENT/FUTURE TRESPASSER EXPOSURE TO SURFACE SOIL
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Trespasser
Receptor Age: Adolescent

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Antimony	1.54E+01	mg/kg	1.54E+01	mg/kg	M	1.86E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Arsenic	7.90E+00	mg/kg	7.90E+00	mg/kg	M	9.50E-07	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	1.42E-06
	Barium	5.40E+02	mg/kg	5.40E+02	mg/kg	M	6.49E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	8.12E-01	mg/kg	8.12E-01	mg/kg	M	9.76E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cadmium	1.29E+00	mg/kg	1.29E+00	mg/kg	M	1.55E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium Total	4.66E+02	mg/kg	4.66E+02	mg/kg	M	5.60E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cobalt	1.75E+02	mg/kg	1.75E+02	mg/kg	M	2.10E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Copper	3.86E+01	mg/kg	3.86E+01	mg/kg	M	4.64E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	2.16E+04	mg/kg	2.16E+04	mg/kg	M	2.60E-03	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	8.82E+03	mg/kg	8.82E+03	mg/kg	M	1.06E-03	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	4.86E+00	mg/kg	4.86E+00	mg/kg	M	5.84E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	2.78E+01	mg/kg	2.78E+01	mg/kg	M	3.34E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	3.85E+00	mg/kg	3.85E+00	mg/kg	M	4.63E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Thallium	2.28E+00	mg/kg	2.28E+00	mg/kg	M	2.74E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	2.03E+02	mg/kg	2.03E+02	mg/kg	M	2.44E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										1.42E-06
Dermal	Antimony	1.54E+01	mg/kg	1.54E+01	mg/kg	M	1.63E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Arsenic	7.90E+00	mg/kg	7.90E+00	mg/kg	M	2.51E-07	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	3.76E-07
	Barium	5.40E+02	mg/kg	5.40E+02	mg/kg	M	5.71E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	8.12E-01	mg/kg	8.12E-01	mg/kg	M	8.59E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cadmium	1.29E+00	mg/kg	1.29E+00	mg/kg	M	1.36E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium Total	4.66E+02	mg/kg	4.66E+02	mg/kg	M	4.93E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cobalt	1.75E+02	mg/kg	1.75E+02	mg/kg	M	1.85E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Copper	3.86E+01	mg/kg	3.86E+01	mg/kg	M	4.08E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	2.16E+04	mg/kg	2.16E+04	mg/kg	M	2.29E-04	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	8.82E+03	mg/kg	8.82E+03	mg/kg	M	9.33E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	4.86E+00	mg/kg	4.86E+00	mg/kg	M	5.14E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	2.78E+01	mg/kg	2.78E+01	mg/kg	M	2.94E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	3.85E+00	mg/kg	3.85E+00	mg/kg	M	4.07E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Thallium	2.28E+00	mg/kg	2.28E+00	mg/kg	M	2.41E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	2.03E+02	mg/kg	2.03E+02	mg/kg	M	2.15E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										3.76E-07

TABLE B.2.5.RME

CALCULATION OF CANCER RISKS FOR CURRENT/FUTURE TRESPASSER EXPOSURE TO SURFACE SOIL
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Trespasser
Receptor Age: Adolescent

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Inhalation	Antimony	1.54E+01	mg/kg	1.54E+01	mg/kg	M	6.56E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Arsenic	7.90E+00	mg/kg	7.90E+00	mg/kg	M	3.35E-11	mg/kg-day	1.50E+01	$(mg/kg\text{-}day)^{-1}$	5.03E-10
	Barium	5.40E+02	mg/kg	5.40E+02	mg/kg	M	2.29E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	8.12E-01	mg/kg	8.12E-01	mg/kg	M	3.44E-12	mg/kg-day	8.40E+00	$(mg/kg\text{-}day)^{-1}$	2.89E-11
	Cadmium	1.29E+00	mg/kg	1.29E+00	mg/kg	M	5.45E-12	mg/kg-day	6.30E+00	$(mg/kg\text{-}day)^{-1}$	3.44E-11
	Chromium Total	4.66E+02	mg/kg	4.66E+02	mg/kg	M	1.98E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cobalt	1.75E+02	mg/kg	1.75E+02	mg/kg	M	7.43E-10	mg/kg-day	9.80E+00	$(mg/kg\text{-}day)^{-1}$	7.28E-09
	Copper	3.86E+01	mg/kg	3.86E+01	mg/kg	M	1.64E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	2.16E+04	mg/kg	2.16E+04	mg/kg	M	9.18E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	8.82E+03	mg/kg	8.82E+03	mg/kg	M	3.74E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	4.86E+00	mg/kg	4.86E+00	mg/kg	M	2.06E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	2.78E+01	mg/kg	2.78E+01	mg/kg	M	1.18E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	3.85E+00	mg/kg	3.85E+00	mg/kg	M	1.63E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Thallium	2.28E+00	mg/kg	2.28E+00	mg/kg	M	9.68E-12	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	2.03E+02	mg/kg	2.03E+02	mg/kg	M	8.60E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										7.84E-09

Total Risk Across All Exposure Routes/Pathways 1.8E-06

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.6.CT

CALCULATION OF CANCER RISKS FOR CURRENT/FUTURE TRESPASSER EXPOSURE TO SLAG
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Medium: Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Trespasser
Receptor Age: Adolescent

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Aluminum	2.07E+04	mg/kg	2.07E+04	mg/kg	M	1.25E-03	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Antimony	9.77E+01	mg/kg	9.77E+01	mg/kg	M	5.87E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Arsenic	4.60E+00	mg/kg	4.60E+00	mg/kg	M	2.77E-07	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	4.15E-07
	Barium	1.75E+02	mg/kg	1.75E+02	mg/kg	M	1.05E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	4.36E-01	mg/kg	4.36E-01	mg/kg	M	2.62E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cadmium	8.90E+00	mg/kg	8.90E+00	mg/kg	M	5.35E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium Total	3.86E+03	mg/kg	3.86E+03	mg/kg	M	2.32E-04	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium VI (Hexavalent)	1.40E+01	mg/kg	1.40E+01	mg/kg	M	8.42E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cobalt	2.02E+01	mg/kg	2.02E+01	mg/kg	M	1.21E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Copper	3.44E+02	mg/kg	3.44E+02	mg/kg	M	2.07E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	1.93E+04	mg/kg	1.93E+04	mg/kg	M	1.16E-03	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Lead	1.35E+02	mg/kg	1.35E+02	mg/kg	M	8.13E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Manganese	2.68E+03	mg/kg	2.68E+03	mg/kg	M	1.61E-04	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	7.20E-02	mg/kg	7.20E-02	mg/kg	M	4.33E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	1.41E+03	mg/kg	1.41E+03	mg/kg	M	8.47E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	1.29E+01	mg/kg	1.29E+01	mg/kg	M	7.75E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Thallium	5.88E+00	mg/kg	5.88E+00	mg/kg	M	3.53E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Vanadium	1.00E+02	mg/kg	1.00E+02	mg/kg	M	6.04E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	2.24E+02	mg/kg	2.24E+02	mg/kg	M	1.35E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										4.15E-07
Dermal	Aluminum	2.07E+04	mg/kg	2.07E+04	mg/kg	M	2.19E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Antimony	9.77E+01	mg/kg	9.77E+01	mg/kg	M	1.03E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Arsenic	4.60E+00	mg/kg	4.60E+00	mg/kg	M	1.46E-08	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	2.19E-08
	Barium	1.75E+02	mg/kg	1.75E+02	mg/kg	M	1.85E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	4.36E-01	mg/kg	4.36E-01	mg/kg	M	4.61E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cadmium	8.90E+00	mg/kg	8.90E+00	mg/kg	M	9.42E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium Total	3.86E+03	mg/kg	3.86E+03	mg/kg	M	4.09E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium VI (Hexavalent)	1.40E+01	mg/kg	1.40E+01	mg/kg	M	1.48E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cobalt	2.02E+01	mg/kg	2.02E+01	mg/kg	M	2.13E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Copper	3.44E+02	mg/kg	3.44E+02	mg/kg	M	3.64E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	1.93E+04	mg/kg	1.93E+04	mg/kg	M	2.04E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Lead	1.35E+02	mg/kg	1.35E+02	mg/kg	M	1.43E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Manganese	2.68E+03	mg/kg	2.68E+03	mg/kg	M	2.84E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	7.20E-02	mg/kg	7.20E-02	mg/kg	M	7.62E-11	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	1.41E+03	mg/kg	1.41E+03	mg/kg	M	1.49E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	1.29E+01	mg/kg	1.29E+01	mg/kg	M	1.36E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Thallium	5.88E+00	mg/kg	5.88E+00	mg/kg	M	6.22E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Vanadium	1.00E+02	mg/kg	1.00E+02	mg/kg	M	1.06E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	2.24E+02	mg/kg	2.24E+02	mg/kg	M	2.37E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										2.19E-08

TABLE B.2.6.CT

CALCULATION OF CANCER RISKS FOR CURRENT/FUTURE TRESPASSER EXPOSURE TO SLAG
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Medium: Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Trespasser
Receptor Age: Adolescent

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Inhalation	Aluminum	2.07E+04	mg/kg	2.07E+04	mg/kg	M	2.20E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Antimony	9.77E+01	mg/kg	9.77E+01	mg/kg	M	1.04E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Arsenic	4.60E+00	mg/kg	4.60E+00	mg/kg	M	4.88E-12	mg/kg-day	1.50E+01	$(mg/kg\text{-}day)^{-1}$	7.32E-11
	Barium	1.75E+02	mg/kg	1.75E+02	mg/kg	M	1.86E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	4.36E-01	mg/kg	4.36E-01	mg/kg	M	4.62E-13	mg/kg-day	8.40E+00	$(mg/kg\text{-}day)^{-1}$	3.88E-12
	Cadmium	8.90E+00	mg/kg	8.90E+00	mg/kg	M	9.44E-12	mg/kg-day	6.30E+00	$(mg/kg\text{-}day)^{-1}$	5.95E-11
	Chromium Total	3.86E+03	mg/kg	3.86E+03	mg/kg	M	4.10E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium VI (Hexavalent)	1.40E+01	mg/kg	1.40E+01	mg/kg	M	1.49E-11	mg/kg-day	4.20E+01	$(mg/kg\text{-}day)^{-1}$	6.24E-10
	Cobalt	2.02E+01	mg/kg	2.02E+01	mg/kg	M	2.14E-11	mg/kg-day	9.80E+00	$(mg/kg\text{-}day)^{-1}$	2.10E-10
	Copper	3.44E+02	mg/kg	3.44E+02	mg/kg	M	3.65E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	1.93E+04	mg/kg	1.93E+04	mg/kg	M	2.05E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Lead	1.35E+02	mg/kg	1.35E+02	mg/kg	M	1.43E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	2.68E+03	mg/kg	2.68E+03	mg/kg	M	2.85E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	7.20E-02	mg/kg	7.20E-02	mg/kg	M	7.64E-14	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	1.41E+03	mg/kg	1.41E+03	mg/kg	M	1.49E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	1.29E+01	mg/kg	1.29E+01	mg/kg	M	1.37E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Thallium	5.88E+00	mg/kg	5.88E+00	mg/kg	M	6.24E-12	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Vanadium	1.00E+02	mg/kg	1.00E+02	mg/kg	M	1.07E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	2.24E+02	mg/kg	2.24E+02	mg/kg	M	2.38E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										9.70E-10
										Total Risk Across All Exposure Routes/Pathways	4.4E-07

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.6.RME

CALCULATION OF CANCER RISKS FOR CURRENT/FUTURE TRESPASSER EXPOSURE TO SLAG
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Medium: Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Trespasser
Receptor Age: Adolescent

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Aluminum	7.70E+04	mg/kg	7.70E+04	mg/kg	M	9.25E-03	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Antimony	3.39E+02	mg/kg	3.39E+02	mg/kg	M	4.08E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Arsenic	1.39E+01	mg/kg	1.39E+01	mg/kg	M	1.67E-06	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	2.50E-06
	Barium	2.73E+02	mg/kg	2.73E+02	mg/kg	M	3.28E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	5.48E-01	mg/kg	5.48E-01	mg/kg	M	6.59E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cadmium	2.11E+01	mg/kg	2.11E+01	mg/kg	M	2.54E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium Total	8.38E+03	mg/kg	8.38E+03	mg/kg	M	1.01E-03	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium VI (Hexavalent)	7.93E+01	mg/kg	7.93E+01	mg/kg	M	9.53E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cobalt	3.65E+01	mg/kg	3.65E+01	mg/kg	M	4.39E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Copper	1.70E+03	mg/kg	1.70E+03	mg/kg	M	2.04E-04	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	2.43E+04	mg/kg	2.43E+04	mg/kg	M	2.92E-03	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Lead	1.22E+03	mg/kg	1.22E+03	mg/kg	M	1.47E-04	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	5.68E+03	mg/kg	5.68E+03	mg/kg	M	6.83E-04	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	3.75E-01	mg/kg	3.75E-01	mg/kg	M	4.51E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	5.16E+03	mg/kg	5.16E+03	mg/kg	M	6.20E-04	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	2.63E+01	mg/kg	2.63E+01	mg/kg	M	3.16E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Thallium	1.01E+01	mg/kg	1.01E+01	mg/kg	M	1.22E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Vanadium	1.87E+02	mg/kg	1.87E+02	mg/kg	M	2.25E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	9.94E+02	mg/kg	9.94E+02	mg/kg	M	1.19E-04	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										2.50E-06
Dermal	Aluminum	7.70E+04	mg/kg	7.70E+04	mg/kg	M	8.14E-04	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Antimony	3.39E+02	mg/kg	3.39E+02	mg/kg	M	3.59E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Arsenic	1.39E+01	mg/kg	1.39E+01	mg/kg	M	4.40E-07	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	6.60E-07
	Barium	2.73E+02	mg/kg	2.73E+02	mg/kg	M	2.89E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	5.48E-01	mg/kg	5.48E-01	mg/kg	M	5.80E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cadmium	2.11E+01	mg/kg	2.11E+01	mg/kg	M	2.24E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium Total	8.38E+03	mg/kg	8.38E+03	mg/kg	M	8.87E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium VI (Hexavalent)	7.93E+01	mg/kg	7.93E+01	mg/kg	M	8.39E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cobalt	3.65E+01	mg/kg	3.65E+01	mg/kg	M	3.86E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Copper	1.70E+03	mg/kg	1.70E+03	mg/kg	M	1.79E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	2.43E+04	mg/kg	2.43E+04	mg/kg	M	2.57E-04	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Lead	1.22E+03	mg/kg	1.22E+03	mg/kg	M	1.29E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	5.68E+03	mg/kg	5.68E+03	mg/kg	M	6.01E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	3.75E-01	mg/kg	3.75E-01	mg/kg	M	3.97E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	5.16E+03	mg/kg	5.16E+03	mg/kg	M	5.46E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	2.63E+01	mg/kg	2.63E+01	mg/kg	M	2.78E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Thallium	1.01E+01	mg/kg	1.01E+01	mg/kg	M	1.07E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Vanadium	1.87E+02	mg/kg	1.87E+02	mg/kg	M	1.98E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	9.94E+02	mg/kg	9.94E+02	mg/kg	M	1.05E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										6.60E-07

TABLE B.2.6.RME

CALCULATION OF CANCER RISKS FOR CURRENT/FUTURE TRESPASSER EXPOSURE TO SLAG
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Medium: Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Trespasser
Receptor Age: Adolescent

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Inhalation	Aluminum	7.70E+04	mg/kg	7.70E+04	mg/kg	M	3.27E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Antimony	3.39E+02	mg/kg	3.39E+02	mg/kg	M	1.44E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Arsenic	1.39E+01	mg/kg	1.39E+01	mg/kg	M	5.88E-11	mg/kg-day	1.50E+01	$(mg/kg\text{-}day)^{-1}$	8.82E-10
	Barium	2.73E+02	mg/kg	2.73E+02	mg/kg	M	1.16E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	5.48E-01	mg/kg	5.48E-01	mg/kg	M	2.33E-12	mg/kg-day	8.40E+00	$(mg/kg\text{-}day)^{-1}$	1.95E-11
	Cadmium	2.11E+01	mg/kg	2.11E+01	mg/kg	M	8.97E-11	mg/kg-day	6.30E+00	$(mg/kg\text{-}day)^{-1}$	5.65E-10
	Chromium Total	8.38E+03	mg/kg	8.38E+03	mg/kg	M	3.56E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium VI (Hexavalent)	7.93E+01	mg/kg	7.93E+01	mg/kg	M	3.36E-10	mg/kg-day	4.20E+01	$(mg/kg\text{-}day)^{-1}$	1.41E-08
	Cobalt	3.65E+01	mg/kg	3.65E+01	mg/kg	M	1.55E-10	mg/kg-day	9.80E+00	$(mg/kg\text{-}day)^{-1}$	1.52E-09
	Copper	1.70E+03	mg/kg	1.70E+03	mg/kg	M	7.20E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	2.43E+04	mg/kg	2.43E+04	mg/kg	M	1.03E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Lead	1.22E+03	mg/kg	1.22E+03	mg/kg	M	5.18E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	5.68E+03	mg/kg	5.68E+03	mg/kg	M	2.41E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	3.75E-01	mg/kg	3.75E-01	mg/kg	M	1.59E-12	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	5.16E+03	mg/kg	5.16E+03	mg/kg	M	2.19E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	2.63E+01	mg/kg	2.63E+01	mg/kg	M	1.12E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Thallium	1.01E+01	mg/kg	1.01E+01	mg/kg	M	4.29E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Vanadium	1.87E+02	mg/kg	1.87E+02	mg/kg	M	7.92E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	9.94E+02	mg/kg	9.94E+02	mg/kg	M	4.22E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										1.71E-08

Total Risk Across All Exposure Routes/Pathways 3.2E-06

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.7.CT

CALCULATION OF CANCER RISKS FOR FUTURE INDUSTRIAL/ COMMERCIAL WORKER EXPOSURE TO SOIL AND SLAG
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Soil and Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Aluminum	1.80E+04	mg/kg	1.80E+04	mg/kg	M	1.98E-03	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Arsenic	6.94E+00	mg/kg	6.94E+00	mg/kg	M	7.65E-07	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	1.15E-06
	Barium	1.45E+02	mg/kg	1.45E+02	mg/kg	M	1.60E-05	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Beryllium	7.66E-01	mg/kg	7.66E-01	mg/kg	M	8.44E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Cadmium	2.41E+00	mg/kg	2.41E+00	mg/kg	M	2.66E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Chromium Total	1.24E+03	mg/kg	1.24E+03	mg/kg	M	1.36E-04	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Chromium VI (Hexavalent)	1.70E+01	mg/kg	1.70E+01	mg/kg	M	1.87E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Cobalt	1.78E+01	mg/kg	1.78E+01	mg/kg	M	1.96E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Copper	1.16E+02	mg/kg	1.16E+02	mg/kg	M	1.28E-05	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Iron	2.29E+04	mg/kg	2.29E+04	mg/kg	M	2.53E-03	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Lead	5.67E+01	mg/kg	5.67E+01	mg/kg	M	6.25E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Manganese	1.43E+03	mg/kg	1.43E+03	mg/kg	M	1.57E-04	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Mercury	3.60E-01	mg/kg	3.60E-01	mg/kg	M	3.97E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Nickel	1.74E+02	mg/kg	1.74E+02	mg/kg	M	1.92E-05	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Selenium	4.30E+00	mg/kg	4.30E+00	mg/kg	M	4.74E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Thallium	3.75E+00	mg/kg	3.75E+00	mg/kg	M	4.13E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Vanadium	5.07E+01	mg/kg	5.07E+01	mg/kg	M	5.58E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Zinc	1.70E+02	mg/kg	1.70E+02	mg/kg	M	1.87E-05	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	(Total)										1.15E-06
Dermal	Aluminum	1.80E+04	mg/kg	1.80E+04	mg/kg	M	1.31E-05	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Arsenic	6.94E+00	mg/kg	6.94E+00	mg/kg	M	1.51E-08	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	2.27E-08
	Barium	1.45E+02	mg/kg	1.45E+02	mg/kg	M	1.05E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Beryllium	7.66E-01	mg/kg	7.66E-01	mg/kg	M	5.57E-10	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Cadmium	2.41E+00	mg/kg	2.41E+00	mg/kg	M	1.75E-10	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Chromium Total	1.24E+03	mg/kg	1.24E+03	mg/kg	M	9.00E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Chromium VI (Hexavalent)	1.70E+01	mg/kg	1.70E+01	mg/kg	M	1.24E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Cobalt	1.78E+01	mg/kg	1.78E+01	mg/kg	M	1.29E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Copper	1.16E+02	mg/kg	1.16E+02	mg/kg	M	8.42E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Iron	2.29E+04	mg/kg	2.29E+04	mg/kg	M	1.67E-05	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Lead	5.67E+01	mg/kg	5.67E+01	mg/kg	M	4.12E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Manganese	1.43E+03	mg/kg	1.43E+03	mg/kg	M	1.04E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Mercury	3.60E-01	mg/kg	3.60E-01	mg/kg	M	2.62E-10	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Nickel	1.74E+02	mg/kg	1.74E+02	mg/kg	M	1.27E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Selenium	4.30E+00	mg/kg	4.30E+00	mg/kg	M	3.13E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Thallium	3.75E+00	mg/kg	3.75E+00	mg/kg	M	2.73E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Vanadium	5.07E+01	mg/kg	5.07E+01	mg/kg	M	3.69E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Zinc	1.70E+02	mg/kg	1.70E+02	mg/kg	M	1.23E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	(Total)										2.27E-08

TABLE B.2.7.CT

CALCULATION OF CANCER RISKS FOR FUTURE INDUSTRIAL/ COMMERCIAL WORKER EXPOSURE TO SOIL AND SLAG
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Soil and Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Inhalation	Aluminum	1.80E+04	mg/kg	1.80E+04	mg/kg	M	9.68E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Arsenic	6.94E+00	mg/kg	6.94E+00	mg/kg	M	3.73E-11	mg/kg-day	1.50E+01	$(mg/kg\text{-}day)^{-1}$	5.60E-10
	Barium	1.45E+02	mg/kg	1.45E+02	mg/kg	M	7.79E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	7.66E-01	mg/kg	7.66E-01	mg/kg	M	4.12E-12	mg/kg-day	8.40E+00	$(mg/kg\text{-}day)^{-1}$	3.46E-11
	Cadmium	2.41E+00	mg/kg	2.41E+00	mg/kg	M	1.30E-11	mg/kg-day	6.30E+00	$(mg/kg\text{-}day)^{-1}$	8.17E-11
	Chromium Total	1.24E+03	mg/kg	1.24E+03	mg/kg	M	6.66E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium VI (Hexavalent)	1.70E+01	mg/kg	1.70E+01	mg/kg	M	9.15E-11	mg/kg-day	4.20E+01	$(mg/kg\text{-}day)^{-1}$	3.84E-09
	Cobalt	1.78E+01	mg/kg	1.78E+01	mg/kg	M	9.58E-11	mg/kg-day	9.80E+00	$(mg/kg\text{-}day)^{-1}$	9.39E-10
	Copper	1.16E+02	mg/kg	1.16E+02	mg/kg	M	6.23E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	2.29E+04	mg/kg	2.29E+04	mg/kg	M	1.23E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Lead	5.67E+01	mg/kg	5.67E+01	mg/kg	M	3.05E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	1.43E+03	mg/kg	1.43E+03	mg/kg	M	7.68E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	3.60E-01	mg/kg	3.60E-01	mg/kg	M	1.94E-12	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	1.74E+02	mg/kg	1.74E+02	mg/kg	M	9.36E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	4.30E+00	mg/kg	4.30E+00	mg/kg	M	2.31E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Thallium	3.75E+00	mg/kg	3.75E+00	mg/kg	M	2.02E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Vanadium	5.07E+01	mg/kg	5.07E+01	mg/kg	M	2.73E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	1.70E+02	mg/kg	1.70E+02	mg/kg	M	9.13E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										5.46E-09
										Total Risk Across All Exposure Routes/Pathways	1.2E-06

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.7.RME

CALCULATION OF CANCER RISKS FOR FUTURE INDUSTRIAL/ COMMERCIAL WORKER EXPOSURE TO SOIL AND SLAG
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Soil and Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Aluminum	2.89E+04	mg/kg	2.89E+04	mg/kg	M	1.01E-02	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Arsenic	9.68E+00	mg/kg	9.68E+00	mg/kg	M	3.38E-06	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	5.07E-06
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M	5.95E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	9.71E-01	mg/kg	9.71E-01	mg/kg	M	3.39E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cadmium	1.34E+01	mg/kg	1.34E+01	mg/kg	M	4.68E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium Total	1.59E+03	mg/kg	1.59E+03	mg/kg	M	5.56E-04	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium VI (Hexavalent)	5.82E+01	mg/kg	5.82E+01	mg/kg	M	2.03E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cobalt	5.70E+01	mg/kg	5.70E+01	mg/kg	M	1.99E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Copper	5.37E+02	mg/kg	5.37E+02	mg/kg	M	1.88E-04	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	2.83E+04	mg/kg	2.83E+04	mg/kg	M	9.90E-03	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Lead	8.16E+01	mg/kg	8.16E+01	mg/kg	M	2.85E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Manganese	1.81E+03	mg/kg	1.81E+03	mg/kg	M	6.33E-04	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	3.56E+00	mg/kg	3.56E+00	mg/kg	M	1.24E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	6.17E+02	mg/kg	6.17E+02	mg/kg	M	2.16E-04	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	5.41E+00	mg/kg	5.41E+00	mg/kg	M	1.89E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Thallium	5.40E+00	mg/kg	5.40E+00	mg/kg	M	1.89E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Vanadium	5.84E+01	mg/kg	5.84E+01	mg/kg	M	2.04E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	2.08E+02	mg/kg	2.08E+02	mg/kg	M	7.28E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										5.07E-06
Dermal	Aluminum	2.89E+04	mg/kg	2.89E+04	mg/kg	M	6.66E-04	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Arsenic	9.68E+00	mg/kg	9.68E+00	mg/kg	M	6.69E-07	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	1.00E-06
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M	3.93E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	9.71E-01	mg/kg	9.71E-01	mg/kg	M	2.24E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cadmium	1.34E+01	mg/kg	1.34E+01	mg/kg	M	3.09E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium Total	1.59E+03	mg/kg	1.59E+03	mg/kg	M	3.67E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium VI (Hexavalent)	5.82E+01	mg/kg	5.82E+01	mg/kg	M	1.34E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cobalt	5.70E+01	mg/kg	5.70E+01	mg/kg	M	1.31E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Copper	5.37E+02	mg/kg	5.37E+02	mg/kg	M	1.24E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	2.83E+04	mg/kg	2.83E+04	mg/kg	M	6.53E-04	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Lead	8.16E+01	mg/kg	8.16E+01	mg/kg	M	1.88E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Manganese	1.81E+03	mg/kg	1.81E+03	mg/kg	M	4.18E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	3.56E+00	mg/kg	3.56E+00	mg/kg	M	8.21E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	6.17E+02	mg/kg	6.17E+02	mg/kg	M	1.42E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	5.41E+00	mg/kg	5.41E+00	mg/kg	M	1.25E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Thallium	5.40E+00	mg/kg	5.40E+00	mg/kg	M	1.25E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Vanadium	5.84E+01	mg/kg	5.84E+01	mg/kg	M	1.35E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	2.08E+02	mg/kg	2.08E+02	mg/kg	M	4.80E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										1.00E-06

TABLE B.2.7.RME

CALCULATION OF CANCER RISKS FOR FUTURE INDUSTRIAL/ COMMERCIAL WORKER EXPOSURE TO SOIL AND SLAG
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Soil and Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Inhalation	Aluminum	2.89E+04	mg/kg	2.89E+04	mg/kg	M	4.93E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Arsenic	9.68E+00	mg/kg	9.68E+00	mg/kg	M	1.65E-10	mg/kg-day	1.50E+01	$(mg/kg\text{-}day)^{-1}$	2.48E-09
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M	2.91E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	9.71E-01	mg/kg	9.71E-01	mg/kg	M	1.66E-11	mg/kg-day	8.40E+00	$(mg/kg\text{-}day)^{-1}$	1.39E-10
	Cadmium	1.34E+01	mg/kg	1.34E+01	mg/kg	M	2.29E-10	mg/kg-day	6.30E+00	$(mg/kg\text{-}day)^{-1}$	1.44E-09
	Chromium Total	1.59E+03	mg/kg	1.59E+03	mg/kg	M	2.72E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium VI (Hexavalent)	5.82E+01	mg/kg	5.82E+01	mg/kg	M	9.93E-10	mg/kg-day	4.20E+01	$(mg/kg\text{-}day)^{-1}$	4.17E-08
	Cobalt	5.70E+01	mg/kg	5.70E+01	mg/kg	M	9.72E-10	mg/kg-day	9.80E+00	$(mg/kg\text{-}day)^{-1}$	9.53E-09
	Copper	5.37E+02	mg/kg	5.37E+02	mg/kg	M	9.16E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	2.83E+04	mg/kg	2.83E+04	mg/kg	M	4.83E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Lead	8.16E+01	mg/kg	8.16E+01	mg/kg	M	1.39E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	1.81E+03	mg/kg	1.81E+03	mg/kg	M	3.09E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	3.56E+00	mg/kg	3.56E+00	mg/kg	M	6.07E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	6.17E+02	mg/kg	6.17E+02	mg/kg	M	1.05E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	5.41E+00	mg/kg	5.41E+00	mg/kg	M	9.22E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Thallium	5.40E+00	mg/kg	5.40E+00	mg/kg	M	9.21E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Vanadium	5.84E+01	mg/kg	5.84E+01	mg/kg	M	9.97E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	2.08E+02	mg/kg	2.08E+02	mg/kg	M	3.55E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										5.53E-08
										Total Risk Across All Exposure Routes/Pathways	6.1E-06

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.8.CT

CALCULATION OF CANCER RISKS FOR FUTURE INDUSTRIAL/ COMMERCIAL WORKER EXPOSURE TO SOIL
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Arsenic	6.16E+00	mg/kg	6.16E+00	mg/kg	M	6.79E-07	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	1.02E-06
	Barium	1.48E+02	mg/kg	1.48E+02	mg/kg	M	1.63E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	6.90E-01	mg/kg	6.90E-01	mg/kg	M	7.60E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cadmium	1.22E+00	mg/kg	1.22E+00	mg/kg	M	1.34E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium Total	1.65E+02	mg/kg	1.65E+02	mg/kg	M	1.82E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cobalt	1.79E+01	mg/kg	1.79E+01	mg/kg	M	1.97E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Copper	3.34E+01	mg/kg	3.34E+01	mg/kg	M	3.68E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	2.42E+04	mg/kg	2.42E+04	mg/kg	M	2.67E-03	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Lead	5.41E+01	mg/kg	5.41E+01	mg/kg	M	5.96E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	1.05E+03	mg/kg	1.05E+03	mg/kg	M	1.16E-04	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	4.40E-01	mg/kg	4.40E-01	mg/kg	M	4.85E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	2.62E+01	mg/kg	2.62E+01	mg/kg	M	2.88E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	2.35E+00	mg/kg	2.35E+00	mg/kg	M	2.59E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	1.64E+02	mg/kg	1.64E+02	mg/kg	M	1.80E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										1.02E-06
Dermal	Arsenic	6.16E+00	mg/kg	6.16E+00	mg/kg	M	1.34E-08	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	2.02E-08
	Barium	1.48E+02	mg/kg	1.48E+02	mg/kg	M	1.07E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	6.90E-01	mg/kg	6.90E-01	mg/kg	M	5.02E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cadmium	1.22E+00	mg/kg	1.22E+00	mg/kg	M	8.87E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium Total	1.65E+02	mg/kg	1.65E+02	mg/kg	M	1.20E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cobalt	1.79E+01	mg/kg	1.79E+01	mg/kg	M	1.30E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Copper	3.34E+01	mg/kg	3.34E+01	mg/kg	M	2.43E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	2.42E+04	mg/kg	2.42E+04	mg/kg	M	1.76E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Lead	5.41E+01	mg/kg	5.41E+01	mg/kg	M	3.93E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	1.05E+03	mg/kg	1.05E+03	mg/kg	M	7.64E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	4.40E-01	mg/kg	4.40E-01	mg/kg	M	3.20E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	2.62E+01	mg/kg	2.62E+01	mg/kg	M	1.90E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	2.35E+00	mg/kg	2.35E+00	mg/kg	M	1.71E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	1.64E+02	mg/kg	1.64E+02	mg/kg	M	1.19E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										2.02E-08

TABLE B.2.8.CT

CALCULATION OF CANCER RISKS FOR FUTURE INDUSTRIAL/ COMMERCIAL WORKER EXPOSURE TO SOIL
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Inhalation	Arsenic	6.16E+00	mg/kg	6.16E+00	mg/kg	M	3.31E-11	mg/kg-day	1.50E+01	$(mg/kg\text{-}day)^{-1}$	4.97E-10
	Barium	1.48E+02	mg/kg	1.48E+02	mg/kg	M	7.95E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	6.90E-01	mg/kg	6.90E-01	mg/kg	M	3.71E-12	mg/kg-day	8.40E+00	$(mg/kg\text{-}day)^{-1}$	3.12E-11
	Cadmium	1.22E+00	mg/kg	1.22E+00	mg/kg	M	6.56E-12	mg/kg-day	6.30E+00	$(mg/kg\text{-}day)^{-1}$	4.14E-11
	Chromium Total	1.65E+02	mg/kg	1.65E+02	mg/kg	M	8.88E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cobalt	1.79E+01	mg/kg	1.79E+01	mg/kg	M	9.63E-11	mg/kg-day	9.80E+00	$(mg/kg\text{-}day)^{-1}$	9.44E-10
	Copper	3.34E+01	mg/kg	3.34E+01	mg/kg	M	1.80E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	2.42E+04	mg/kg	2.42E+04	mg/kg	M	1.30E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Lead	5.41E+01	mg/kg	5.41E+01	mg/kg	M	2.91E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	1.05E+03	mg/kg	1.05E+03	mg/kg	M	5.65E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	4.40E-01	mg/kg	4.40E-01	mg/kg	M	2.37E-12	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	2.62E+01	mg/kg	2.62E+01	mg/kg	M	1.41E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	2.35E+00	mg/kg	2.35E+00	mg/kg	M	1.26E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	1.64E+02	mg/kg	1.64E+02	mg/kg	M	8.80E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										1.51E-09
										Total Risk Across All Exposure Routes/Pathways	1.0E-06

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.8.RME

CALCULATION OF CANCER RISKS FOR FUTURE INDUSTRIAL/ COMMERCIAL WORKER EXPOSURE TO SOIL
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Arsenic	7.06E+00	mg/kg	7.06E+00	mg/kg	M	2.47E-06	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	3.70E-06
	Barium	3.36E+02	mg/kg	3.36E+02	mg/kg	M	1.18E-04	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	7.90E-01	mg/kg	7.90E-01	mg/kg	M	2.76E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cadmium	1.52E+00	mg/kg	1.52E+00	mg/kg	M	5.32E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium Total	2.58E+02	mg/kg	2.58E+02	mg/kg	M	9.02E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cobalt	8.89E+01	mg/kg	8.89E+01	mg/kg	M	3.11E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Copper	4.68E+01	mg/kg	4.68E+01	mg/kg	M	1.63E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	3.85E+04	mg/kg	3.85E+04	mg/kg	M	1.35E-02	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Lead	2.26E+02	mg/kg	2.26E+02	mg/kg	M	7.91E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	4.49E+03	mg/kg	4.49E+03	mg/kg	M	1.57E-03	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	8.44E-01	mg/kg	8.44E-01	mg/kg	M	2.95E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	2.82E+01	mg/kg	2.82E+01	mg/kg	M	9.86E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	2.88E+00	mg/kg	2.88E+00	mg/kg	M	1.01E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	2.08E+02	mg/kg	2.08E+02	mg/kg	M	7.27E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										3.70E-06
Dermal	Arsenic	7.06E+00	mg/kg	7.06E+00	mg/kg	M	4.89E-07	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	7.33E-07
	Barium	3.36E+02	mg/kg	3.36E+02	mg/kg	M	7.76E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	7.90E-01	mg/kg	7.90E-01	mg/kg	M	1.82E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cadmium	1.52E+00	mg/kg	1.52E+00	mg/kg	M	3.51E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium Total	2.58E+02	mg/kg	2.58E+02	mg/kg	M	5.95E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cobalt	8.89E+01	mg/kg	8.89E+01	mg/kg	M	2.05E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Copper	4.68E+01	mg/kg	4.68E+01	mg/kg	M	1.08E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	3.85E+04	mg/kg	3.85E+04	mg/kg	M	8.88E-04	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Lead	2.26E+02	mg/kg	2.26E+02	mg/kg	M	5.22E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	4.49E+03	mg/kg	4.49E+03	mg/kg	M	1.03E-04	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	8.44E-01	mg/kg	8.44E-01	mg/kg	M	1.95E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	2.82E+01	mg/kg	2.82E+01	mg/kg	M	6.51E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	2.88E+00	mg/kg	2.88E+00	mg/kg	M	6.65E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	2.08E+02	mg/kg	2.08E+02	mg/kg	M	4.80E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										7.33E-07

TABLE B.2.8.RME

CALCULATION OF CANCER RISKS FOR FUTURE INDUSTRIAL/ COMMERCIAL WORKER EXPOSURE TO SOIL
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Inhalation	Arsenic	7.06E+00	mg/kg	7.06E+00	mg/kg	M	1.20E-10	mg/kg-day	1.50E+01	$(mg/kg\text{-}day)^{-1}$	1.81E-09
	Barium	3.36E+02	mg/kg	3.36E+02	mg/kg	M	5.74E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	7.90E-01	mg/kg	7.90E-01	mg/kg	M	1.35E-11	mg/kg-day	8.40E+00	$(mg/kg\text{-}day)^{-1}$	1.13E-10
	Cadmium	1.52E+00	mg/kg	1.52E+00	mg/kg	M	2.60E-11	mg/kg-day	6.30E+00	$(mg/kg\text{-}day)^{-1}$	1.64E-10
	Chromium Total	2.58E+02	mg/kg	2.58E+02	mg/kg	M	4.40E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cobalt	8.89E+01	mg/kg	8.89E+01	mg/kg	M	1.52E-09	mg/kg-day	9.80E+00	$(mg/kg\text{-}day)^{-1}$	1.49E-08
	Copper	4.68E+01	mg/kg	4.68E+01	mg/kg	M	7.98E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	3.85E+04	mg/kg	3.85E+04	mg/kg	M	6.57E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Lead	2.26E+02	mg/kg	2.26E+02	mg/kg	M	3.86E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	4.49E+03	mg/kg	4.49E+03	mg/kg	M	7.66E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	8.44E-01	mg/kg	8.44E-01	mg/kg	M	1.44E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	2.82E+01	mg/kg	2.82E+01	mg/kg	M	4.81E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	2.88E+00	mg/kg	2.88E+00	mg/kg	M	4.92E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	2.08E+02	mg/kg	2.08E+02	mg/kg	M	3.55E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										1.69E-08
										Total Risk Across All Exposure Routes/Pathways	4.5E-06

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.9.CT

CALCULATION OF CANCER RISKS FOR FUTURE INDUSTRIAL/ COMMERCIAL WORKER EXPOSURE TO SLAG
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Aluminum	1.81E+04	mg/kg	1.81E+04	mg/kg	M	1.99E-03	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Arsenic	6.38E+00	mg/kg	6.38E+00	mg/kg	M	7.03E-07	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	1.05E-06
	Barium	1.29E+02	mg/kg	1.29E+02	mg/kg	M	1.42E-05	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Beryllium	6.07E-01	mg/kg	6.07E-01	mg/kg	M	6.69E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Cadmium	3.40E+00	mg/kg	3.40E+00	mg/kg	M	3.75E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Chromium Total	2.30E+03	mg/kg	2.30E+03	mg/kg	M	2.53E-04	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Chromium VI (Hexavalent)	3.15E+01	mg/kg	3.15E+01	mg/kg	M	3.47E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Cobalt	1.29E+01	mg/kg	1.29E+01	mg/kg	M	1.42E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Copper	1.76E+02	mg/kg	1.76E+02	mg/kg	M	1.94E-05	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Iron	1.64E+04	mg/kg	1.64E+04	mg/kg	M	1.81E-03	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Lead	5.67E+01	mg/kg	5.67E+01	mg/kg	M	6.25E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Manganese	3.45E+03	mg/kg	3.45E+03	mg/kg	M	3.80E-04	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Mercury	7.90E-02	mg/kg	7.90E-02	mg/kg	M	8.71E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Nickel	4.30E+02	mg/kg	4.30E+02	mg/kg	M	4.73E-05	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Selenium	5.80E+00	mg/kg	5.80E+00	mg/kg	M	6.39E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Thallium	5.71E+00	mg/kg	5.71E+00	mg/kg	M	6.29E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Vanadium	6.57E+01	mg/kg	6.57E+01	mg/kg	M	7.24E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Zinc	1.29E+02	mg/kg	1.29E+02	mg/kg	M	1.42E-05	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	(Total)										1.05E-06
Dermal	Aluminum	1.81E+04	mg/kg	1.81E+04	mg/kg	M	1.32E-05	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Arsenic	6.38E+00	mg/kg	6.38E+00	mg/kg	M	1.39E-08	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	2.09E-08
	Barium	1.29E+02	mg/kg	1.29E+02	mg/kg	M	9.37E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Beryllium	6.07E-01	mg/kg	6.07E-01	mg/kg	M	4.41E-10	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Cadmium	3.40E+00	mg/kg	3.40E+00	mg/kg	M	2.47E-10	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Chromium Total	2.30E+03	mg/kg	2.30E+03	mg/kg	M	1.67E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Chromium VI (Hexavalent)	3.15E+01	mg/kg	3.15E+01	mg/kg	M	2.29E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Cobalt	1.29E+01	mg/kg	1.29E+01	mg/kg	M	9.40E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Copper	1.76E+02	mg/kg	1.76E+02	mg/kg	M	1.28E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Iron	1.64E+04	mg/kg	1.64E+04	mg/kg	M	1.19E-05	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Lead	5.67E+01	mg/kg	5.67E+01	mg/kg	M	4.13E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Manganese	3.45E+03	mg/kg	3.45E+03	mg/kg	M	2.51E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Mercury	7.90E-02	mg/kg	7.90E-02	mg/kg	M	5.75E-11	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Nickel	4.30E+02	mg/kg	4.30E+02	mg/kg	M	3.12E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Selenium	5.80E+00	mg/kg	5.80E+00	mg/kg	M	4.22E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Thallium	5.71E+00	mg/kg	5.71E+00	mg/kg	M	4.15E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Vanadium	6.57E+01	mg/kg	6.57E+01	mg/kg	M	4.78E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Zinc	1.29E+02	mg/kg	1.29E+02	mg/kg	M	9.35E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	(Total)										2.09E-08

TABLE B.2.9.CT

CALCULATION OF CANCER RISKS FOR FUTURE INDUSTRIAL/ COMMERCIAL WORKER EXPOSURE TO SLAG
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Inhalation	Aluminum	1.81E+04	mg/kg	1.81E+04	mg/kg	M	9.73E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Arsenic	6.38E+00	mg/kg	6.38E+00	mg/kg	M	3.43E-11	mg/kg-day	1.50E+01	$(mg/kg\text{-}day)^{-1}$	5.15E-10
	Barium	1.29E+02	mg/kg	1.29E+02	mg/kg	M	6.93E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	6.07E-01	mg/kg	6.07E-01	mg/kg	M	3.27E-12	mg/kg-day	8.40E+00	$(mg/kg\text{-}day)^{-1}$	2.74E-11
	Cadmium	3.40E+00	mg/kg	3.40E+00	mg/kg	M	1.83E-11	mg/kg-day	6.30E+00	$(mg/kg\text{-}day)^{-1}$	1.15E-10
	Chromium Total	2.30E+03	mg/kg	2.30E+03	mg/kg	M	1.24E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium VI (Hexavalent)	3.15E+01	mg/kg	3.15E+01	mg/kg	M	1.69E-10	mg/kg-day	4.20E+01	$(mg/kg\text{-}day)^{-1}$	7.12E-09
	Cobalt	1.29E+01	mg/kg	1.29E+01	mg/kg	M	6.96E-11	mg/kg-day	9.80E+00	$(mg/kg\text{-}day)^{-1}$	6.82E-10
	Copper	1.76E+02	mg/kg	1.76E+02	mg/kg	M	9.47E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	1.64E+04	mg/kg	1.64E+04	mg/kg	M	8.82E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Lead	5.67E+01	mg/kg	5.67E+01	mg/kg	M	3.05E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	3.45E+03	mg/kg	3.45E+03	mg/kg	M	1.86E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	7.90E-02	mg/kg	7.90E-02	mg/kg	M	4.25E-13	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	4.30E+02	mg/kg	4.30E+02	mg/kg	M	2.31E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	5.80E+00	mg/kg	5.80E+00	mg/kg	M	3.12E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Thallium	5.71E+00	mg/kg	5.71E+00	mg/kg	M	3.07E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Vanadium	6.57E+01	mg/kg	6.57E+01	mg/kg	M	3.53E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	1.29E+02	mg/kg	1.29E+02	mg/kg	M	6.92E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										8.46E-09
										Total Risk Across All Exposure Routes/Pathways	1.1E-06

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.9.RME

CALCULATION OF CANCER RISKS FOR FUTURE INDUSTRIAL/ COMMERCIAL WORKER EXPOSURE TO SLAG
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Aluminum	3.45E+04	mg/kg	3.45E+04	mg/kg	M	1.21E-02	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Arsenic	1.08E+01	mg/kg	1.08E+01	mg/kg	M	3.77E-06	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	5.66E-06
	Barium	1.72E+02	mg/kg	1.72E+02	mg/kg	M	6.00E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	8.09E-01	mg/kg	8.09E-01	mg/kg	M	2.83E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cadmium	7.37E+00	mg/kg	7.37E+00	mg/kg	M	2.58E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium Total	3.02E+03	mg/kg	3.02E+03	mg/kg	M	1.05E-03	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium VI (Hexavalent)	1.07E+02	mg/kg	1.07E+02	mg/kg	M	3.73E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cobalt	1.90E+01	mg/kg	1.90E+01	mg/kg	M	6.64E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Copper	9.75E+02	mg/kg	9.75E+02	mg/kg	M	3.41E-04	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	2.54E+04	mg/kg	2.54E+04	mg/kg	M	8.87E-03	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Lead	1.33E+02	mg/kg	1.33E+02	mg/kg	M	4.66E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	1.85E+04	mg/kg	1.85E+04	mg/kg	M	6.45E-03	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	9.32E-02	mg/kg	9.32E-02	mg/kg	M	3.26E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	1.10E+03	mg/kg	1.10E+03	mg/kg	M	3.83E-04	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	8.39E+00	mg/kg	8.39E+00	mg/kg	M	2.93E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Thallium	8.76E+00	mg/kg	8.76E+00	mg/kg	M	3.06E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Vanadium	8.16E+01	mg/kg	8.16E+01	mg/kg	M	2.85E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	2.15E+02	mg/kg	2.15E+02	mg/kg	M	7.51E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										5.66E-06
Dermal	Aluminum	3.45E+04	mg/kg	3.45E+04	mg/kg	M	7.95E-04	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Arsenic	1.08E+01	mg/kg	1.08E+01	mg/kg	M	7.47E-07	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	1.12E-06
	Barium	1.72E+02	mg/kg	1.72E+02	mg/kg	M	3.96E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	8.09E-01	mg/kg	8.09E-01	mg/kg	M	1.87E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cadmium	7.37E+00	mg/kg	7.37E+00	mg/kg	M	1.70E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium Total	3.02E+03	mg/kg	3.02E+03	mg/kg	M	6.96E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium VI (Hexavalent)	1.07E+02	mg/kg	1.07E+02	mg/kg	M	2.46E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cobalt	1.90E+01	mg/kg	1.90E+01	mg/kg	M	4.38E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Copper	9.75E+02	mg/kg	9.75E+02	mg/kg	M	2.25E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	2.54E+04	mg/kg	2.54E+04	mg/kg	M	5.85E-04	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Lead	1.33E+02	mg/kg	1.33E+02	mg/kg	M	3.07E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	1.85E+04	mg/kg	1.85E+04	mg/kg	M	4.26E-04	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	9.32E-02	mg/kg	9.32E-02	mg/kg	M	2.15E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	1.10E+03	mg/kg	1.10E+03	mg/kg	M	2.53E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	8.39E+00	mg/kg	8.39E+00	mg/kg	M	1.93E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Thallium	8.76E+00	mg/kg	8.76E+00	mg/kg	M	2.02E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Vanadium	8.16E+01	mg/kg	8.16E+01	mg/kg	M	1.88E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	2.15E+02	mg/kg	2.15E+02	mg/kg	M	4.96E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										1.12E-06

TABLE B.2.9.RME

CALCULATION OF CANCER RISKS FOR FUTURE INDUSTRIAL/ COMMERCIAL WORKER EXPOSURE TO SLAG
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Slag
Exposure Medium: Surface Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Inhalation	Aluminum	3.45E+04	mg/kg	3.45E+04	mg/kg	M	5.88E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Arsenic	1.08E+01	mg/kg	1.08E+01	mg/kg	M	1.84E-10	mg/kg-day	1.50E+01	$(mg/kg\text{-}day)^{-1}$	2.76E-09
	Barium	1.72E+02	mg/kg	1.72E+02	mg/kg	M	2.93E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	8.09E-01	mg/kg	8.09E-01	mg/kg	M	1.38E-11	mg/kg-day	8.40E+00	$(mg/kg\text{-}day)^{-1}$	1.16E-10
	Cadmium	7.37E+00	mg/kg	7.37E+00	mg/kg	M	1.26E-10	mg/kg-day	6.30E+00	$(mg/kg\text{-}day)^{-1}$	7.92E-10
	Chromium Total	3.02E+03	mg/kg	3.02E+03	mg/kg	M	5.15E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium VI (Hexavalent)	1.07E+02	mg/kg	1.07E+02	mg/kg	M	1.82E-09	mg/kg-day	4.20E+01	$(mg/kg\text{-}day)^{-1}$	7.65E-08
	Cobalt	1.90E+01	mg/kg	1.90E+01	mg/kg	M	3.24E-10	mg/kg-day	9.80E+00	$(mg/kg\text{-}day)^{-1}$	3.18E-09
	Copper	9.75E+02	mg/kg	9.75E+02	mg/kg	M	1.66E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	2.54E+04	mg/kg	2.54E+04	mg/kg	M	4.33E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Lead	1.33E+02	mg/kg	1.33E+02	mg/kg	M	2.27E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	1.85E+04	mg/kg	1.85E+04	mg/kg	M	3.15E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	9.32E-02	mg/kg	9.32E-02	mg/kg	M	1.59E-12	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	1.10E+03	mg/kg	1.10E+03	mg/kg	M	1.87E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	8.39E+00	mg/kg	8.39E+00	mg/kg	M	1.43E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Thallium	8.76E+00	mg/kg	8.76E+00	mg/kg	M	1.49E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Vanadium	8.16E+01	mg/kg	8.16E+01	mg/kg	M	1.39E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	2.15E+02	mg/kg	2.15E+02	mg/kg	M	3.67E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										8.34E-08
										Total Risk Across All Exposure Routes/Pathways	6.9E-06

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.10.CT

CALCULATION OF CANCER RISKS FOR FUTURE CONSTRUCTION/ UTILITY WORKER EXPOSURE TO SOIL AND SLAG
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Soil and Slag
Exposure Medium: Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Aluminum	1.80E+04	mg/kg	1.80E+04	mg/kg	M	3.32E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Arsenic	6.94E+00	mg/kg	6.94E+00	mg/kg	M	1.28E-08	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	1.92E-08
	Barium	1.45E+02	mg/kg	1.45E+02	mg/kg	M	2.67E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	7.66E-01	mg/kg	7.66E-01	mg/kg	M	1.41E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cadmium	2.41E+00	mg/kg	2.41E+00	mg/kg	M	4.45E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium Total	1.24E+03	mg/kg	1.24E+03	mg/kg	M	2.28E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium VI (Hexavalent)	1.70E+01	mg/kg	1.70E+01	mg/kg	M	3.14E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cobalt	1.78E+01	mg/kg	1.78E+01	mg/kg	M	3.28E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Copper	1.16E+02	mg/kg	1.16E+02	mg/kg	M	2.14E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	2.29E+04	mg/kg	2.29E+04	mg/kg	M	4.23E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Lead	5.67E+01	mg/kg	5.67E+01	mg/kg	M	1.05E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	1.43E+03	mg/kg	1.43E+03	mg/kg	M	2.63E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	3.60E-01	mg/kg	3.60E-01	mg/kg	M	6.64E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	1.74E+02	mg/kg	1.74E+02	mg/kg	M	3.21E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	4.30E+00	mg/kg	4.30E+00	mg/kg	M	7.93E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Thallium	3.75E+00	mg/kg	3.75E+00	mg/kg	M	6.92E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Vanadium	5.07E+01	mg/kg	5.07E+01	mg/kg	M	9.35E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	1.70E+02	mg/kg	1.70E+02	mg/kg	M	3.13E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										1.92E-08
Dermal	Aluminum	1.80E+04	mg/kg	1.80E+04	mg/kg	M	3.32E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Arsenic	6.94E+00	mg/kg	6.94E+00	mg/kg	M	3.84E-10	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	5.76E-10
	Barium	1.45E+02	mg/kg	1.45E+02	mg/kg	M	2.67E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	7.66E-01	mg/kg	7.66E-01	mg/kg	M	1.41E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cadmium	2.41E+00	mg/kg	2.41E+00	mg/kg	M	4.45E-12	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium Total	1.24E+03	mg/kg	1.24E+03	mg/kg	M	2.28E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium VI (Hexavalent)	1.70E+01	mg/kg	1.70E+01	mg/kg	M	3.14E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cobalt	1.78E+01	mg/kg	1.78E+01	mg/kg	M	3.28E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Copper	1.16E+02	mg/kg	1.16E+02	mg/kg	M	2.14E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	2.29E+04	mg/kg	2.29E+04	mg/kg	M	4.23E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Lead	5.67E+01	mg/kg	5.67E+01	mg/kg	M	1.05E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	1.43E+03	mg/kg	1.43E+03	mg/kg	M	2.63E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	3.60E-01	mg/kg	3.60E-01	mg/kg	M	6.64E-12	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	1.74E+02	mg/kg	1.74E+02	mg/kg	M	3.21E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	4.30E+00	mg/kg	4.30E+00	mg/kg	M	7.93E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Thallium	3.75E+00	mg/kg	3.75E+00	mg/kg	M	6.92E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Vanadium	5.07E+01	mg/kg	5.07E+01	mg/kg	M	9.35E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	1.70E+02	mg/kg	1.70E+02	mg/kg	M	3.13E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										5.76E-10

TABLE B.2.10.CT

CALCULATION OF CANCER RISKS FOR FUTURE CONSTRUCTION/ UTILITY WORKER EXPOSURE TO SOIL AND SLAG
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Soil and Slag
Exposure Medium: Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Inhalation	Aluminum	1.80E+04	mg/kg	1.80E+04	mg/kg	M	1.42E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Arsenic	6.94E+00	mg/kg	6.94E+00	mg/kg	M	5.46E-12	mg/kg-day	1.50E+01	$(mg/kg\text{-}day)^{-1}$	8.19E-11
	Barium	1.45E+02	mg/kg	1.45E+02	mg/kg	M	1.14E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	7.66E-01	mg/kg	7.66E-01	mg/kg	M	6.03E-13	mg/kg-day	8.40E+00	$(mg/kg\text{-}day)^{-1}$	5.06E-12
	Cadmium	2.41E+00	mg/kg	2.41E+00	mg/kg	M	1.90E-12	mg/kg-day	6.30E+00	$(mg/kg\text{-}day)^{-1}$	1.19E-11
	Chromium Total	1.24E+03	mg/kg	1.24E+03	mg/kg	M	9.74E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium VI (Hexavalent)	1.70E+01	mg/kg	1.70E+01	mg/kg	M	1.34E-11	mg/kg-day	4.20E+01	$(mg/kg\text{-}day)^{-1}$	5.62E-10
	Cobalt	1.78E+01	mg/kg	1.78E+01	mg/kg	M	1.40E-11	mg/kg-day	9.80E+00	$(mg/kg\text{-}day)^{-1}$	1.37E-10
	Copper	1.16E+02	mg/kg	1.16E+02	mg/kg	M	9.11E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	2.29E+04	mg/kg	2.29E+04	mg/kg	M	1.80E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Lead	5.67E+01	mg/kg	5.67E+01	mg/kg	M	4.46E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	1.43E+03	mg/kg	1.43E+03	mg/kg	M	1.12E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	3.60E-01	mg/kg	3.60E-01	mg/kg	M	2.83E-13	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	1.74E+02	mg/kg	1.74E+02	mg/kg	M	1.37E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	4.30E+00	mg/kg	4.30E+00	mg/kg	M	3.38E-12	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Thallium	3.75E+00	mg/kg	3.75E+00	mg/kg	M	2.95E-12	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Vanadium	5.07E+01	mg/kg	5.07E+01	mg/kg	M	3.99E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	1.70E+02	mg/kg	1.70E+02	mg/kg	M	1.33E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										7.98E-10
										Total Risk Across All Exposure Routes/Pathways	2.1E-08

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.10.RME

CALCULATION OF CANCER RISKS FOR FUTURE CONSTRUCTION/ UTILITY WORKER EXPOSURE TO SOIL AND SLAG
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Soil and Slag
Exposure Medium: Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Aluminum	2.89E+04	mg/kg	2.89E+04	mg/kg	M	1.07E-04	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Arsenic	9.68E+00	mg/kg	9.68E+00	mg/kg	M	3.57E-08	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	5.36E-08
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M	6.28E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Beryllium	9.71E-01	mg/kg	9.71E-01	mg/kg	M	3.59E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Cadmium	1.34E+01	mg/kg	1.34E+01	mg/kg	M	4.94E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Chromium Total	1.59E+03	mg/kg	1.59E+03	mg/kg	M	5.87E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Chromium VI (Hexavalent)	5.82E+01	mg/kg	5.82E+01	mg/kg	M	2.15E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Cobalt	5.70E+01	mg/kg	5.70E+01	mg/kg	M	2.10E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Copper	5.37E+02	mg/kg	5.37E+02	mg/kg	M	1.98E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Iron	2.83E+04	mg/kg	2.83E+04	mg/kg	M	1.05E-04	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Lead	8.16E+01	mg/kg	8.16E+01	mg/kg	M	3.01E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Manganese	1.81E+03	mg/kg	1.81E+03	mg/kg	M	6.69E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Mercury	3.56E+00	mg/kg	3.56E+00	mg/kg	M	1.31E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Nickel	6.17E+02	mg/kg	6.17E+02	mg/kg	M	2.28E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Selenium	5.41E+00	mg/kg	5.41E+00	mg/kg	M	2.00E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Thallium	5.40E+00	mg/kg	5.40E+00	mg/kg	M	1.99E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Vanadium	5.84E+01	mg/kg	5.84E+01	mg/kg	M	2.16E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Zinc	2.08E+02	mg/kg	2.08E+02	mg/kg	M	7.68E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	(Total)										5.36E-08
Dermal	Aluminum	2.89E+04	mg/kg	2.89E+04	mg/kg	M	3.20E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Arsenic	9.68E+00	mg/kg	9.68E+00	mg/kg	M	3.21E-09	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	4.82E-09
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M	1.88E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Beryllium	9.71E-01	mg/kg	9.71E-01	mg/kg	M	1.08E-10	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Cadmium	1.34E+01	mg/kg	1.34E+01	mg/kg	M	1.48E-10	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Chromium Total	1.59E+03	mg/kg	1.59E+03	mg/kg	M	1.76E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Chromium VI (Hexavalent)	5.82E+01	mg/kg	5.82E+01	mg/kg	M	6.45E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Cobalt	5.70E+01	mg/kg	5.70E+01	mg/kg	M	6.31E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Copper	5.37E+02	mg/kg	5.37E+02	mg/kg	M	5.94E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Iron	2.83E+04	mg/kg	2.83E+04	mg/kg	M	3.14E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Lead	8.16E+01	mg/kg	8.16E+01	mg/kg	M	9.04E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Manganese	1.81E+03	mg/kg	1.81E+03	mg/kg	M	2.01E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Mercury	3.56E+00	mg/kg	3.56E+00	mg/kg	M	3.94E-10	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Nickel	6.17E+02	mg/kg	6.17E+02	mg/kg	M	6.83E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Selenium	5.41E+00	mg/kg	5.41E+00	mg/kg	M	5.99E-10	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Thallium	5.40E+00	mg/kg	5.40E+00	mg/kg	M	5.98E-10	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Vanadium	5.84E+01	mg/kg	5.84E+01	mg/kg	M	6.47E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Zinc	2.08E+02	mg/kg	2.08E+02	mg/kg	M	2.30E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	(Total)										4.82E-09

TABLE B.2.10.RME

CALCULATION OF CANCER RISKS FOR FUTURE CONSTRUCTION/ UTILITY WORKER EXPOSURE TO SOIL AND SLAG
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Soil and Slag
Exposure Medium: Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Inhalation	Aluminum	2.89E+04	mg/kg	2.89E+04	mg/kg	M	4.55E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Arsenic	9.68E+00	mg/kg	9.68E+00	mg/kg	M	1.52E-11	mg/kg-day	1.50E+01	$(mg/kg\text{-}day)^{-1}$	2.28E-10
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M	2.68E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	9.71E-01	mg/kg	9.71E-01	mg/kg	M	1.53E-12	mg/kg-day	8.40E+00	$(mg/kg\text{-}day)^{-1}$	1.28E-11
	Cadmium	1.34E+01	mg/kg	1.34E+01	mg/kg	M	2.11E-11	mg/kg-day	6.30E+00	$(mg/kg\text{-}day)^{-1}$	1.33E-10
	Chromium Total	1.59E+03	mg/kg	1.59E+03	mg/kg	M	2.50E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium VI (Hexavalent)	5.82E+01	mg/kg	5.82E+01	mg/kg	M	9.16E-11	mg/kg-day	4.20E+01	$(mg/kg\text{-}day)^{-1}$	3.85E-09
	Cobalt	5.70E+01	mg/kg	5.70E+01	mg/kg	M	8.97E-11	mg/kg-day	9.80E+00	$(mg/kg\text{-}day)^{-1}$	8.79E-10
	Copper	5.37E+02	mg/kg	5.37E+02	mg/kg	M	8.45E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	2.83E+04	mg/kg	2.83E+04	mg/kg	M	4.46E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Lead	8.16E+01	mg/kg	8.16E+01	mg/kg	M	1.28E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	1.81E+03	mg/kg	1.81E+03	mg/kg	M	2.85E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	3.56E+00	mg/kg	3.56E+00	mg/kg	M	5.60E-12	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	6.17E+02	mg/kg	6.17E+02	mg/kg	M	9.71E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	5.41E+00	mg/kg	5.41E+00	mg/kg	M	8.50E-12	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Thallium	5.40E+00	mg/kg	5.40E+00	mg/kg	M	8.49E-12	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Vanadium	5.84E+01	mg/kg	5.84E+01	mg/kg	M	9.19E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	2.08E+02	mg/kg	2.08E+02	mg/kg	M	3.28E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										5.10E-09
										Total Risk Across All Exposure Routes/Pathways	6.3E-08

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.11.CT

CALCULATION OF CANCER RISKS FOR FUTURE CONSTRUCTION/ UTILITY WORKER EXPOSURE TO SOIL
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Arsenic	6.16E+00	mg/kg	6.16E+00	mg/kg	M	1.14E-08	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	1.70E-08
	Barium	1.48E+02	mg/kg	1.48E+02	mg/kg	M	2.73E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	6.90E-01	mg/kg	6.90E-01	mg/kg	M	1.27E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cadmium	1.22E+00	mg/kg	1.22E+00	mg/kg	M	2.25E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium Total	1.65E+02	mg/kg	1.65E+02	mg/kg	M	3.05E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cobalt	1.79E+01	mg/kg	1.79E+01	mg/kg	M	3.30E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Copper	3.34E+01	mg/kg	3.34E+01	mg/kg	M	6.16E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	2.42E+04	mg/kg	2.42E+04	mg/kg	M	4.47E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Lead	5.41E+01	mg/kg	5.41E+01	mg/kg	M	9.98E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Manganese	1.05E+03	mg/kg	1.05E+03	mg/kg	M	1.94E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	4.40E-01	mg/kg	4.40E-01	mg/kg	M	8.12E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	2.62E+01	mg/kg	2.62E+01	mg/kg	M	4.83E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	2.35E+00	mg/kg	2.35E+00	mg/kg	M	4.34E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	1.64E+02	mg/kg	1.64E+02	mg/kg	M	3.02E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										1.70E-08
Dermal	Arsenic	6.16E+00	mg/kg	6.16E+00	mg/kg	M	3.41E-10	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	5.11E-10
	Barium	1.48E+02	mg/kg	1.48E+02	mg/kg	M	2.73E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	6.90E-01	mg/kg	6.90E-01	mg/kg	M	1.27E-11	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cadmium	1.22E+00	mg/kg	1.22E+00	mg/kg	M	2.25E-12	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium Total	1.65E+02	mg/kg	1.65E+02	mg/kg	M	3.05E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cobalt	1.79E+01	mg/kg	1.79E+01	mg/kg	M	3.30E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Copper	3.34E+01	mg/kg	3.34E+01	mg/kg	M	6.16E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	2.42E+04	mg/kg	2.42E+04	mg/kg	M	4.47E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Lead	5.41E+01	mg/kg	5.41E+01	mg/kg	M	9.98E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Manganese	1.05E+03	mg/kg	1.05E+03	mg/kg	M	1.94E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	4.40E-01	mg/kg	4.40E-01	mg/kg	M	8.12E-12	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	2.62E+01	mg/kg	2.62E+01	mg/kg	M	4.83E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	2.35E+00	mg/kg	2.35E+00	mg/kg	M	4.34E-11	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	1.64E+02	mg/kg	1.64E+02	mg/kg	M	3.02E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										5.11E-10

TABLE B.2.11.CT

CALCULATION OF CANCER RISKS FOR FUTURE CONSTRUCTION/ UTILITY WORKER EXPOSURE TO SOIL
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Inhalation	Arsenic	6.16E+00	mg/kg	6.16E+00	mg/kg	M	4.85E-12	mg/kg-day	1.50E+01	$(mg/kg\text{-}day)^{-1}$	7.27E-11
	Barium	1.48E+02	mg/kg	1.48E+02	mg/kg	M	1.16E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	6.90E-01	mg/kg	6.90E-01	mg/kg	M	5.43E-13	mg/kg-day	8.40E+00	$(mg/kg\text{-}day)^{-1}$	4.56E-12
	Cadmium	1.22E+00	mg/kg	1.22E+00	mg/kg	M	9.60E-13	mg/kg-day	6.30E+00	$(mg/kg\text{-}day)^{-1}$	6.05E-12
	Chromium Total	1.65E+02	mg/kg	1.65E+02	mg/kg	M	1.30E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cobalt	1.79E+01	mg/kg	1.79E+01	mg/kg	M	1.41E-11	mg/kg-day	9.80E+00	$(mg/kg\text{-}day)^{-1}$	1.38E-10
	Copper	3.34E+01	mg/kg	3.34E+01	mg/kg	M	2.62E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	2.42E+04	mg/kg	2.42E+04	mg/kg	M	1.90E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Lead	5.41E+01	mg/kg	5.41E+01	mg/kg	M	4.26E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	1.05E+03	mg/kg	1.05E+03	mg/kg	M	8.26E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	4.40E-01	mg/kg	4.40E-01	mg/kg	M	3.46E-13	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	2.62E+01	mg/kg	2.62E+01	mg/kg	M	2.06E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	2.35E+00	mg/kg	2.35E+00	mg/kg	M	1.85E-12	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	1.64E+02	mg/kg	1.64E+02	mg/kg	M	1.29E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										2.21E-10

Total Risk Across All Exposure Routes/Pathways 1.8E-08

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.11.RME

CALCULATION OF CANCER RISKS FOR FUTURE CONSTRUCTION/ UTILITY WORKER EXPOSURE TO SOIL
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Arsenic	7.06E+00	mg/kg	7.06E+00	mg/kg	M	2.61E-08	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	3.91E-08
	Barium	3.36E+02	mg/kg	3.36E+02	mg/kg	M	1.24E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	7.90E-01	mg/kg	7.90E-01	mg/kg	M	2.92E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cadmium	1.52E+00	mg/kg	1.52E+00	mg/kg	M	5.62E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium Total	2.58E+02	mg/kg	2.58E+02	mg/kg	M	9.53E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cobalt	8.89E+01	mg/kg	8.89E+01	mg/kg	M	3.28E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Copper	4.68E+01	mg/kg	4.68E+01	mg/kg	M	1.73E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	3.85E+04	mg/kg	3.85E+04	mg/kg	M	1.42E-04	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Lead	2.26E+02	mg/kg	2.26E+02	mg/kg	M	8.35E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Manganese	4.49E+03	mg/kg	4.49E+03	mg/kg	M	1.66E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	8.44E-01	mg/kg	8.44E-01	mg/kg	M	3.11E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	2.82E+01	mg/kg	2.82E+01	mg/kg	M	1.04E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	2.88E+00	mg/kg	2.88E+00	mg/kg	M	1.06E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	2.08E+02	mg/kg	2.08E+02	mg/kg	M	7.67E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										3.91E-08
Dermal	Arsenic	7.06E+00	mg/kg	7.06E+00	mg/kg	M	2.35E-09	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	3.52E-09
	Barium	3.36E+02	mg/kg	3.36E+02	mg/kg	M	3.72E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	7.90E-01	mg/kg	7.90E-01	mg/kg	M	8.75E-11	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cadmium	1.52E+00	mg/kg	1.52E+00	mg/kg	M	1.68E-11	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium Total	2.58E+02	mg/kg	2.58E+02	mg/kg	M	2.86E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cobalt	8.89E+01	mg/kg	8.89E+01	mg/kg	M	9.84E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Copper	4.68E+01	mg/kg	4.68E+01	mg/kg	M	5.18E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	3.85E+04	mg/kg	3.85E+04	mg/kg	M	4.26E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Lead	2.26E+02	mg/kg	2.26E+02	mg/kg	M	2.51E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Manganese	4.49E+03	mg/kg	4.49E+03	mg/kg	M	4.97E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	8.44E-01	mg/kg	8.44E-01	mg/kg	M	9.34E-11	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	2.82E+01	mg/kg	2.82E+01	mg/kg	M	3.12E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	2.88E+00	mg/kg	2.88E+00	mg/kg	M	3.19E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	2.08E+02	mg/kg	2.08E+02	mg/kg	M	2.30E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										3.52E-09

TABLE B.2.11.RME

CALCULATION OF CANCER RISKS FOR FUTURE CONSTRUCTION/ UTILITY WORKER EXPOSURE TO SOIL
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Inhalation	Arsenic	7.06E+00	mg/kg	7.06E+00	mg/kg	M	1.11E-11	mg/kg-day	1.50E+01	$(mg/kg\text{-}day)^{-1}$	1.67E-10
	Barium	3.36E+02	mg/kg	3.36E+02	mg/kg	M	5.29E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	7.90E-01	mg/kg	7.90E-01	mg/kg	M	1.24E-12	mg/kg-day	8.40E+00	$(mg/kg\text{-}day)^{-1}$	1.04E-11
	Cadmium	1.52E+00	mg/kg	1.52E+00	mg/kg	M	2.39E-12	mg/kg-day	6.30E+00	$(mg/kg\text{-}day)^{-1}$	1.51E-11
	Chromium Total	2.58E+02	mg/kg	2.58E+02	mg/kg	M	4.06E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cobalt	8.89E+01	mg/kg	8.89E+01	mg/kg	M	1.40E-10	mg/kg-day	9.80E+00	$(mg/kg\text{-}day)^{-1}$	1.37E-09
	Copper	4.68E+01	mg/kg	4.68E+01	mg/kg	M	7.36E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	3.85E+04	mg/kg	3.85E+04	mg/kg	M	6.06E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Lead	2.26E+02	mg/kg	2.26E+02	mg/kg	M	3.56E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	4.49E+03	mg/kg	4.49E+03	mg/kg	M	7.06E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	8.44E-01	mg/kg	8.44E-01	mg/kg	M	1.33E-12	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	2.82E+01	mg/kg	2.82E+01	mg/kg	M	4.44E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	2.88E+00	mg/kg	2.88E+00	mg/kg	M	4.54E-12	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	2.08E+02	mg/kg	2.08E+02	mg/kg	M	3.27E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										1.56E-09
										Total Risk Across All Exposure Routes/Pathways	4.4E-08

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.12.CT

CALCULATION OF CANCER RISKS FOR FUTURE CONSTRUCTION/ UTILITY WORKER EXPOSURE TO SLAG
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Slag
Exposure Medium: Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Aluminum	1.81E+04	mg/kg	1.81E+04	mg/kg	M	3.34E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Arsenic	6.38E+00	mg/kg	6.38E+00	mg/kg	M	1.18E-08	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	1.77E-08
	Barium	1.29E+02	mg/kg	1.29E+02	mg/kg	M	2.38E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	6.07E-01	mg/kg	6.07E-01	mg/kg	M	1.12E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cadmium	3.40E+00	mg/kg	3.40E+00	mg/kg	M	6.27E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium Total	2.30E+03	mg/kg	2.30E+03	mg/kg	M	4.24E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium VI (Hexavalent)	3.15E+01	mg/kg	3.15E+01	mg/kg	M	5.81E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cobalt	1.29E+01	mg/kg	1.29E+01	mg/kg	M	2.39E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Copper	1.76E+02	mg/kg	1.76E+02	mg/kg	M	3.25E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	1.64E+04	mg/kg	1.64E+04	mg/kg	M	3.02E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Lead	5.67E+01	mg/kg	5.67E+01	mg/kg	M	1.05E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	3.45E+03	mg/kg	3.45E+03	mg/kg	M	6.37E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	7.90E-02	mg/kg	7.90E-02	mg/kg	M	1.46E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	4.30E+02	mg/kg	4.30E+02	mg/kg	M	7.93E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	5.80E+00	mg/kg	5.80E+00	mg/kg	M	1.07E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Thallium	5.71E+00	mg/kg	5.71E+00	mg/kg	M	1.05E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Vanadium	6.57E+01	mg/kg	6.57E+01	mg/kg	M	1.21E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	1.29E+02	mg/kg	1.29E+02	mg/kg	M	2.37E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										1.77E-08
Dermal	Aluminum	1.81E+04	mg/kg	1.81E+04	mg/kg	M	3.34E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Arsenic	6.38E+00	mg/kg	6.38E+00	mg/kg	M	3.53E-10	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	5.30E-10
	Barium	1.29E+02	mg/kg	1.29E+02	mg/kg	M	2.38E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	6.07E-01	mg/kg	6.07E-01	mg/kg	M	1.12E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cadmium	3.40E+00	mg/kg	3.40E+00	mg/kg	M	6.27E-12	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium Total	2.30E+03	mg/kg	2.30E+03	mg/kg	M	4.24E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium VI (Hexavalent)	3.15E+01	mg/kg	3.15E+01	mg/kg	M	5.81E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cobalt	1.29E+01	mg/kg	1.29E+01	mg/kg	M	2.39E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Copper	1.76E+02	mg/kg	1.76E+02	mg/kg	M	3.25E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	1.64E+04	mg/kg	1.64E+04	mg/kg	M	3.02E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Lead	5.67E+01	mg/kg	5.67E+01	mg/kg	M	1.05E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	3.45E+03	mg/kg	3.45E+03	mg/kg	M	6.37E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	7.90E-02	mg/kg	7.90E-02	mg/kg	M	1.46E-12	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	4.30E+02	mg/kg	4.30E+02	mg/kg	M	7.93E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	5.80E+00	mg/kg	5.80E+00	mg/kg	M	1.07E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Thallium	5.71E+00	mg/kg	5.71E+00	mg/kg	M	1.05E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Vanadium	6.57E+01	mg/kg	6.57E+01	mg/kg	M	1.21E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	1.29E+02	mg/kg	1.29E+02	mg/kg	M	2.37E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										5.30E-10

TABLE B.2.12.CT

CALCULATION OF CANCER RISKS FOR FUTURE CONSTRUCTION/ UTILITY WORKER EXPOSURE TO SLAG
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Slag
Exposure Medium: Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Inhalation	Aluminum	1.81E+04	mg/kg	1.81E+04	mg/kg	M	1.42E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Arsenic	6.38E+00	mg/kg	6.38E+00	mg/kg	M	5.02E-12	mg/kg-day	1.50E+01	$(mg/kg\text{-}day)^{-1}$	7.53E-11
	Barium	1.29E+02	mg/kg	1.29E+02	mg/kg	M	1.01E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	6.07E-01	mg/kg	6.07E-01	mg/kg	M	4.77E-13	mg/kg-day	8.40E+00	$(mg/kg\text{-}day)^{-1}$	4.01E-12
	Cadmium	3.40E+00	mg/kg	3.40E+00	mg/kg	M	2.67E-12	mg/kg-day	6.30E+00	$(mg/kg\text{-}day)^{-1}$	1.68E-11
	Chromium Total	2.30E+03	mg/kg	2.30E+03	mg/kg	M	1.81E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium VI (Hexavalent)	3.15E+01	mg/kg	3.15E+01	mg/kg	M	2.48E-11	mg/kg-day	4.20E+01	$(mg/kg\text{-}day)^{-1}$	1.04E-09
	Cobalt	1.29E+01	mg/kg	1.29E+01	mg/kg	M	1.02E-11	mg/kg-day	9.80E+00	$(mg/kg\text{-}day)^{-1}$	9.96E-11
	Copper	1.76E+02	mg/kg	1.76E+02	mg/kg	M	1.38E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	1.64E+04	mg/kg	1.64E+04	mg/kg	M	1.29E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Lead	5.67E+01	mg/kg	5.67E+01	mg/kg	M	4.46E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	3.45E+03	mg/kg	3.45E+03	mg/kg	M	2.72E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	7.90E-02	mg/kg	7.90E-02	mg/kg	M	6.21E-14	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	4.30E+02	mg/kg	4.30E+02	mg/kg	M	3.38E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	5.80E+00	mg/kg	5.80E+00	mg/kg	M	4.56E-12	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Thallium	5.71E+00	mg/kg	5.71E+00	mg/kg	M	4.49E-12	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Vanadium	6.57E+01	mg/kg	6.57E+01	mg/kg	M	5.17E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	1.29E+02	mg/kg	1.29E+02	mg/kg	M	1.01E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										1.24E-09
										Total Risk Across All Exposure Routes/Pathways	1.9E-08

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.12.RME

CALCULATION OF CANCER RISKS FOR FUTURE CONSTRUCTION/ UTILITY WORKER EXPOSURE TO SLAG
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Slag
Exposure Medium: Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Aluminum	3.45E+04	mg/kg	3.45E+04	mg/kg	M	1.27E-04	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Arsenic	1.08E+01	mg/kg	1.08E+01	mg/kg	M	3.98E-08	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	5.97E-08
	Barium	1.72E+02	mg/kg	1.72E+02	mg/kg	M	6.34E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Beryllium	8.09E-01	mg/kg	8.09E-01	mg/kg	M	2.99E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Cadmium	7.37E+00	mg/kg	7.37E+00	mg/kg	M	2.72E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Chromium Total	3.02E+03	mg/kg	3.02E+03	mg/kg	M	1.11E-05	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Chromium VI (Hexavalent)	1.07E+02	mg/kg	1.07E+02	mg/kg	M	3.94E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Cobalt	1.90E+01	mg/kg	1.90E+01	mg/kg	M	7.02E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Copper	9.75E+02	mg/kg	9.75E+02	mg/kg	M	3.60E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Iron	2.54E+04	mg/kg	2.54E+04	mg/kg	M	9.37E-05	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Lead	1.33E+02	mg/kg	1.33E+02	mg/kg	M	4.92E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Manganese	1.85E+04	mg/kg	1.85E+04	mg/kg	M	6.81E-05	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Mercury	9.32E-02	mg/kg	9.32E-02	mg/kg	M	3.44E-10	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Nickel	1.10E+03	mg/kg	1.10E+03	mg/kg	M	4.05E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Selenium	8.39E+00	mg/kg	8.39E+00	mg/kg	M	3.10E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Thallium	8.76E+00	mg/kg	8.76E+00	mg/kg	M	3.23E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Vanadium	8.16E+01	mg/kg	8.16E+01	mg/kg	M	3.01E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Zinc	2.15E+02	mg/kg	2.15E+02	mg/kg	M	7.93E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	(Total)										5.97E-08
Dermal	Aluminum	3.45E+04	mg/kg	3.45E+04	mg/kg	M	3.82E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Arsenic	1.08E+01	mg/kg	1.08E+01	mg/kg	M	3.58E-09	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	5.38E-09
	Barium	1.72E+02	mg/kg	1.72E+02	mg/kg	M	1.90E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Beryllium	8.09E-01	mg/kg	8.09E-01	mg/kg	M	8.96E-11	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Cadmium	7.37E+00	mg/kg	7.37E+00	mg/kg	M	8.16E-11	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Chromium Total	3.02E+03	mg/kg	3.02E+03	mg/kg	M	3.34E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Chromium VI (Hexavalent)	1.07E+02	mg/kg	1.07E+02	mg/kg	M	1.18E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Cobalt	1.90E+01	mg/kg	1.90E+01	mg/kg	M	2.10E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Copper	9.75E+02	mg/kg	9.75E+02	mg/kg	M	1.08E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Iron	2.54E+04	mg/kg	2.54E+04	mg/kg	M	2.81E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Lead	1.33E+02	mg/kg	1.33E+02	mg/kg	M	1.48E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Manganese	1.85E+04	mg/kg	1.85E+04	mg/kg	M	2.04E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Mercury	9.32E-02	mg/kg	9.32E-02	mg/kg	M	1.03E-11	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Nickel	1.10E+03	mg/kg	1.10E+03	mg/kg	M	1.21E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Selenium	8.39E+00	mg/kg	8.39E+00	mg/kg	M	9.29E-10	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Thallium	8.76E+00	mg/kg	8.76E+00	mg/kg	M	9.70E-10	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Vanadium	8.16E+01	mg/kg	8.16E+01	mg/kg	M	9.03E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Zinc	2.15E+02	mg/kg	2.15E+02	mg/kg	M	2.38E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	(Total)										5.38E-09

TABLE B.2.12.RME

CALCULATION OF CANCER RISKS FOR FUTURE CONSTRUCTION/ UTILITY WORKER EXPOSURE TO SLAG
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Slag
Exposure Medium: Soil
Exposure Point: Ingestion, Dermal, and Inhalation
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Inhalation	Aluminum	3.45E+04	mg/kg	3.45E+04	mg/kg	M	5.43E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Arsenic	1.08E+01	mg/kg	1.08E+01	mg/kg	M	1.70E-11	mg/kg-day	1.50E+01	$(mg/kg\text{-}day)^{-1}$	2.55E-10
	Barium	1.72E+02	mg/kg	1.72E+02	mg/kg	M	2.70E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	8.09E-01	mg/kg	8.09E-01	mg/kg	M	1.27E-12	mg/kg-day	8.40E+00	$(mg/kg\text{-}day)^{-1}$	1.07E-11
	Cadmium	7.37E+00	mg/kg	7.37E+00	mg/kg	M	1.16E-11	mg/kg-day	6.30E+00	$(mg/kg\text{-}day)^{-1}$	7.30E-11
	Chromium Total	3.02E+03	mg/kg	3.02E+03	mg/kg	M	4.75E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium VI (Hexavalent)	1.07E+02	mg/kg	1.07E+02	mg/kg	M	1.68E-10	mg/kg-day	4.20E+01	$(mg/kg\text{-}day)^{-1}$	7.05E-09
	Cobalt	1.90E+01	mg/kg	1.90E+01	mg/kg	M	2.99E-11	mg/kg-day	9.80E+00	$(mg/kg\text{-}day)^{-1}$	2.93E-10
	Copper	9.75E+02	mg/kg	9.75E+02	mg/kg	M	1.53E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	2.54E+04	mg/kg	2.54E+04	mg/kg	M	3.99E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Lead	1.33E+02	mg/kg	1.33E+02	mg/kg	M	2.10E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Manganese	1.85E+04	mg/kg	1.85E+04	mg/kg	M	2.90E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	9.32E-02	mg/kg	9.32E-02	mg/kg	M	1.47E-13	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	1.10E+03	mg/kg	1.10E+03	mg/kg	M	1.73E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	8.39E+00	mg/kg	8.39E+00	mg/kg	M	1.32E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Thallium	8.76E+00	mg/kg	8.76E+00	mg/kg	M	1.38E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Vanadium	8.16E+01	mg/kg	8.16E+01	mg/kg	M	1.28E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	2.15E+02	mg/kg	2.15E+02	mg/kg	M	3.38E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										7.69E-09
										Total Risk Across All Exposure Routes/Pathways	7.3E-08

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.13.CT

CALCULATION OF CANCER RISKS FOR FUTURE CONSTRUCTION/ UTILITY WORKER EXPOSURE TO GROUNDWATER
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Ingestion and Dermal
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Aluminum	9.21E+00	mg/L	9.21E+00	mg/L	M	2.57E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Antimony	1.00E-02	mg/L	1.00E-02	mg/L	M	2.80E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Arsenic	2.21E-02	mg/L	2.21E-02	mg/L	M	6.18E-10	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	9.27E-10
	Chromium	5.10E-02	mg/L	5.10E-02	mg/L	M	1.43E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium VI (Hexavalent)	2.50E-02	mg/L	2.50E-02	mg/L	M	6.99E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	9.50E+00	mg/L	9.50E+00	mg/L	M	2.66E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Lead	3.90E-02	mg/L	3.90E-02	mg/L	M	1.09E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Manganese	4.76E-01	mg/L	4.76E-01	mg/L	M	1.33E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	2.77E-02	mg/L	2.77E-02	mg/L	M	7.74E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Thallium	1.58E-02	mg/L	1.58E-02	mg/L	M	4.42E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Vanadium	2.31E-02	mg/L	2.31E-02	mg/L	M	6.46E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	2.14E-01	mg/L	2.14E-01	mg/L	M	5.98E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										9.27E-10
Dermal	Aluminum	9.21E+00	mg/L	9.21E+00	mg/L	M	1.70E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Antimony	1.00E-02	mg/L	1.00E-02	mg/L	M	1.85E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Arsenic	2.21E-02	mg/L	2.21E-02	mg/L	M	4.08E-10	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	6.12E-10
	Chromium	5.10E-02	mg/L	5.10E-02	mg/L	M	9.41E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium VI (Hexavalent)	2.50E-02	mg/L	2.50E-02	mg/L	M	9.23E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	9.50E+00	mg/L	9.50E+00	mg/L	M	1.75E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Lead	3.90E-02	mg/L	3.90E-02	mg/L	M	7.20E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Manganese	4.76E-01	mg/L	4.76E-01	mg/L	M	8.79E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	2.77E-02	mg/L	2.77E-02	mg/L	M	5.11E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Thallium	1.58E-02	mg/L	1.58E-02	mg/L	M	2.92E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Vanadium	2.31E-02	mg/L	2.31E-02	mg/L	M	4.26E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	2.14E-01	mg/L	2.14E-01	mg/L	M	2.37E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										6.12E-10
										Total Risk Across All Exposure Routes/Pathways	1.5E-09

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.13.RME

CALCULATION OF CANCER RISKS FOR FUTURE CONSTRUCTION/ UTILITY WORKER EXPOSURE TO GROUNDWATER
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Ingestion and Dermal
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Aluminum	2.33E+01	mg/L	2.33E+01	mg/L	M	2.61E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Antimony	1.07E-02	mg/L	1.07E-02	mg/L	M	1.19E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Arsenic	2.57E-02	mg/L	2.57E-02	mg/L	M	2.88E-09	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	4.32E-09
	Chromium	1.53E-01	mg/L	1.53E-01	mg/L	M	1.71E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium VI (Hexavalent)	3.52E-02	mg/L	3.52E-02	mg/L	M	3.93E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	1.58E+01	mg/L	1.58E+01	mg/L	M	1.77E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Lead	6.12E-02	mg/L	6.12E-02	mg/L	M	6.85E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Manganese	7.06E-01	mg/L	7.06E-01	mg/L	M	7.89E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	3.33E-02	mg/L	3.33E-02	mg/L	M	3.72E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Thallium	1.58E-02	mg/L	1.58E-02	mg/L	M	1.77E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Vanadium	6.44E-02	mg/L	6.44E-02	mg/L	M	7.20E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	3.45E-01	mg/L	3.45E-01	mg/L	M	3.85E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										4.32E-09
Dermal	Aluminum	2.33E+01	mg/L	2.33E+01	mg/L	M	1.72E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Antimony	1.07E-02	mg/L	1.07E-02	mg/L	M	7.86E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Arsenic	2.57E-02	mg/L	2.57E-02	mg/L	M	1.90E-09	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	2.85E-09
	Chromium	1.53E-01	mg/L	1.53E-01	mg/L	M	1.13E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium VI (Hexavalent)	3.52E-02	mg/L	3.52E-02	mg/L	M	5.19E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	1.58E+01	mg/L	1.58E+01	mg/L	M	1.17E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Lead	6.12E-02	mg/L	6.12E-02	mg/L	M	4.52E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Manganese	7.06E-01	mg/L	7.06E-01	mg/L	M	5.21E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	3.33E-02	mg/L	3.33E-02	mg/L	M	2.46E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Thallium	1.58E-02	mg/L	1.58E-02	mg/L	M	1.17E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Vanadium	6.44E-02	mg/L	6.44E-02	mg/L	M	4.75E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	3.45E-01	mg/L	3.45E-01	mg/L	M	1.53E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										2.85E-09
										Total Risk Across All Exposure Routes/Pathways	7.2E-09

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.14.CT

CALCULATION OF CANCER RISKS FOR CURRENT MAINTENANCE WORKER EXPOSURE TO SURFACE WATER
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Ingestion and Dermal
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Aluminum	2.39E+00	mg/L	2.39E+00	mg/L	M	2.40E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Antimony	1.50E-02	mg/L	1.50E-02	mg/L	M	1.51E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Arsenic	1.96E-02	mg/L	1.96E-02	mg/L	M	1.97E-09	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	2.95E-09
	Barium	1.90E-01	mg/L	1.90E-01	mg/L	M	1.91E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Beryllium	3.04E-03	mg/L	3.04E-03	mg/L	M	3.06E-10	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Chromium	2.80E-01	mg/L	2.80E-01	mg/L	M	2.82E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Chromium VI (Hexavalent)	6.30E-02	mg/L	6.30E-02	mg/L	M	6.34E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Copper	4.20E-02	mg/L	4.20E-02	mg/L	M	4.23E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Iron	5.30E+00	mg/L	5.30E+00	mg/L	M	5.33E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Lead	3.00E-02	mg/L	3.00E-02	mg/L	M	3.02E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Manganese	7.19E-01	mg/L	7.19E-01	mg/L	M	7.24E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Mercury	3.60E-04	mg/L	3.60E-04	mg/L	M	3.62E-11	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Nickel	2.40E-02	mg/L	2.40E-02	mg/L	M	2.42E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Selenium	2.30E-02	mg/L	2.30E-02	mg/L	M	2.31E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Thallium	2.90E-02	mg/L	2.90E-02	mg/L	M	2.92E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Vanadium	2.10E-02	mg/L	2.10E-02	mg/L	M	2.11E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Zinc	9.93E-02	mg/L	9.93E-02	mg/L	M	9.99E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	(Total)										2.95E-09
Dermal	Aluminum	2.39E+00	mg/L	2.39E+00	mg/L	M	1.59E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Antimony	1.50E-02	mg/L	1.50E-02	mg/L	M	9.96E-10	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Arsenic	1.96E-02	mg/L	1.96E-02	mg/L	M	1.30E-09	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	1.95E-09
	Barium	1.90E-01	mg/L	1.90E-01	mg/L	M	1.26E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Beryllium	3.04E-03	mg/L	3.04E-03	mg/L	M	2.02E-10	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Chromium	2.80E-01	mg/L	2.80E-01	mg/L	M	1.86E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Chromium VI (Hexavalent)	6.30E-02	mg/L	6.30E-02	mg/L	M	8.37E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Copper	4.20E-02	mg/L	4.20E-02	mg/L	M	2.79E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Iron	5.30E+00	mg/L	5.30E+00	mg/L	M	3.52E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Lead	3.00E-02	mg/L	3.00E-02	mg/L	M	1.99E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Manganese	7.19E-01	mg/L	7.19E-01	mg/L	M	4.78E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Mercury	3.60E-04	mg/L	3.60E-04	mg/L	M	2.39E-11	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Nickel	2.40E-02	mg/L	2.40E-02	mg/L	M	3.19E-10	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Selenium	2.30E-02	mg/L	2.30E-02	mg/L	M	1.53E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Thallium	2.90E-02	mg/L	2.90E-02	mg/L	M	1.93E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Vanadium	2.10E-02	mg/L	2.10E-02	mg/L	M	1.39E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Zinc	9.93E-02	mg/L	9.93E-02	mg/L	M	3.96E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	(Total)										1.95E-09
										Total Risk Across All Exposure Routes/Pathways	4.9E-09

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.14.RME

CALCULATION OF CANCER RISKS FOR CURRENT MAINTENANCE WORKER EXPOSURE TO SURFACE WATER
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Ingestion and Dermal
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Aluminum	5.74E+00	mg/L	5.74E+00	mg/L	M	6.42E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Antimony	1.69E-02	mg/L	1.69E-02	mg/L	M	1.89E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Arsenic	2.26E-02	mg/L	2.26E-02	mg/L	M	2.52E-08	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	3.79E-08
	Barium	3.37E-01	mg/L	3.37E-01	mg/L	M	3.76E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	3.04E-03	mg/L	3.04E-03	mg/L	M	3.40E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium	6.84E-01	mg/L	6.84E-01	mg/L	M	7.65E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium VI (Hexavalent)	1.02E-01	mg/L	1.02E-01	mg/L	M	1.14E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Copper	2.66E-01	mg/L	2.66E-01	mg/L	M	2.97E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	3.15E+01	mg/L	3.15E+01	mg/L	M	3.53E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Lead	1.84E-01	mg/L	1.84E-01	mg/L	M	2.06E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Manganese	1.91E+00	mg/L	1.91E+00	mg/L	M	2.14E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	4.00E-04	mg/L	4.00E-04	mg/L	M	4.47E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	1.44E-01	mg/L	1.44E-01	mg/L	M	1.61E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	2.58E-02	mg/L	2.58E-02	mg/L	M	2.88E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Thallium	3.42E-02	mg/L	3.42E-02	mg/L	M	3.82E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Vanadium	2.84E-02	mg/L	2.84E-02	mg/L	M	3.18E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	2.66E-01	mg/L	2.66E-01	mg/L	M	2.98E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										3.79E-08
Dermal	Aluminum	5.74E+00	mg/L	5.74E+00	mg/L	M	4.24E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Antimony	1.69E-02	mg/L	1.69E-02	mg/L	M	1.25E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Arsenic	2.26E-02	mg/L	2.26E-02	mg/L	M	1.67E-08	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	2.50E-08
	Barium	3.37E-01	mg/L	3.37E-01	mg/L	M	2.48E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	3.04E-03	mg/L	3.04E-03	mg/L	M	2.24E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium	6.84E-01	mg/L	6.84E-01	mg/L	M	5.05E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium VI (Hexavalent)	1.02E-01	mg/L	1.02E-01	mg/L	M	1.51E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Copper	2.66E-01	mg/L	2.66E-01	mg/L	M	1.96E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	3.15E+01	mg/L	3.15E+01	mg/L	M	2.33E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Lead	1.84E-01	mg/L	1.84E-01	mg/L	M	1.36E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Manganese	1.91E+00	mg/L	1.91E+00	mg/L	M	1.41E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	4.00E-04	mg/L	4.00E-04	mg/L	M	2.95E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	1.44E-01	mg/L	1.44E-01	mg/L	M	2.12E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	2.58E-02	mg/L	2.58E-02	mg/L	M	1.90E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Thallium	3.42E-02	mg/L	3.42E-02	mg/L	M	2.52E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Vanadium	2.84E-02	mg/L	2.84E-02	mg/L	M	2.10E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	2.66E-01	mg/L	2.66E-01	mg/L	M	1.18E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										2.50E-08
										Total Risk Across All Exposure Routes/Pathways	6.3E-08

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.15.CT

CALCULATION OF CANCER RISKS FOR CURRENT/FUTURE TRESPASSER EXPOSURE TO SURFACE WATER
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Ingestion and Dermal
Receptor Population: Trespasser
Receptor Age: Adolescent

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Aluminum	2.39E+00	mg/L	2.39E+00	mg/L	M	1.44E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Antimony	1.50E-02	mg/L	1.50E-02	mg/L	M	9.02E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Arsenic	1.96E-02	mg/L	1.96E-02	mg/L	M	1.18E-07	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	1.76E-07
	Barium	1.90E-01	mg/L	1.90E-01	mg/L	M	1.14E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	3.04E-03	mg/L	3.04E-03	mg/L	M	1.83E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium	2.80E-01	mg/L	2.80E-01	mg/L	M	1.68E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium VI (Hexavalent)	6.30E-02	mg/L	6.30E-02	mg/L	M	3.79E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Copper	4.20E-02	mg/L	4.20E-02	mg/L	M	2.52E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	5.30E+00	mg/L	5.30E+00	mg/L	M	3.19E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Lead	3.00E-02	mg/L	3.00E-02	mg/L	M	1.80E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Manganese	7.19E-01	mg/L	7.19E-01	mg/L	M	4.32E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	3.60E-04	mg/L	3.60E-04	mg/L	M	2.16E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	2.40E-02	mg/L	2.40E-02	mg/L	M	1.44E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	2.30E-02	mg/L	2.30E-02	mg/L	M	1.38E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Thallium	2.90E-02	mg/L	2.90E-02	mg/L	M	1.74E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Vanadium	2.10E-02	mg/L	2.10E-02	mg/L	M	1.26E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	9.93E-02	mg/L	9.93E-02	mg/L	M	5.97E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										1.76E-07
Dermal	Aluminum	2.39E+00	mg/L	2.39E+00	mg/L	M	1.26E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Antimony	1.50E-02	mg/L	1.50E-02	mg/L	M	7.94E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Arsenic	1.96E-02	mg/L	1.96E-02	mg/L	M	1.03E-07	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	1.55E-07
	Barium	1.90E-01	mg/L	1.90E-01	mg/L	M	1.00E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	3.04E-03	mg/L	3.04E-03	mg/L	M	1.61E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium	2.80E-01	mg/L	2.80E-01	mg/L	M	1.48E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium VI (Hexavalent)	6.30E-02	mg/L	6.30E-02	mg/L	M	6.67E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Copper	4.20E-02	mg/L	4.20E-02	mg/L	M	2.22E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	5.30E+00	mg/L	5.30E+00	mg/L	M	2.80E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Lead	3.00E-02	mg/L	3.00E-02	mg/L	M	1.59E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Manganese	7.19E-01	mg/L	7.19E-01	mg/L	M	3.81E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	3.60E-04	mg/L	3.60E-04	mg/L	M	1.90E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	2.40E-02	mg/L	2.40E-02	mg/L	M	2.54E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	2.30E-02	mg/L	2.30E-02	mg/L	M	1.22E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Thallium	2.90E-02	mg/L	2.90E-02	mg/L	M	1.53E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Vanadium	2.10E-02	mg/L	2.10E-02	mg/L	M	1.11E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	9.93E-02	mg/L	9.93E-02	mg/L	M	3.15E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										1.55E-07
										Total Risk Across All Exposure Routes/Pathways	3.3E-07

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.15.RME

CALCULATION OF CANCER RISKS FOR CURRENT/FUTURE TRESPASSER EXPOSURE TO SURFACE WATER
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Ingestion and Dermal
Receptor Population: Trespasser
Receptor Age: Adolescent

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Aluminum	5.74E+00	mg/L	5.74E+00	mg/L	M	1.38E-04	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Antimony	1.69E-02	mg/L	1.69E-02	mg/L	M	4.06E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Arsenic	2.26E-02	mg/L	2.26E-02	mg/L	M	5.43E-07	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	8.14E-07
	Barium	3.37E-01	mg/L	3.37E-01	mg/L	M	8.09E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Beryllium	3.04E-03	mg/L	3.04E-03	mg/L	M	7.31E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Chromium	6.84E-01	mg/L	6.84E-01	mg/L	M	1.65E-05	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Chromium VI (Hexavalent)	1.02E-01	mg/L	1.02E-01	mg/L	M	2.46E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Copper	2.66E-01	mg/L	2.66E-01	mg/L	M	6.40E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Iron	3.15E+01	mg/L	3.15E+01	mg/L	M	7.58E-04	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Lead	1.84E-01	mg/L	1.84E-01	mg/L	M	4.43E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Manganese	1.91E+00	mg/L	1.91E+00	mg/L	M	4.59E-05	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Mercury	4.00E-04	mg/L	4.00E-04	mg/L	M	9.62E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Nickel	1.44E-01	mg/L	1.44E-01	mg/L	M	3.46E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Selenium	2.58E-02	mg/L	2.58E-02	mg/L	M	6.20E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Thallium	3.42E-02	mg/L	3.42E-02	mg/L	M	8.23E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Vanadium	2.84E-02	mg/L	2.84E-02	mg/L	M	6.83E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Zinc	2.66E-01	mg/L	2.66E-01	mg/L	M	6.40E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	(Total)										8.14E-07
Dermal	Aluminum	5.74E+00	mg/L	5.74E+00	mg/L	M	1.22E-04	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Antimony	1.69E-02	mg/L	1.69E-02	mg/L	M	3.58E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Arsenic	2.26E-02	mg/L	2.26E-02	mg/L	M	4.78E-07	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	7.16E-07
	Barium	3.37E-01	mg/L	3.37E-01	mg/L	M	7.12E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Beryllium	3.04E-03	mg/L	3.04E-03	mg/L	M	6.43E-08	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Chromium	6.84E-01	mg/L	6.84E-01	mg/L	M	1.45E-05	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Chromium VI (Hexavalent)	1.02E-01	mg/L	1.02E-01	mg/L	M	4.33E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Copper	2.66E-01	mg/L	2.66E-01	mg/L	M	5.63E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Iron	3.15E+01	mg/L	3.15E+01	mg/L	M	6.67E-04	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Lead	1.84E-01	mg/L	1.84E-01	mg/L	M	3.90E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Manganese	1.91E+00	mg/L	1.91E+00	mg/L	M	4.04E-05	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Mercury	4.00E-04	mg/L	4.00E-04	mg/L	M	8.46E-09	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Nickel	1.44E-01	mg/L	1.44E-01	mg/L	M	6.09E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Selenium	2.58E-02	mg/L	2.58E-02	mg/L	M	5.46E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Thallium	3.42E-02	mg/L	3.42E-02	mg/L	M	7.24E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Vanadium	2.84E-02	mg/L	2.84E-02	mg/L	M	6.01E-07	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	Zinc	2.66E-01	mg/L	2.66E-01	mg/L	M	3.38E-06	mg/kg-day	--	$(mg/kg-day)^{-1}$	NC
	(Total)										7.16E-07

Total Risk Across All Exposure Routes/Pathways 1.5E-06

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.16.CT

CALCULATION OF CANCER RISKS FOR FUTURE INDUSTRIAL/ COMMERCIAL WORKER EXPOSURE TO SURFACE WATER
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Ingestion and Dermal
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Aluminum	2.39E+00	mg/L	2.39E+00	mg/L	M	6.58E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Antimony	1.50E-02	mg/L	1.50E-02	mg/L	M	4.13E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Arsenic	1.96E-02	mg/L	1.96E-02	mg/L	M	5.39E-08	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	8.08E-08
	Barium	1.90E-01	mg/L	1.90E-01	mg/L	M	5.23E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	3.04E-03	mg/L	3.04E-03	mg/L	M	8.38E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium	2.80E-01	mg/L	2.80E-01	mg/L	M	7.72E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium VI (Hexavalent)	6.30E-02	mg/L	6.30E-02	mg/L	M	1.74E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Copper	4.20E-02	mg/L	4.20E-02	mg/L	M	1.16E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	5.30E+00	mg/L	5.30E+00	mg/L	M	1.46E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Lead	3.00E-02	mg/L	3.00E-02	mg/L	M	8.27E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Manganese	7.19E-01	mg/L	7.19E-01	mg/L	M	1.98E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	3.60E-04	mg/L	3.60E-04	mg/L	M	9.92E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	2.40E-02	mg/L	2.40E-02	mg/L	M	6.61E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	2.30E-02	mg/L	2.30E-02	mg/L	M	6.34E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Thallium	2.90E-02	mg/L	2.90E-02	mg/L	M	7.99E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Vanadium	2.10E-02	mg/L	2.10E-02	mg/L	M	5.79E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	9.93E-02	mg/L	9.93E-02	mg/L	M	2.73E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										8.08E-08
Dermal	Aluminum	2.39E+00	mg/L	2.39E+00	mg/L	M	4.35E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Antimony	1.50E-02	mg/L	1.50E-02	mg/L	M	2.73E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Arsenic	1.96E-02	mg/L	1.96E-02	mg/L	M	3.56E-08	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	5.34E-08
	Barium	1.90E-01	mg/L	1.90E-01	mg/L	M	3.45E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	3.04E-03	mg/L	3.04E-03	mg/L	M	5.53E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium	2.80E-01	mg/L	2.80E-01	mg/L	M	5.09E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium VI (Hexavalent)	6.30E-02	mg/L	6.30E-02	mg/L	M	2.29E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Copper	4.20E-02	mg/L	4.20E-02	mg/L	M	7.64E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	5.30E+00	mg/L	5.30E+00	mg/L	M	9.64E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Lead	3.00E-02	mg/L	3.00E-02	mg/L	M	5.46E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Manganese	7.19E-01	mg/L	7.19E-01	mg/L	M	1.31E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	3.60E-04	mg/L	3.60E-04	mg/L	M	6.55E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	2.40E-02	mg/L	2.40E-02	mg/L	M	8.73E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	2.30E-02	mg/L	2.30E-02	mg/L	M	4.18E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Thallium	2.90E-02	mg/L	2.90E-02	mg/L	M	5.27E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Vanadium	2.10E-02	mg/L	2.10E-02	mg/L	M	3.82E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	9.93E-02	mg/L	9.93E-02	mg/L	M	1.08E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										5.34E-08
										Total Risk Across All Exposure Routes/Pathways	1.3E-07

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.16.RME

CALCULATION OF CANCER RISKS FOR FUTURE INDUSTRIAL/ COMMERCIAL WORKER EXPOSURE TO SURFACE WATER
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Ingestion and Dermal
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Aluminum	5.74E+00	mg/L	5.74E+00	mg/L	M	1.00E-04	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Antimony	1.69E-02	mg/L	1.69E-02	mg/L	M	2.95E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Arsenic	2.26E-02	mg/L	2.26E-02	mg/L	M	3.94E-07	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	5.92E-07
	Barium	3.37E-01	mg/L	3.37E-01	mg/L	M	5.88E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	3.04E-03	mg/L	3.04E-03	mg/L	M	5.31E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium	6.84E-01	mg/L	6.84E-01	mg/L	M	1.20E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium VI (Hexavalent)	1.02E-01	mg/L	1.02E-01	mg/L	M	1.79E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Copper	2.66E-01	mg/L	2.66E-01	mg/L	M	4.65E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	3.15E+01	mg/L	3.15E+01	mg/L	M	5.51E-04	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Lead	1.84E-01	mg/L	1.84E-01	mg/L	M	3.22E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Manganese	1.91E+00	mg/L	1.91E+00	mg/L	M	3.34E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	4.00E-04	mg/L	4.00E-04	mg/L	M	6.99E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	1.44E-01	mg/L	1.44E-01	mg/L	M	2.51E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	2.58E-02	mg/L	2.58E-02	mg/L	M	4.50E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Thallium	3.42E-02	mg/L	3.42E-02	mg/L	M	5.98E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Vanadium	2.84E-02	mg/L	2.84E-02	mg/L	M	4.97E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	2.66E-01	mg/L	2.66E-01	mg/L	M	4.65E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										5.92E-07
Dermal	Aluminum	5.74E+00	mg/L	5.74E+00	mg/L	M	6.62E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Antimony	1.69E-02	mg/L	1.69E-02	mg/L	M	1.95E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Arsenic	2.26E-02	mg/L	2.26E-02	mg/L	M	2.60E-07	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	3.90E-07
	Barium	3.37E-01	mg/L	3.37E-01	mg/L	M	3.88E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	3.04E-03	mg/L	3.04E-03	mg/L	M	3.51E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium	6.84E-01	mg/L	6.84E-01	mg/L	M	7.89E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium VI (Hexavalent)	1.02E-01	mg/L	1.02E-01	mg/L	M	2.36E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Copper	2.66E-01	mg/L	2.66E-01	mg/L	M	3.07E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	3.15E+01	mg/L	3.15E+01	mg/L	M	3.64E-04	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Lead	1.84E-01	mg/L	1.84E-01	mg/L	M	2.13E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Manganese	1.91E+00	mg/L	1.91E+00	mg/L	M	2.20E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	4.00E-04	mg/L	4.00E-04	mg/L	M	4.61E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	1.44E-01	mg/L	1.44E-01	mg/L	M	3.32E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	2.58E-02	mg/L	2.58E-02	mg/L	M	2.97E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Thallium	3.42E-02	mg/L	3.42E-02	mg/L	M	3.94E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Vanadium	2.84E-02	mg/L	2.84E-02	mg/L	M	3.28E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	2.66E-01	mg/L	2.66E-01	mg/L	M	1.84E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										3.90E-07

Total Risk Across All Exposure Routes/Pathways 9.8E-07

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.17.CT

CALCULATION OF CANCER RISKS FOR FUTURE CONSTRUCTION/ UTILITY WORKER EXPOSURE TO SURFACE WATER
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Ingestion and Dermal
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Aluminum	2.39E+00	mg/L	2.39E+00	mg/L	M	6.68E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Antimony	1.50E-02	mg/L	1.50E-02	mg/L	M	4.19E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Arsenic	1.96E-02	mg/L	1.96E-02	mg/L	M	5.47E-10	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	8.20E-10
	Barium	1.90E-01	mg/L	1.90E-01	mg/L	M	5.31E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	3.04E-03	mg/L	3.04E-03	mg/L	M	8.50E-11	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium	2.80E-01	mg/L	2.80E-01	mg/L	M	7.83E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium VI (Hexavalent)	6.30E-02	mg/L	6.30E-02	mg/L	M	1.76E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Copper	4.20E-02	mg/L	4.20E-02	mg/L	M	1.17E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	5.30E+00	mg/L	5.30E+00	mg/L	M	1.48E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Lead	3.00E-02	mg/L	3.00E-02	mg/L	M	8.39E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Manganese	7.19E-01	mg/L	7.19E-01	mg/L	M	2.01E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	3.60E-04	mg/L	3.60E-04	mg/L	M	1.01E-11	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	2.40E-02	mg/L	2.40E-02	mg/L	M	6.71E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	2.30E-02	mg/L	2.30E-02	mg/L	M	6.43E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Thallium	2.90E-02	mg/L	2.90E-02	mg/L	M	8.11E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Vanadium	2.10E-02	mg/L	2.10E-02	mg/L	M	5.87E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	9.93E-02	mg/L	9.93E-02	mg/L	M	2.77E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										8.20E-10
Dermal	Aluminum	2.39E+00	mg/L	2.39E+00	mg/L	M	4.41E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Antimony	1.50E-02	mg/L	1.50E-02	mg/L	M	2.77E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Arsenic	1.96E-02	mg/L	1.96E-02	mg/L	M	3.61E-10	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	5.41E-10
	Barium	1.90E-01	mg/L	1.90E-01	mg/L	M	3.50E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	3.04E-03	mg/L	3.04E-03	mg/L	M	5.61E-11	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium	2.80E-01	mg/L	2.80E-01	mg/L	M	5.17E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium VI (Hexavalent)	6.30E-02	mg/L	6.30E-02	mg/L	M	2.32E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Copper	4.20E-02	mg/L	4.20E-02	mg/L	M	7.75E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	5.30E+00	mg/L	5.30E+00	mg/L	M	9.78E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Lead	3.00E-02	mg/L	3.00E-02	mg/L	M	5.54E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Manganese	7.19E-01	mg/L	7.19E-01	mg/L	M	1.33E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	3.60E-04	mg/L	3.60E-04	mg/L	M	6.64E-12	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	2.40E-02	mg/L	2.40E-02	mg/L	M	8.86E-11	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	2.30E-02	mg/L	2.30E-02	mg/L	M	4.24E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Thallium	2.90E-02	mg/L	2.90E-02	mg/L	M	5.35E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Vanadium	2.10E-02	mg/L	2.10E-02	mg/L	M	3.87E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	9.93E-02	mg/L	9.93E-02	mg/L	M	1.10E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										5.41E-10

Total Risk Across All Exposure Routes/Pathways 1.4E-09

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.17.RME

CALCULATION OF CANCER RISKS FOR FUTURE CONSTRUCTION/ UTILITY WORKER EXPOSURE TO SURFACE WATER
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Ingestion and Dermal
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Aluminum	5.74E+00	mg/L	5.74E+00	mg/L	M	6.42E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Antimony	1.69E-02	mg/L	1.69E-02	mg/L	M	1.89E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Arsenic	2.26E-02	mg/L	2.26E-02	mg/L	M	2.52E-09	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	3.79E-09
	Barium	3.37E-01	mg/L	3.37E-01	mg/L	M	3.76E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	3.04E-03	mg/L	3.04E-03	mg/L	M	3.40E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium	6.84E-01	mg/L	6.84E-01	mg/L	M	7.65E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium VI (Hexavalent)	1.02E-01	mg/L	1.02E-01	mg/L	M	1.14E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Copper	2.66E-01	mg/L	2.66E-01	mg/L	M	2.97E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	3.15E+01	mg/L	3.15E+01	mg/L	M	3.53E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Lead	1.84E-01	mg/L	1.84E-01	mg/L	M	2.06E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Manganese	1.91E+00	mg/L	1.91E+00	mg/L	M	2.14E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	4.00E-04	mg/L	4.00E-04	mg/L	M	4.47E-11	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	1.44E-01	mg/L	1.44E-01	mg/L	M	1.61E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	2.58E-02	mg/L	2.58E-02	mg/L	M	2.88E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Thallium	3.42E-02	mg/L	3.42E-02	mg/L	M	3.82E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Vanadium	2.84E-02	mg/L	2.84E-02	mg/L	M	3.18E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	2.66E-01	mg/L	2.66E-01	mg/L	M	2.98E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										3.79E-09
Dermal	Aluminum	5.74E+00	mg/L	5.74E+00	mg/L	M	4.24E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Antimony	1.69E-02	mg/L	1.69E-02	mg/L	M	1.25E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Arsenic	2.26E-02	mg/L	2.26E-02	mg/L	M	1.67E-09	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	2.50E-09
	Barium	3.37E-01	mg/L	3.37E-01	mg/L	M	2.48E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	3.04E-03	mg/L	3.04E-03	mg/L	M	2.24E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium	6.84E-01	mg/L	6.84E-01	mg/L	M	5.05E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium VI (Hexavalent)	1.02E-01	mg/L	1.02E-01	mg/L	M	1.51E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Copper	2.66E-01	mg/L	2.66E-01	mg/L	M	1.96E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	3.15E+01	mg/L	3.15E+01	mg/L	M	2.33E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Lead	1.84E-01	mg/L	1.84E-01	mg/L	M	1.36E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Manganese	1.91E+00	mg/L	1.91E+00	mg/L	M	1.41E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	4.00E-04	mg/L	4.00E-04	mg/L	M	2.95E-11	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	1.44E-01	mg/L	1.44E-01	mg/L	M	2.12E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	2.58E-02	mg/L	2.58E-02	mg/L	M	1.90E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Thallium	3.42E-02	mg/L	3.42E-02	mg/L	M	2.52E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Vanadium	2.84E-02	mg/L	2.84E-02	mg/L	M	2.10E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	2.66E-01	mg/L	2.66E-01	mg/L	M	1.18E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										2.50E-09
										Total Risk Across All Exposure Routes/Pathways	6.3E-09

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.18.CT

CALCULATION OF CANCER RISKS FOR CURRENT MAINTENANCE WORKER EXPOSURE TO SEDIMENT
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Ingestion and Dermal
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Arsenic	7.94E+00	mg/L	7.94E+00	mg/L	M	3.20E-08	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	4.79E-08
	Barium	1.92E+02	mg/L	1.92E+02	mg/L	M	7.74E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	5.06E-01	mg/L	5.06E-01	mg/L	M	2.04E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cadmium	7.52E-01	mg/L	7.52E-01	mg/L	M	3.03E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium	4.09E+02	mg/L	4.09E+02	mg/L	M	1.65E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Copper	5.42E+01	mg/L	5.42E+01	mg/L	M	2.18E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	1.88E+04	mg/L	1.88E+04	mg/L	M	7.57E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	9.75E-02	mg/L	9.75E-02	mg/L	M	3.93E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	5.81E+01	mg/L	5.81E+01	mg/L	M	2.34E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	1.01E+01	mg/L	1.01E+01	mg/L	M	4.06E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	1.95E+02	mg/L	1.95E+02	mg/L	M	7.87E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										4.79E-08
Dermal	Arsenic	7.94E+00	mg/L	7.94E+00	mg/L	M	6.33E-10	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	9.49E-10
	Barium	1.92E+02	mg/L	1.92E+02	mg/L	M	5.11E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	5.06E-01	mg/L	5.06E-01	mg/L	M	1.34E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cadmium	7.52E-01	mg/L	7.52E-01	mg/L	M	2.00E-12	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium	4.09E+02	mg/L	4.09E+02	mg/L	M	1.09E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Copper	5.42E+01	mg/L	5.42E+01	mg/L	M	1.44E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	1.88E+04	mg/L	1.88E+04	mg/L	M	5.00E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	9.75E-02	mg/L	9.75E-02	mg/L	M	2.59E-12	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	5.81E+01	mg/L	5.81E+01	mg/L	M	1.54E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	1.01E+01	mg/L	1.01E+01	mg/L	M	2.68E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	1.95E+02	mg/L	1.95E+02	mg/L	M	5.19E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										9.49E-10
										Total Risk Across All Exposure Routes/Pathways	4.9E-08

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.18.RME

CALCULATION OF CANCER RISKS FOR CURRENT MAINTENANCE WORKER EXPOSURE TO SEDIMENT
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Ingestion and Dermal
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Arsenic	1.34E+01	mg/L	1.34E+01	mg/L	M	2.99E-07	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	4.48E-07
	Barium	4.89E+02	mg/L	4.89E+02	mg/L	M	1.09E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	6.30E-01	mg/L	6.30E-01	mg/L	M	1.41E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cadmium	9.08E-01	mg/L	9.08E-01	mg/L	M	2.03E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium	1.02E+03	mg/L	1.02E+03	mg/L	M	2.28E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Copper	1.28E+02	mg/L	1.28E+02	mg/L	M	2.87E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	2.39E+04	mg/L	2.39E+04	mg/L	M	5.34E-04	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	1.59E-01	mg/L	1.59E-01	mg/L	M	3.55E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	1.41E+02	mg/L	1.41E+02	mg/L	M	3.15E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	1.28E+01	mg/L	1.28E+01	mg/L	M	2.87E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	3.48E+02	mg/L	3.48E+02	mg/L	M	7.78E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										4.48E-07
Dermal	Arsenic	1.34E+01	mg/L	1.34E+01	mg/L	M	5.92E-08	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	8.88E-08
	Barium	4.89E+02	mg/L	4.89E+02	mg/L	M	7.22E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	6.30E-01	mg/L	6.30E-01	mg/L	M	9.30E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cadmium	9.08E-01	mg/L	9.08E-01	mg/L	M	1.34E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium	1.02E+03	mg/L	1.02E+03	mg/L	M	1.51E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Copper	1.28E+02	mg/L	1.28E+02	mg/L	M	1.89E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	2.39E+04	mg/L	2.39E+04	mg/L	M	3.52E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	1.59E-01	mg/L	1.59E-01	mg/L	M	2.34E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	1.41E+02	mg/L	1.41E+02	mg/L	M	2.08E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	1.28E+01	mg/L	1.28E+01	mg/L	M	1.90E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	3.48E+02	mg/L	3.48E+02	mg/L	M	5.13E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										8.88E-08
										Total Risk Across All Exposure Routes/Pathways	5.4E-07

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.19.CT

CALCULATION OF CANCER RISKS FOR CURRENT/FUTURE TRESPASSER EXPOSURE TO SEDIMENT
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Ingestion and Dermal
Receptor Population: Trespasser
Receptor Age: Adolescent

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Arsenic	7.94E+00	mg/L	7.94E+00	mg/L	M	4.77E-07	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	7.16E-07
	Barium	1.92E+02	mg/L	1.92E+02	mg/L	M	1.16E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	5.06E-01	mg/L	5.06E-01	mg/L	M	3.04E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cadmium	7.52E-01	mg/L	7.52E-01	mg/L	M	4.52E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium	4.09E+02	mg/L	4.09E+02	mg/L	M	2.46E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Copper	5.42E+01	mg/L	5.42E+01	mg/L	M	3.26E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	1.88E+04	mg/L	1.88E+04	mg/L	M	1.13E-03	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	9.75E-02	mg/L	9.75E-02	mg/L	M	5.86E-09	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	5.81E+01	mg/L	5.81E+01	mg/L	M	3.49E-06	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	1.01E+01	mg/L	1.01E+01	mg/L	M	6.06E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	1.95E+02	mg/L	1.95E+02	mg/L	M	1.17E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										7.16E-07
Dermal	Arsenic	7.94E+00	mg/L	7.94E+00	mg/L	M	2.52E-08	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	3.78E-08
	Barium	1.92E+02	mg/L	1.92E+02	mg/L	M	2.03E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Beryllium	5.06E-01	mg/L	5.06E-01	mg/L	M	5.35E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Cadmium	7.52E-01	mg/L	7.52E-01	mg/L	M	7.96E-11	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Chromium	4.09E+02	mg/L	4.09E+02	mg/L	M	4.33E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Copper	5.42E+01	mg/L	5.42E+01	mg/L	M	5.74E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Iron	1.88E+04	mg/L	1.88E+04	mg/L	M	1.99E-05	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Mercury	9.75E-02	mg/L	9.75E-02	mg/L	M	1.03E-10	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Nickel	5.81E+01	mg/L	5.81E+01	mg/L	M	6.15E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Selenium	1.01E+01	mg/L	1.01E+01	mg/L	M	1.07E-08	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	Zinc	1.95E+02	mg/L	1.95E+02	mg/L	M	2.07E-07	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	NC
	(Total)										3.78E-08
										Total Risk Across All Exposure Routes/Pathways	7.5E-07

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.19.RME

CALCULATION OF CANCER RISKS FOR CURRENT/FUTURE TRESPASSER EXPOSURE TO SEDIMENT
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Ingestion and Dermal
Receptor Population: Trespasser
Receptor Age: Adolescent

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Arsenic	1.34E+01	mg/L	1.34E+01	mg/L	M	1.61E-06	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	2.41E-06
	Barium	4.89E+02	mg/L	4.89E+02	mg/L	M	5.88E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	6.30E-01	mg/L	6.30E-01	mg/L	M	7.57E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cadmium	9.08E-01	mg/L	9.08E-01	mg/L	M	1.09E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium	1.02E+03	mg/L	1.02E+03	mg/L	M	1.23E-04	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Copper	1.28E+02	mg/L	1.28E+02	mg/L	M	1.54E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	2.39E+04	mg/L	2.39E+04	mg/L	M	2.87E-03	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	1.59E-01	mg/L	1.59E-01	mg/L	M	1.91E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	1.41E+02	mg/L	1.41E+02	mg/L	M	1.69E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	1.28E+01	mg/L	1.28E+01	mg/L	M	1.54E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	3.48E+02	mg/L	3.48E+02	mg/L	M	4.18E-05	mg/kg-day	--.	(mg/kg-day) $^{-1}$	NC
	(Total)										2.41E-06
Dermal	Arsenic	1.34E+01	mg/L	1.34E+01	mg/L	M	4.24E-07	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	6.37E-07
	Barium	4.89E+02	mg/L	4.89E+02	mg/L	M	5.18E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	6.30E-01	mg/L	6.30E-01	mg/L	M	6.67E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cadmium	9.08E-01	mg/L	9.08E-01	mg/L	M	9.61E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium	1.02E+03	mg/L	1.02E+03	mg/L	M	1.08E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Copper	1.28E+02	mg/L	1.28E+02	mg/L	M	1.36E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	2.39E+04	mg/L	2.39E+04	mg/L	M	2.53E-04	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	1.59E-01	mg/L	1.59E-01	mg/L	M	1.68E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	1.41E+02	mg/L	1.41E+02	mg/L	M	1.49E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	1.28E+01	mg/L	1.28E+01	mg/L	M	1.36E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	3.48E+02	mg/L	3.48E+02	mg/L	M	3.68E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										6.37E-07
										Total Risk Across All Exposure Routes/Pathways	3.0E-06

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.20.CT

CALCULATION OF CANCER RISKS FOR FUTURE INDUSTRIAL/ COMMERCIAL WORKER EXPOSURE TO SEDIMENT
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Ingestion and Dermal
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Arsenic	7.94E+00	mg/L	7.94E+00	mg/L	M	8.75E-07	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	1.31E-06
	Barium	1.92E+02	mg/L	1.92E+02	mg/L	M	2.12E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	5.06E-01	mg/L	5.06E-01	mg/L	M	5.58E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cadmium	7.52E-01	mg/L	7.52E-01	mg/L	M	8.29E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium	4.09E+02	mg/L	4.09E+02	mg/L	M	4.51E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Copper	5.42E+01	mg/L	5.42E+01	mg/L	M	5.98E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	1.88E+04	mg/L	1.88E+04	mg/L	M	2.07E-03	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	9.75E-02	mg/L	9.75E-02	mg/L	M	1.07E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	5.81E+01	mg/L	5.81E+01	mg/L	M	6.40E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	1.01E+01	mg/L	1.01E+01	mg/L	M	1.11E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	1.95E+02	mg/L	1.95E+02	mg/L	M	2.15E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										1.31E-06
Dermal	Arsenic	7.94E+00	mg/L	7.94E+00	mg/L	M	1.73E-08	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	2.60E-08
	Barium	1.92E+02	mg/L	1.92E+02	mg/L	M	1.40E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	5.06E-01	mg/L	5.06E-01	mg/L	M	3.68E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cadmium	7.52E-01	mg/L	7.52E-01	mg/L	M	5.47E-11	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium	4.09E+02	mg/L	4.09E+02	mg/L	M	2.98E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Copper	5.42E+01	mg/L	5.42E+01	mg/L	M	3.94E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	1.88E+04	mg/L	1.88E+04	mg/L	M	1.37E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	9.75E-02	mg/L	9.75E-02	mg/L	M	7.09E-11	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	5.81E+01	mg/L	5.81E+01	mg/L	M	4.23E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	1.01E+01	mg/L	1.01E+01	mg/L	M	7.33E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	1.95E+02	mg/L	1.95E+02	mg/L	M	1.42E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										2.60E-08
										Total Risk Across All Exposure Routes/Pathways	1.3E-06

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.20.RME

CALCULATION OF CANCER RISKS FOR FUTURE INDUSTRIAL/ COMMERCIAL WORKER EXPOSURE TO SEDIMENT
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Ingestion and Dermal
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Arsenic	1.34E+01	mg/L	1.34E+01	mg/L	M	4.67E-06	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	7.01E-06
	Barium	4.89E+02	mg/L	4.89E+02	mg/L	M	1.71E-04	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	6.30E-01	mg/L	6.30E-01	mg/L	M	2.20E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cadmium	9.08E-01	mg/L	9.08E-01	mg/L	M	3.17E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium	1.02E+03	mg/L	1.02E+03	mg/L	M	3.57E-04	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Copper	1.28E+02	mg/L	1.28E+02	mg/L	M	4.48E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	2.39E+04	mg/L	2.39E+04	mg/L	M	8.34E-03	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	1.59E-01	mg/L	1.59E-01	mg/L	M	5.54E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	1.41E+02	mg/L	1.41E+02	mg/L	M	4.91E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	1.28E+01	mg/L	1.28E+01	mg/L	M	4.49E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	3.48E+02	mg/L	3.48E+02	mg/L	M	1.22E-04	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										7.01E-06
Dermal	Arsenic	1.34E+01	mg/L	1.34E+01	mg/L	M	9.25E-07	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	1.39E-06
	Barium	4.89E+02	mg/L	4.89E+02	mg/L	M	1.13E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	6.30E-01	mg/L	6.30E-01	mg/L	M	1.45E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cadmium	9.08E-01	mg/L	9.08E-01	mg/L	M	2.09E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium	1.02E+03	mg/L	1.02E+03	mg/L	M	2.35E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Copper	1.28E+02	mg/L	1.28E+02	mg/L	M	2.96E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	2.39E+04	mg/L	2.39E+04	mg/L	M	5.51E-04	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	1.59E-01	mg/L	1.59E-01	mg/L	M	3.66E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	1.41E+02	mg/L	1.41E+02	mg/L	M	3.24E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	1.28E+01	mg/L	1.28E+01	mg/L	M	2.96E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	3.48E+02	mg/L	3.48E+02	mg/L	M	8.02E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										1.39E-06
										Total Risk Across All Exposure Routes/Pathways	8.4E-06

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.21.CT

CALCULATION OF CANCER RISKS FOR FUTURE CONSTRUCTION/ UTILITY WORKER EXPOSURE TO SEDIMENT
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Ingestion and Dermal
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Arsenic	7.94E+00	mg/L	7.94E+00	mg/L	M	1.47E-08	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	2.20E-08
	Barium	1.92E+02	mg/L	1.92E+02	mg/L	M	3.55E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	5.06E-01	mg/L	5.06E-01	mg/L	M	9.34E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cadmium	7.52E-01	mg/L	7.52E-01	mg/L	M	1.39E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium	4.09E+02	mg/L	4.09E+02	mg/L	M	7.55E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Copper	5.42E+01	mg/L	5.42E+01	mg/L	M	1.00E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	1.88E+04	mg/L	1.88E+04	mg/L	M	3.47E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	9.75E-02	mg/L	9.75E-02	mg/L	M	1.80E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	5.81E+01	mg/L	5.81E+01	mg/L	M	1.07E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	1.01E+01	mg/L	1.01E+01	mg/L	M	1.86E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	1.95E+02	mg/L	1.95E+02	mg/L	M	3.61E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										2.20E-08
Dermal	Arsenic	7.94E+00	mg/L	7.94E+00	mg/L	M	4.40E-10	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	6.59E-10
	Barium	1.92E+02	mg/L	1.92E+02	mg/L	M	3.55E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	5.06E-01	mg/L	5.06E-01	mg/L	M	9.34E-12	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cadmium	7.52E-01	mg/L	7.52E-01	mg/L	M	1.39E-12	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium	4.09E+02	mg/L	4.09E+02	mg/L	M	7.55E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Copper	5.42E+01	mg/L	5.42E+01	mg/L	M	1.00E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	1.88E+04	mg/L	1.88E+04	mg/L	M	3.47E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	9.75E-02	mg/L	9.75E-02	mg/L	M	1.80E-12	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	5.81E+01	mg/L	5.81E+01	mg/L	M	1.07E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	1.01E+01	mg/L	1.01E+01	mg/L	M	1.86E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	1.95E+02	mg/L	1.95E+02	mg/L	M	3.61E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										6.59E-10
										Total Risk Across All Exposure Routes/Pathways	2.3E-08

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.2.21.RME

CALCULATION OF CANCER RISKS FOR FUTURE CONSTRUCTION/ UTILITY WORKER EXPOSURE TO SEDIMENT
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Ingestion and Dermal
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Exposure Route	*Chemical of Potential Concern*	*Medium EPC Value*	*Medium EPC Units*	*Route EPC Value*	*Route EPC Units*	*EPC Selected for Hazard Calculation (1)*	*Intake (Cancer)*	*Intake (Cancer) Units*	*Cancer Slope Factor*	*Cancer Slope Factor Units*	*Cancer Risk*
Ingestion	Arsenic	1.34E+01	mg/L	1.34E+01	mg/L	M	4.93E-08	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	7.40E-08
	Barium	4.89E+02	mg/L	4.89E+02	mg/L	M	1.81E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	6.30E-01	mg/L	6.30E-01	mg/L	M	2.32E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cadmium	9.08E-01	mg/L	9.08E-01	mg/L	M	3.35E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium	1.02E+03	mg/L	1.02E+03	mg/L	M	3.76E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Copper	1.28E+02	mg/L	1.28E+02	mg/L	M	4.73E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	2.39E+04	mg/L	2.39E+04	mg/L	M	8.81E-05	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	1.59E-01	mg/L	1.59E-01	mg/L	M	5.85E-10	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	1.41E+02	mg/L	1.41E+02	mg/L	M	5.19E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	1.28E+01	mg/L	1.28E+01	mg/L	M	4.74E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	3.48E+02	mg/L	3.48E+02	mg/L	M	1.28E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										7.40E-08
Dermal	Arsenic	1.34E+01	mg/L	1.34E+01	mg/L	M	4.44E-09	mg/kg-day	1.50E+00	(mg/kg-day) $^{-1}$	6.66E-09
	Barium	4.89E+02	mg/L	4.89E+02	mg/L	M	5.42E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Beryllium	6.30E-01	mg/L	6.30E-01	mg/L	M	6.97E-11	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Cadmium	9.08E-01	mg/L	9.08E-01	mg/L	M	1.01E-11	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Chromium	1.02E+03	mg/L	1.02E+03	mg/L	M	1.13E-07	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Copper	1.28E+02	mg/L	1.28E+02	mg/L	M	1.42E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Iron	2.39E+04	mg/L	2.39E+04	mg/L	M	2.64E-06	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Mercury	1.59E-01	mg/L	1.59E-01	mg/L	M	1.75E-11	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Nickel	1.41E+02	mg/L	1.41E+02	mg/L	M	1.56E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Selenium	1.28E+01	mg/L	1.28E+01	mg/L	M	1.42E-09	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	Zinc	3.48E+02	mg/L	3.48E+02	mg/L	M	3.85E-08	mg/kg-day	--	(mg/kg-day) $^{-1}$	NC
	(Total)										6.66E-09
										Total Risk Across All Exposure Routes/Pathways	8.1E-08

Notes:
-- = Not Available
N/A = Not Applicable
NC = Not Calculated
(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE B.3.1.CT

SUMMARY OF CURRENT MAINTENANCE WORKER RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	*Exposure Medium*	*Exposure Point*	*Chemical*	*Carcinogenic Risk*				*Chemical*	*Non-Carcinogenic Hazard Quotient*				
				Ingestion	*Inhalation*	*Dermal*	*Exposure Routes Total*		*Primary Target Organ*	*Ingestion*	*Inhalation*	*Dermal*	*Exposure Routes Total*
Surface Soil and Slag	Surface Soil/ Ambient Air	--	Aluminum	NC	NC	NC	NC	Aluminum	--	5.85E-04	2.85E-05	3.86E-06	6.17E-04
			Antimony	NC	NC	NC	NC	Antimony	blood system	1.82E-03	NC	7.99E-05	1.90E-03
			Arsenic	3.88E-08	1.90E-11	7.69E-10	3.96E-08	Arsenic	skin discoloration	6.71E-04	NC	1.33E-05	6.84E-04
			Barium	NC	NC	NC	NC	Barium	no effects	7.42E-05	1.81E-06	6.99E-09	7.60E-05
			Beryllium	NC	9.66E-13	NC	9.66E-13	Beryllium	chronic beryllium disease	9.16E-06	1.57E-07	8.64E-06	1.80E-05
			Cadmium	NC	4.15E-12	NC	4.15E-12	Cadmium	kidney	2.10E-04	8.98E-08	2.77E-06	2.13E-04
			Chromium Total	NC	NC	NC	NC	Chromium Total	no effects	2.59E-05	NC	1.32E-05	3.91E-05
			Chromium VI (Hexavalent)	NC	5.61E-11	NC	5.61E-11	Chromium VI (Hexavalent)	no effects	7.10E-05	3.71E-07	1.87E-05	9.01E-05
			Cobalt	NC	4.31E-11	NC	4.31E-11	Cobalt	--	3.51E-05	6.01E-06	2.31E-07	4.13E-05
			Copper	NC	NC	NC	NC	Copper	gastrointestinal system	1.29E-04	NC	8.52E-07	1.30E-04
			Iron	NC	NC	NC	NC	Iron	--	2.00E-03	NC	1.32E-05	2.01E-03
			Lead	NC	NC	NC	NC	Lead	--	NC	NC	NC	NC
			Manganese	NC	NC	NC	NC	Manganese	central nervous system	1.18E-03	1.88E-04	1.95E-04	1.56E-03
			Mercury	NC	NC	NC	NC	Mercury	autoimmune system	3.13E-05	5.33E-09	2.07E-07	3.15E-05
			Nickel	NC	NC	NC	NC	Nickel	body weight	3.97E-04	NC	6.56E-05	4.63E-04
			Selenium	NC	NC	NC	NC	Selenium	clinical selenosis	3.05E-05	NC	2.01E-07	3.07E-05
			Thallium	NC	NC	NC	NC	Thallium	liver	1.17E-03	NC	7.73E-06	1.18E-03
			Vanadium	NC	NC	NC	NC	Vanadium	--	1.63E-03	NC	4.15E-04	2.05E-03
			Zinc	NC	NC	NC	NC	Zinc	blood system	1.82E-05	NC	1.20E-07	1.83E-05
Surface Soil	Surface Soil/ Ambient Air	--	Antimony	NC	NC	NC	NC	Antimony	blood system	8.30E-04	NC	3.65E-05	8.66E-04
			Arsenic	3.79E-08	1.85E-11	7.50E-10	3.86E-08	Arsenic	skin discoloration	6.54E-04	NC	1.30E-05	6.67E-04
			Barium	NC	NC	NC	NC	Barium	no effects	7.38E-05	1.80E-06	6.96E-09	7.56E-05
			Beryllium	NC	1.00E-12	NC	1.00E-12	Beryllium	chronic beryllium disease	9.50E-06	1.63E-07	8.96E-06	1.86E-05
			Cadmium	NC	1.17E-12	NC	1.17E-12	Cadmium	kidney	5.91E-05	2.53E-08	7.79E-07	5.99E-05
			Chromium Total	NC	NC	NC	NC	Chromium Total	no effects	6.05E-06	NC	3.07E-06	9.12E-06
			Cobalt	NC	4.68E-11	NC	4.68E-11	Cobalt	--	3.80E-05	6.52E-06	2.51E-07	4.48E-05
			Copper	NC	NC	NC	NC	Copper	gastrointestinal system	2.42E-05	NC	1.60E-07	2.44E-05
			Iron	NC	NC	NC	NC	Iron	--	2.00E-03	NC	1.32E-05	2.01E-03
			Manganese	NC	NC	NC	NC	Manganese	--	9.73E-04	1.55E-04	1.60E-04	1.29E-03
			Mercury	NC	NC	NC	NC	Mercury	central nervous system	4.38E-05	7.47E-09	2.89E-07	4.41E-05
			Nickel	NC	NC	NC	NC	Nickel	autoimmune system	3.86E-05	NC	6.37E-06	4.49E-05
			Selenium	NC	NC	NC	NC	Selenium	clinical selenosis	1.73E-05	NC	1.14E-07	1.74E-05
			Thallium	NC	NC	NC	NC	Thallium	liver	6.89E-04	NC	4.55E-06	6.93E-04
			Zinc	NC	NC	NC	NC	Zinc	blood system	1.62E-05	NC	1.07E-07	1.63E-05

TABLE B.3.1.CT

SUMMARY OF CURRENT MAINTENANCE WORKER RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Slag	Surface Soil/ Ambient Air	--	Aluminum	NC	NC	NC	NC	Aluminum	--	6.49E-04	3.17E-05	4.28E-06	6.85E-04
			Antimony	NC	NC	NC	NC	Antimony	blood system	7.65E-03	NC	3.37E-04	7.98E-03
			Arsenic	2.78E-08	1.36E-11	5.50E-10	2.83E-08	Arsenic	skin discoloration	4.80E-04	NC	9.51E-06	4.90E-04
			Barium	NC	NC	NC	NC	Barium	no effects	7.83E-05	1.91E-06	7.38E-09	8.02E-05
			Beryllium	NC	7.20E-13	NC	7.20E-13	Beryllium	chronic beryllium disease	6.82E-06	1.17E-07	6.43E-06	1.34E-05
			Cadmium	NC	1.10E-11	NC	1.10E-11	Cadmium	kidney	5.57E-04	2.39E-07	7.36E-06	5.65E-04
			Chromium Total	NC	NC	NC	NC	Chromium Total	no effects	8.06E-05	NC	4.09E-05	1.22E-04
			Chromium VI (Hexavalent)	NC	1.16E-10	NC	1.16E-10	Chromium VI (Hexavalent)	no effects	1.46E-04	7.64E-07	3.86E-05	1.85E-04
			Cobalt	NC	3.88E-11	NC	3.88E-11	Cobalt	--	3.16E-05	5.41E-06	2.08E-07	3.72E-05
			Copper	NC	NC	NC	NC	Copper	gastrointestinal system	2.69E-04	NC	1.78E-06	2.71E-04
			Iron	NC	NC	NC	NC	Iron	--	2.01E-03	NC	1.33E-05	2.03E-03
			Lead	NC	NC	NC	NC	Lead	--	NC	NC	NC	NC
			Manganese	NC	NC	NC	NC	Manganese	central nervous system	1.80E-03	2.87E-04	2.96E-04	2.38E-03
			Mercury	NC	NC	NC	NC	Mercury	autoimmune system	7.51E-06	1.28E-09	4.96E-08	7.57E-06
			Nickel	NC	NC	NC	NC	Nickel	body weight	2.20E-03	NC	3.64E-04	2.57E-03
			Selenium	NC	NC	NC	NC	Selenium	clinical selenosis	8.07E-05	NC	5.33E-07	8.13E-05
			Thallium	NC	NC	NC	NC	Thallium	liver	2.63E-03	NC	1.74E-05	2.65E-03
			Vanadium	NC	NC	NC	NC	Vanadium	--	3.14E-03	NC	7.98E-04	3.94E-03
			Zinc	NC	NC	NC	NC	Zinc	blood system	2.34E-05	NC	1.54E-07	2.35E-05
Surface Water	Surface Water	--	Aluminum	NC	--	NC	NC	Aluminum	--	1.87E-06	--	1.23E-06	3.11E-06
			Antimony	NC	--	NC	NC	Antimony	blood system	2.94E-05	--	1.29E-04	1.59E-04
			Arsenic	2.95E-09	--	1.95E-09	4.90E-09	Arsenic	skin discoloration	5.10E-05	--	3.37E-05	8.47E-05
			Barium	NC	--	NC	NC	Barium	no effects	2.12E-06	--	2.00E-05	2.21E-05
			Beryllium	NC	--	NC	NC	Beryllium	chronic beryllium disease	1.19E-06	--	1.12E-04	1.13E-04
			Chromium	NC	--	NC	NC	Chromium	no effects	1.46E-07	--	7.42E-06	7.57E-06
			Chromium VI (Hexavalent)	NC	--	NC	NC	Chromium VI (Hexavalent)	no effects	1.64E-05	--	8.68E-04	8.84E-04
			Copper	NC	--	NC	NC	Copper	gastrointestinal system	8.22E-07	--	5.42E-07	1.36E-06
			Iron	NC	--	NC	NC	Iron	--	1.38E-05	--	9.13E-06	2.30E-05
			Lead	NC	--	NC	NC	Lead	--	NC	--	NC	NC
			Manganese	NC	--	NC	NC	Manganese	central nervous system	1.21E-05	--	1.99E-04	2.11E-04
			Mercury	NC	--	NC	NC	Mercury	autoimmune system	9.39E-07	--	6.20E-07	1.56E-06
			Nickel	NC	--	NC	NC	Nickel	body weight	9.39E-07	--	3.10E-06	4.04E-06
			Selenium	NC	--	NC	NC	Selenium	clinical selenosis	3.60E-06	--	2.38E-06	5.98E-06
			Thallium	NC	--	NC	NC	Thallium	liver	3.24E-04	--	2.14E-04	5.38E-04
			Vanadium	NC	--	NC	NC	Vanadium	--	1.64E-05	--	4.17E-04	4.34E-04
			Zinc	NC	--	NC	NC	Zinc	blood system	2.59E-07	--	1.03E-07	3.62E-07

TABLE B.3.1.CT

SUMMARY OF CURRENT MAINTENANCE WORKER RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	*Exposure Medium*	*Exposure Point*	*Chemical*	*Carcinogenic Risk*				*Chemical*	*Non-Carcinogenic Hazard Quotient*				
				Ingestion	*Inhalation*	*Dermal*	*Exposure Routes Total*		*Primary Target Organ*	*Ingestion*	*Inhalation*	*Dermal*	*Exposure Routes Total*
Sediment	Sediment	--	Arsenic	4.79E-08	--	9.49E-10	4.89E-08	Arsenic	skin discoloration	8.29E-04	--	1.64E-05	8.45E-04
			Barium	NC	--	NC	NC	Barium	no effects	8.60E-05	--	8.11E-06	9.41E-05
			Beryllium	NC	--	NC	NC	Beryllium	chronic beryllium disease	7.92E-06	--	7.47E-06	1.54E-05
			Cadmium	NC	--	NC	NC	Cadmium	kidney	4.71E-05	--	6.22E-07	4.77E-05
			Chromium	NC	--	NC	NC	Chromium	no effects	8.54E-06	--	4.34E-06	1.29E-05
			Copper	NC	--	NC	NC	Copper	gastrointestinal disease	4.25E-05	--	2.80E-07	4.27E-05
			Iron	NC	--	NC	NC	Iron	--	1.96E-03	--	1.30E-05	1.98E-03
			Mercury	NC	--	NC	NC	Mercury	autoimmune system	1.02E-05	--	6.72E-08	1.02E-05
			Nickel	NC	--	NC	NC	Nickel	body weight	9.10E-05	--	1.50E-05	1.06E-04
			Selenium	NC	--	NC	NC	Selenium	clinical selenosis	6.31E-05	--	4.17E-07	6.35E-05
			Zinc	NC	--	NC	NC	Zinc	blood system	2.04E-05	--	1.35E-07	2.05E-05

Total Risk Across Surface Soil and Slag	4.0E-08
Total Risk Across Surface Soil	3.9E-08
Total Risk Across Slag	2.9E-08
Total Risk Across Surface Water	4.9E-09
Total Risk Across Sediment	4.9E-08

Total Risk Across All Media and All Exposure Routes (surface soil and slag)	9.4E-08
Total Risk Across All Media and All Exposure Routes (surface soil)	9.2E-08
Total Risk Across All Media and All Exposure Routes (slag)	8.2E-08

Total Hazard Index Across All Media and All Exposure Routes (surface soil and slag)	1.7E-02
Total Hazard Index Across All Media and All Exposure Routes (surface soil)	1.2E-02
Total Hazard Index Across All Media and All Exposure Routes (slag)	3.0E-02

Surface Soil and Slag

Total [blood system] HI =	2.1E-03
Total [skin discoloration] HI =	1.6E-03
Total [chronic beryllium disease] HI =	1.5E-04
Total [kidney] HI =	2.6E-04
Total [gastrointestinal system] HI =	1.7E-04
Total [central nervous system] HI =	1.8E-03
Total [autoimmune system] HI =	4.3E-05
Total [body weight] HI =	5.7E-04
Total [clinical selenosis] HI =	1.0E-04
Total [liver] HI =	1.7E-03

Note:
NC = Not Calculated

TABLE B.3.1.RME

SUMMARY OF CURRENT MAINTENANCE WORKER RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	*Exposure Medium*	*Exposure Point*	*Chemical*	*Carcinogenic Risk*				*Chemical*	*Non-Carcinogenic Hazard Quotient*				
				Ingestion	*Inhalation*	*Dermal*	*Exposure Routes Total*		*Primary Target Organ*	*Ingestion*	*Inhalation*	*Dermal*	*Exposure Routes Total*
Surface Soil and Slag	Surface Soil/ Ambient Air	--	Aluminum	NC	NC	NC	NC	Aluminum	--	2.31E-03	1.13E-04	1.53E-04	2.58E-03
			Antimony	NC	NC	NC	NC	Antimony	blood system	5.98E-03	NC	2.63E-03	8.61E-03
			Arsenic	6.06E-07	2.96E-10	1.20E-07	7.26E-07	Arsenic	skin discoloration	3.77E-03	NC	7.47E-04	4.52E-03
			Barium	NC	NC	NC	NC	Barium	no effects	3.38E-04	8.24E-06	3.18E-07	3.46E-04
			Beryllium	NC	1.11E-11	NC	1.11E-11	Beryllium	chronic beryllium disease	3.79E-05	6.49E-07	3.57E-04	3.95E-04
			Cadmium	NC	1.80E-10	NC	1.80E-10	Cadmium	kidney	3.28E-03	1.40E-06	4.33E-04	3.71E-03
			Chromium Total	NC	NC	NC	NC	Chromium Total	no effects	8.24E-05	NC	4.18E-04	5.00E-04
			Chromium VI (Hexavalent)	NC	4.56E-10	NC	4.56E-10	Chromium VI (Hexavalent)	no effects	2.08E-04	1.09E-06	5.48E-04	7.57E-04
			Cobalt	NC	9.79E-10	NC	9.79E-10	Cobalt	--	2.86E-04	4.91E-05	1.89E-05	3.54E-04
			Copper	NC	NC	NC	NC	Copper	gastrointestinal system	2.00E-03	NC	1.32E-04	2.13E-03
			Iron	NC	NC	NC	NC	Iron	--	4.51E-03	NC	2.98E-04	4.81E-03
			Lead	NC	NC	NC	NC	Lead	--	NC	NC	NC	NC
			Manganese	NC	NC	NC	NC	Manganese	central nervous system	7.23E-03	1.15E-03	1.19E-02	2.03E-02
			Mercury	NC	NC	NC	NC	Mercury	autoimmune system	5.19E-04	8.84E-08	3.42E-05	5.53E-04
			Nickel	NC	NC	NC	NC	Nickel	body weight	3.24E-03	NC	5.35E-03	8.60E-03
			Selenium	NC	NC	NC	NC	Selenium	clinical selenosis	8.28E-05	NC	5.47E-06	8.83E-05
			Thallium	NC	NC	NC	NC	Thallium	liver	3.48E-03	NC	2.30E-04	3.71E-03
			Vanadium	NC	NC	NC	NC	Vanadium	--	4.13E-03	NC	1.05E-02	1.46E-02
			Zinc	NC	NC	NC	NC	Zinc	blood system	8.70E-05	NC	5.74E-06	9.27E-05
Surface Soil	Surface Soil/ Ambient Air	--	Antimony	NC	NC	NC	NC	Antimony	blood system	2.42E-03	NC	1.06E-03	3.48E-03
			Arsenic	2.65E-07	1.29E-10	5.25E-08	3.18E-07	Arsenic	skin discoloration	1.65E-03	NC	3.26E-04	1.98E-03
			Barium	NC	NC	NC	NC	Barium	no effects	4.83E-04	1.18E-05	4.55E-07	4.95E-04
			Beryllium	NC	7.45E-12	NC	7.45E-12	Beryllium	chronic beryllium disease	2.54E-05	4.35E-07	2.40E-04	2.66E-04
			Cadmium	NC	8.84E-12	NC	8.84E-12	Cadmium	kidney	1.61E-04	6.89E-08	2.12E-05	1.82E-04
			Chromium Total	NC	NC	NC	NC	Chromium Total	no effects	1.95E-05	NC	9.88E-05	1.18E-04
			Cobalt	NC	1.87E-09	NC	1.87E-09	Cobalt	--	5.48E-04	9.39E-05	3.62E-05	6.78E-04
			Copper	NC	NC	NC	NC	Copper	gastrointestinal system	6.04E-05	NC	3.99E-06	6.44E-05
			Iron	NC	NC	NC	NC	Iron	--	4.52E-03	NC	2.98E-04	4.82E-03
			Manganese	NC	NC	NC	NC	Manganese	--	1.18E-02	1.89E-03	1.95E-02	3.32E-02
			Mercury	NC	NC	NC	NC	Mercury	central nervous system	1.01E-03	1.73E-07	6.69E-05	1.08E-03
			Nickel	NC	NC	NC	NC	Nickel	autoimmune system	8.69E-05	NC	1.43E-04	2.30E-04
			Selenium	NC	NC	NC	NC	Selenium	clinical selenosis	4.82E-05	NC	3.18E-06	5.14E-05
			Thallium	NC	NC	NC	NC	Thallium	liver	2.04E-03	NC	1.35E-04	2.17E-03
			Zinc	NC	NC	NC	NC	Zinc	blood system	4.23E-05	NC	2.79E-06	4.51E-05

TABLE B.3.1.RME

SUMMARY OF CURRENT MAINTENANCE WORKER RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	*Exposure Medium*	*Exposure Point*	*Chemical*	*Carcinogenic Risk*				*Chemical*	*Non-Carcinogenic Hazard Quotient*				
				Ingestion	*Inhalation*	*Dermal*	*Exposure Routes Total*		*Primary Target Organ*	*Ingestion*	*Inhalation*	*Dermal*	*Exposure Routes Total*
Slag	Surface Soil/ Ambient Air	--	Aluminum	NC	NC	NC	NC	Aluminum	--	4.82E-03	2.35E-04	3.18E-04	5.37E-03
			Antimony	NC	NC	NC	NC	Antimony	blood system	5.31E-02	NC	2.34E-02	7.64E-02
			Arsenic	4.65E-07	2.27E-10	9.21E-08	5.57E-07	Arsenic	skin discoloration	2.89E-03	NC	5.73E-04	3.47E-03
			Barium	NC	NC	NC	NC	Barium	no effects	2.44E-04	5.97E-06	2.30E-07	2.51E-04
			Beryllium	NC	5.03E-12	NC	5.03E-12	Beryllium	chronic beryllium disease	1.72E-05	2.94E-07	1.62E-04	1.79E-04
			Cadmium	NC	1.45E-10	NC	1.45E-10	Cadmium	kidney	2.65E-03	1.13E-06	3.49E-04	3.00E-03
			Chromium Total	NC	NC	NC	NC	Chromium Total	no effects	3.50E-04	NC	1.78E-03	2.13E-03
			Chromium VI (Hexavalent)	NC	3.64E-09	NC	3.64E-09	Chromium VI (Hexavalent)	no effects	1.65E-03	8.66E-06	4.37E-03	6.03E-03
			Cobalt	NC	3.91E-10	NC	3.91E-10	Cobalt	--	1.14E-04	1.96E-05	7.55E-06	1.42E-04
			Copper	NC	NC	NC	NC	Copper	gastrointestinal system	2.66E-03	NC	1.75E-04	2.83E-03
			Iron	NC	NC	NC	NC	Iron	--	5.06E-03	NC	3.34E-04	5.40E-03
			Lead	NC	NC	NC	NC	Lead	--	NC	NC	NC	NC
			Manganese	NC	NC	NC	NC	Manganese	central nervous system	7.62E-03	1.21E-03	1.26E-02	2.14E-02
			Mercury	NC	NC	NC	NC	Mercury	autoimmune system	7.83E-05	1.33E-08	5.17E-06	8.35E-05
			Nickel	NC	NC	NC	NC	Nickel	body weight	1.62E-02	NC	2.67E-02	4.28E-02
			Selenium	NC	NC	NC	NC	Selenium	clinical selenosis	3.29E-04	NC	2.17E-05	3.51E-04
			Thallium	NC	NC	NC	NC	Thallium	liver	9.05E-03	NC	5.97E-04	9.65E-03
			Vanadium	NC	NC	NC	NC	Vanadium	--	1.17E-02	NC	2.97E-02	4.14E-02
			Zinc	NC	NC	NC	NC	Zinc	blood system	2.07E-04	NC	1.37E-05	2.21E-04
Surface Water	Surface Water	--	Aluminum	NC	--	NC	NC	Aluminum	--	1.80E-05	--	1.19E-05	2.99E-05
			Antimony	NC	--	NC	NC	Antimony	blood system	1.32E-04	--	5.82E-04	7.14E-04
			Arsenic	3.79E-08	--	2.50E-08	6.29E-08	Arsenic	skin discoloration	2.36E-04	--	1.55E-04	3.91E-04
			Barium	NC	--	NC	NC	Barium	no effects	1.51E-05	--	1.42E-04	1.57E-04
			Beryllium	NC	--	NC	NC	Beryllium	chronic beryllium disease	4.76E-06	--	4.49E-04	4.53E-04
			Chromium	NC	--	NC	NC	Chromium	no effects	1.43E-06	--	7.25E-05	7.40E-05
			Chromium VI (Hexavalent)	NC	--	NC	NC	Chromium VI (Hexavalent)	no effects	1.07E-04	--	5.64E-03	5.75E-03
			Copper	NC	--	NC	NC	Copper	gastrointestinal system	2.08E-05	--	1.37E-05	3.46E-05
			Iron	NC	--	NC	NC	Iron	--	3.29E-04	--	2.17E-04	5.46E-04
			Lead	NC	--	NC	NC	Lead	--	NC	--	NC	NC
			Manganese	NC	--	NC	NC	Manganese	central nervous system	1.28E-04	--	2.11E-03	2.24E-03
			Mercury	NC	--	NC	NC	Mercury	autoimmune system	4.17E-06	--	2.76E-06	6.93E-06
			Nickel	NC	--	NC	NC	Nickel	body weight	2.25E-05	--	7.43E-05	9.68E-05
			Selenium	NC	--	NC	NC	Selenium	clinical selenosis	1.61E-05	--	1.07E-05	2.68E-05
			Thallium	NC	--	NC	NC	Thallium	liver	1.53E-03	--	1.01E-03	2.54E-03
			Vanadium	NC	--	NC	NC	Vanadium	--	8.90E-05	--	2.26E-03	2.35E-03
			Zinc	NC	--	NC	NC	Zinc	blood system	2.78E-06	--	1.10E-06	3.88E-06

TABLE B.3.1.RME

SUMMARY OF CURRENT MAINTENANCE WORKER RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	*Exposure Medium*	*Exposure Point*	*Chemical*	*Carcinogenic Risk*				*Chemical*	*Non-Carcinogenic Hazard Quotient*				
				Ingestion	*Inhalation*	*Dermal*	*Exposure Routes Total*		*Primary Target Organ*	*Ingestion*	*Inhalation*	*Dermal*	*Exposure Routes Total*
Sediment	Sediment	--	Arsenic	4.48E-07	--	8.88E-08	5.37E-07	Arsenic	skin discoloration	2.79E-03	--	5.53E-04	3.34E-03
			Barium	NC	--	NC	NC	Barium	no effects	4.38E-04	--	4.13E-04	8.50E-04
			Beryllium	NC	--	NC	NC	Beryllium	chronic beryllium disease	1.97E-05	--	1.86E-04	2.06E-04
			Cadmium	NC	--	NC	NC	Cadmium	kidney	1.14E-04	--	1.50E-05	1.29E-04
			Chromium	NC	--	NC	NC	Chromium	no effects	4.26E-05	--	2.16E-04	2.59E-04
			Copper	NC	--	NC	NC	Copper	gastrointestinal disease	2.01E-04	--	1.33E-05	2.14E-04
			Iron	NC	--	NC	NC	Iron	--	4.98E-03	--	3.29E-04	5.31E-03
			Mercury	NC	--	NC	NC	Mercury	autoimmune system	3.31E-05	--	2.18E-06	3.53E-05
			Nickel	NC	--	NC	NC	Nickel	body weight	4.40E-04	--	7.27E-04	1.17E-03
			Selenium	NC	--	NC	NC	Selenium	clinical selenosis	1.61E-04	--	1.06E-05	1.71E-04
			Zinc	NC	--	NC	NC	Zinc	blood system	7.26E-05	--	4.79E-06	7.74E-05

Total Risk Across Surface Soil and Slag	7.3E-07
Total Risk Across Surface Soil	3.2E-07
Total Risk Across Slag	5.6E-07
Total Risk Across Surface Water	6.3E-08
Total Risk Across Sediment	5.4E-07

Total Risk Across All Media and All Exposure Routes (surface soil and slag)	1.3E-06
Total Risk Across All Media and All Exposure Routes (surface soil)	9.2E-07
Total Risk Across All Media and All Exposure Routes (slag)	1.2E-06

Total Hazard Index Across All Media and All Exposure Routes (surface soil and slag)	1.0E-01
Total Hazard Index Across All Media and All Exposure Routes (surface soil)	7.6E-02
Total Hazard Index Across All Media and All Exposure Routes (slag)	2.5E-01

Surface Soil and Slag

Total [blood system] HI =	9.5E-03
Total [skin discoloration] HI =	8.3E-03
Total [chronic beryllium disease] HI =	1.1E-03
Total [kidney] HI =	3.8E-03
Total [gastrointestinal system] HI =	2.4E-03
Total [central nervous system] HI =	2.3E-02
Total [autoimmune system] HI =	6.0E-04
Total [body weight] HI =	9.9E-03
Total [clinical selenosis] HI =	2.9E-04
Total [liver] HI =	6.2E-03

Note:
NC = Not Calculated

TABLE B.3.2.CT

SUMMARY OF CURRENT/FUTURE TRESPASSER RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent

Medium	*Exposure Medium*	*Exposure Point*	*Chemical*	*Carcinogenic Risk*				*Chemical*	*Non-Carcinogenic Hazard Quotient*				
				Ingestion	*Inhalation*	*Dermal*	*Exposure Routes Total*		*Primary Target Organ*	*Ingestion*	*Inhalation*	*Dermal*	*Exposure Routes Total*
Surface Soil and Slag	Surface Soil/ Ambient Air	--	Aluminum	NC	NC	NC	NC	Aluminum	--	6.55E-03	1.16E-04	1.15E-04	6.78E-03
			Antimony	NC	NC	NC	NC	Antimony	blood system	2.03E-02	NC	2.39E-03	2.27E-02
			Arsenic	5.80E-07	1.02E-10	3.06E-08	6.11E-07	Arsenic	skin discoloration	7.52E-03	NC	3.97E-04	7.91E-03
			Barium	NC	NC	NC	NC	Barium	no effects	8.31E-04	7.33E-06	2.09E-07	8.38E-04
			Beryllium	NC	5.21E-12	NC	5.21E-12	Beryllium	chronic beryllium disease	1.03E-04	6.35E-07	2.58E-04	3.61E-04
			Cadmium	NC	2.24E-11	NC	2.24E-11	Cadmium	kidney	2.35E-03	3.64E-07	8.27E-05	2.43E-03
			Chromium Total	NC	NC	NC	NC	Chromium Total	no effects	2.90E-04	NC	3.93E-04	6.83E-04
			Chromium VI (Hexavalent)	NC	3.03E-10	NC	3.03E-10	Chromium VI (Hexavalent)	no effects	7.95E-04	1.50E-06	5.60E-04	1.36E-03
			Cobalt	NC	2.33E-10	NC	2.33E-10	Cobalt	--	3.93E-04	2.43E-05	6.91E-06	4.24E-04
			Copper	NC	NC	NC	NC	Copper	gastrointestinal system	1.45E-03	NC	2.55E-05	1.47E-03
			Iron	NC	NC	NC	NC	Iron	--	2.24E-02	NC	3.94E-04	2.28E-02
			Lead	NC	NC	NC	NC	Lead	--	NC	NC	NC	NC
			Manganese	NC	NC	NC	NC	Manganese	central nervous system	1.32E-02	7.63E-04	5.82E-03	1.98E-02
			Mercury	NC	NC	NC	NC	Mercury	autoimmune system	3.51E-04	2.16E-08	6.17E-06	3.57E-04
			Nickel	NC	NC	NC	NC	Nickel	body weight	4.45E-03	NC	1.96E-03	6.41E-03
			Selenium	NC	NC	NC	NC	Selenium	clinical selenosis	3.42E-04	NC	6.01E-06	3.48E-04
			Thallium	NC	NC	NC	NC	Thallium	liver	1.31E-02	NC	2.31E-04	1.34E-02
			Vanadium	NC	NC	NC	NC	Vanadium	--	1.83E-02	NC	1.24E-02	3.07E-02
			Zinc	NC	NC	NC	NC	Zinc	blood system	2.04E-04	NC	3.59E-06	2.07E-04
Surface Soil	Surface Soil/ Ambient Air	--	Antimony	NC	NC	NC	NC	Antimony	blood system	9.29E-03	NC	1.09E-03	1.04E-02
			Arsenic	5.65E-07	9.98E-11	2.99E-08	5.95E-07	Arsenic	skin discoloration	7.33E-03	NC	3.87E-04	7.72E-03
			Barium	NC	NC	NC	NC	Barium	no effects	8.27E-04	7.29E-06	2.08E-07	8.34E-04
			Beryllium	NC	5.41E-12	NC	5.41E-12	Beryllium	chronic beryllium disease	1.06E-04	6.59E-07	2.68E-04	3.75E-04
			Cadmium	NC	6.30E-12	NC	6.30E-12	Cadmium	kidney	6.61E-04	1.02E-07	2.33E-05	6.85E-04
			Chromium Total	NC	NC	NC	NC	Chromium Total	no effects	6.77E-05	NC	9.17E-05	1.59E-04
			Cobalt	NC	2.53E-10	NC	2.53E-10	Cobalt	--	4.26E-04	2.64E-05	7.50E-06	4.60E-04
			Copper	NC	NC	NC	NC	Copper	gastrointestinal system	2.71E-04	NC	4.78E-06	2.76E-04
			Iron	NC	NC	NC	NC	Iron	--	2.24E-02	NC	3.94E-04	2.28E-02
			Manganese	NC	NC	NC	NC	Manganese	--	1.09E-02	6.28E-04	4.79E-03	1.63E-02
			Mercury	NC	NC	NC	NC	Mercury	central nervous system	4.91E-04	3.02E-08	8.64E-06	5.00E-04
			Nickel	NC	NC	NC	NC	Nickel	autoimmune system	4.32E-04	NC	1.90E-04	6.22E-04
			Selenium	NC	NC	NC	NC	Selenium	clinical selenosis	1.94E-04	NC	3.41E-06	1.97E-04
			Thallium	NC	NC	NC	NC	Thallium	liver	7.72E-03	NC	1.36E-04	7.85E-03
			Zinc	NC	NC	NC	NC	Zinc	blood system	1.81E-04	NC	3.18E-06	1.84E-04

TABLE B.3.2.CT

SUMMARY OF CURRENT/FUTURE TRESPASSER RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Slag	Surface Soil/ Ambient Air	--	Aluminum	NC	NC	NC	NC	Aluminum	--	7.27E-03	1.28E-04	1.28E-04	7.53E-03
			Antimony	NC	NC	NC	NC	Antimony	blood system	8.57E-02	NC	1.01E-02	9.57E-02
			Arsenic	4.15E-07	7.32E-11	2.19E-08	4.37E-07	Arsenic	skin discoloration	5.38E-03	NC	2.84E-04	5.66E-03
			Barium	NC	NC	NC	NC	Barium	no effects	8.77E-04	7.73E-06	2.20E-07	8.84E-04
			Beryllium	NC	3.88E-12	NC	3.88E-12	Beryllium	chronic beryllium disease	7.64E-05	4.73E-07	1.92E-04	2.69E-04
			Cadmium	NC	5.95E-11	NC	5.95E-11	Cadmium	kidney	6.24E-03	9.66E-07	2.20E-04	6.46E-03
			Chromium Total	NC	NC	NC	NC	Chromium Total	no effects	9.03E-04	NC	1.22E-03	2.13E-03
			Chromium VI (Hexavalent)	NC	6.24E-10	NC	6.24E-10	Chromium VI (Hexavalent)	no effects	1.64E-03	3.09E-06	1.15E-03	2.79E-03
			Cobalt	NC	2.10E-10	NC	2.10E-10	Cobalt	--	3.53E-04	2.19E-05	6.22E-06	3.82E-04
			Copper	NC	NC	NC	NC	Copper	gastrointestinal system	3.01E-03	NC	5.30E-05	3.07E-03
			Iron	NC	NC	NC	NC	Iron	--	2.26E-02	NC	3.97E-04	2.30E-02
			Lead	NC	NC	NC	NC	Lead	--	NC	NC	NC	NC
			Manganese	NC	NC	NC	NC	Manganese	central nervous system	2.01E-02	1.16E-03	8.86E-03	3.02E-02
			Mercury	NC	NC	NC	NC	Mercury	autoimmune system	8.42E-05	5.18E-09	1.48E-06	8.57E-05
			Nickel	NC	NC	NC	NC	Nickel	body weight	2.47E-02	NC	1.09E-02	3.56E-02
			Selenium	NC	NC	NC	NC	Selenium	clinical selenosis	9.04E-04	NC	1.59E-05	9.20E-04
			Thallium	NC	NC	NC	NC	Thallium	liver	2.95E-02	NC	5.18E-04	3.00E-02
			Vanadium	NC	NC	NC	NC	Vanadium	--	3.52E-02	NC	2.38E-02	5.91E-02
			Zinc	NC	NC	NC	NC	Zinc	blood system	2.62E-04	NC	4.61E-06	2.66E-04
Surface Water	Surface Water	--	Aluminum	NC	--	NC	NC	Aluminum	--	8.38E-05	--	7.37E-05	1.58E-04
			Antimony	NC	--	NC	NC	Antimony	blood system	1.32E-03	--	7.72E-03	9.03E-03
			Arsenic	1.76E-07	--	1.55E-07	3.32E-07	Arsenic	skin discoloration	2.29E-03	--	2.01E-03	4.30E-03
			Barium	NC	--	NC	NC	Barium	no effects	9.51E-05	--	1.20E-03	1.29E-03
			Beryllium	NC	--	NC	NC	Beryllium	chronic beryllium disease	5.33E-05	--	6.70E-03	6.75E-03
			Chromium	NC	--	NC	NC	Chromium	no effects	6.55E-06	--	4.43E-04	4.50E-04
			Chromium VI (Hexavalent)	NC	--	NC	NC	Chromium VI (Hexavalent)	no effects	7.36E-04	--	5.18E-02	5.26E-02
			Copper	NC	--	NC	NC	Copper	gastrointestinal system	3.68E-05	--	3.24E-05	6.92E-05
			Iron	NC	--	NC	NC	Iron	--	6.20E-04	--	5.45E-04	1.16E-03
			Lead	NC	--	NC	NC	Lead	--	NC	--	NC	NC
			Manganese	NC	--	NC	NC	Manganese	central nervous system	5.40E-04	--	1.19E-02	1.24E-02
			Mercury	NC	--	NC	NC	Mercury	autoimmune system	4.21E-05	--	3.70E-05	7.91E-05
			Nickel	NC	--	NC	NC	Nickel	body weight	4.21E-05	--	1.85E-04	2.27E-04
			Selenium	NC	--	NC	NC	Selenium	clinical selenosis	1.61E-04	--	1.42E-04	3.03E-04
			Thallium	NC	--	NC	NC	Thallium	liver	1.45E-02	--	1.28E-02	2.73E-02
			Vanadium	NC	--	NC	NC	Vanadium	--	7.36E-04	--	2.49E-02	2.57E-02
			Zinc	NC	--	NC	NC	Zinc	blood system	1.16E-05	--	6.13E-06	1.77E-05

TABLE B.3.2.CT

SUMMARY OF CURRENT/FUTURE TRESPASSER RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent

Medium	*Exposure Medium*	*Exposure Point*	*Chemical*	*Carcinogenic Risk*				*Chemical*	*Non-Carcinogenic Hazard Quotient*				
				Ingestion	*Inhalation*	*Dermal*	*Exposure Routes Total*		*Primary Target Organ*	*Ingestion*	*Inhalation*	*Dermal*	*Exposure Routes Total*
Sediment	Sediment	--	Arsenic	7.16E-07	--	3.78E-08	7.54E-07	Arsenic	skin discoloration	9.28E-03	--	4.90E-04	9.77E-03
			Barium	NC	--	NC	NC	Barium	no effects	9.63E-04	--	2.42E-04	1.21E-03
			Beryllium	NC	--	NC	NC	Beryllium	chronic beryllium disease	8.87E-05	--	2.23E-04	3.12E-04
			Cadmium	NC	--	NC	NC	Cadmium	kidney	5.27E-04	--	1.86E-05	5.46E-04
			Chromium	NC	--	NC	NC	Chromium	no effects	9.57E-05	--	1.30E-04	2.25E-04
			Copper	NC	--	NC	NC	Copper	gastrointestinal disease	4.75E-04	--	8.37E-06	4.84E-04
			Iron	NC	--	NC	NC	Iron	--	2.20E-02	--	3.87E-04	2.24E-02
			Mercury	NC	--	NC	NC	Mercury	autoimmune system	1.14E-04	--	2.01E-06	1.16E-04
			Nickel	NC	--	NC	NC	Nickel	body weight	1.02E-03	--	4.48E-04	1.47E-03
			Selenium	NC	--	NC	NC	Selenium	clinical selenosis	7.07E-04	--	1.24E-05	7.19E-04
			Zinc	NC	--	NC	NC	Zinc	blood system	2.28E-04	--	4.02E-06	2.32E-04

Total Risk Across Surface Soil and Slag	6.1E-07
Total Risk Across Surface Soil	6.0E-07
Total Risk Across Slag	4.4E-07
Total Risk Across Surface Water	3.3E-07
Total Risk Across Sediment	7.5E-07

Total Risk Across All Media and All Exposure Routes (surface soil and slag)	1.7E-06
Total Risk Across All Media and All Exposure Routes (surface soil)	1.7E-06
Total Risk Across All Media and All Exposure Routes (slag)	1.5E-06

Total Hazard Index Across All Media and All Exposure Routes (surface soil and slag)	3.2E-01
Total Hazard Index Across All Media and All Exposure Routes (surface soil)	2.5E-01
Total Hazard Index Across All Media and All Exposure Routes (slag)	4.8E-01

Surface Soil and Slag

Total [blood system] HI =	3.2E-02
Total [skin discoloration] HI =	2.2E-02
Total [chronic beryllium disease] HI =	7.4E-03
Total [kidney] HI =	3.0E-03
Total [gastrointestinal system] HI =	2.0E-03
Total [central nervous system] HI =	3.2E-02
Total [autoimmune system] HI =	5.5E-04
Total [body weight] HI =	8.1E-03
Total [clinical selenosis] HI =	1.4E-03
Total [liver] HI =	4.1E-02

Note:
NC = Not Calculated

TABLE B.3.2.RME

SUMMARY OF CURRENT/FUTURE TRESPASSER RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent

Medium	*Exposure Medium*	*Exposure Point*	*Chemical*	*Carcinogenic Risk*				*Chemical*	*Non-Carcinogenic Hazard Quotient*				
				Ingestion	*Inhalation*	*Dermal*	*Exposure Routes Total*		*Primary Target Organ*	*Ingestion*	*Inhalation*	*Dermal*	*Exposure Routes Total*
Surface Soil and Slag	Surface Soil/ Ambient Air	--	Aluminum	NC	NC	NC	NC	Aluminum	--	2.59E-02	9.14E-04	2.28E-03	2.91E-02
			Antimony	NC	NC	NC	NC	Antimony	blood system	6.70E-02	NC	3.93E-02	1.06E-01
			Arsenic	3.26E-06	1.15E-09	8.60E-07	4.12E-06	Arsenic	skin discoloration	4.22E-02	NC	1.11E-02	5.34E-02
			Barium	NC	NC	NC	NC	Barium	no effects	3.78E-03	6.67E-05	4.75E-06	3.85E-03
			Beryllium	NC	4.31E-11	NC	4.31E-11	Beryllium	chronic beryllium disease	4.24E-04	5.25E-06	5.33E-03	5.76E-03
			Cadmium	NC	7.00E-10	NC	7.00E-10	Cadmium	kidney	3.67E-02	1.14E-05	6.46E-03	4.32E-02
			Chromium Total	NC	NC	NC	NC	Chromium Total	no effects	9.22E-04	NC	6.24E-03	7.17E-03
			Chromium VI (Hexavalent)	NC	1.77E-09	NC	1.77E-09	Chromium VI (Hexavalent)	no effects	2.33E-03	8.79E-06	8.19E-03	1.05E-02
			Cobalt	NC	3.81E-09	NC	3.81E-09	Cobalt	--	3.21E-03	3.97E-04	2.82E-04	3.89E-03
			Copper	NC	NC	NC	NC	Copper	gastrointestinal system	2.24E-02	NC	1.97E-03	2.43E-02
			Iron	NC	NC	NC	NC	Iron	--	5.05E-02	NC	4.45E-03	5.50E-02
			Lead	NC	NC	NC	NC	Lead	--	NC	NC	NC	NC
			Manganese	NC	NC	NC	NC	Manganese	central nervous system	8.10E-02	9.34E-03	1.78E-01	2.68E-01
			Mercury	NC	NC	NC	NC	Mercury	autoimmune system	5.81E-03	7.15E-07	5.11E-04	6.32E-03
			Nickel	NC	NC	NC	NC	Nickel	body weight	3.63E-02	NC	7.99E-02	1.16E-01
			Selenium	NC	NC	NC	NC	Selenium	clinical selenosis	9.28E-04	NC	8.16E-05	1.01E-03
			Thallium	NC	NC	NC	NC	Thallium	liver	3.89E-02	NC	3.43E-03	4.24E-02
			Vanadium	NC	NC	NC	NC	Vanadium	--	4.63E-02	NC	1.57E-01	2.03E-01
			Zinc	NC	NC	NC	NC	Zinc	blood system	9.74E-04	NC	8.57E-05	1.06E-03
Surface Soil	Surface Soil/ Ambient Air	--	Antimony	NC	NC	NC	NC	Antimony	blood system	2.71E-02	NC	1.59E-02	4.30E-02
			Arsenic	1.42E-06	5.03E-10	3.76E-07	1.80E-06	Arsenic	skin discoloration	1.85E-02	NC	4.87E-03	2.33E-02
			Barium	NC	NC	NC	NC	Barium	no effects	5.41E-03	9.55E-05	6.80E-06	5.51E-03
			Beryllium	NC	2.89E-11	NC	2.89E-11	Beryllium	chronic beryllium disease	2.85E-04	3.53E-06	3.58E-03	3.87E-03
			Cadmium	NC	3.44E-11	NC	3.44E-11	Cadmium	kidney	1.80E-03	5.58E-07	3.17E-04	2.12E-03
			Chromium Total	NC	NC	NC	NC	Chromium Total	no effects	2.18E-04	NC	1.48E-03	1.69E-03
			Cobalt	NC	7.28E-09	NC	7.28E-09	Cobalt	--	6.14E-03	7.60E-04	5.40E-04	7.44E-03
			Copper	NC	NC	NC	NC	Copper	gastrointestinal system	6.77E-04	NC	5.95E-05	7.36E-04
			Iron	NC	NC	NC	NC	Iron	--	5.06E-02	NC	4.45E-03	5.50E-02
			Manganese	NC	NC	NC	NC	Manganese	--	1.32E-01	1.53E-02	2.91E-01	4.39E-01
			Mercury	NC	NC	NC	NC	Mercury	central nervous system	1.14E-02	1.40E-06	9.99E-04	1.24E-02
			Nickel	NC	NC	NC	NC	Nickel	autoimmune system	9.74E-04	NC	2.14E-03	3.12E-03
			Selenium	NC	NC	NC	NC	Selenium	clinical selenosis	5.40E-04	NC	4.75E-05	5.88E-04
			Thallium	NC	NC	NC	NC	Thallium	liver	2.29E-02	NC	2.01E-03	2.49E-02
			Zinc	NC	NC	NC	NC	Zinc	blood system	4.74E-04	NC	4.17E-05	5.16E-04

TABLE B.3.2.RME

SUMMARY OF CURRENT/FUTURE TRESPASSER RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent

Medium	*Exposure Medium*	*Exposure Point*	*Chemical*	*Carcinogenic Risk*				*Chemical*	*Non-Carcinogenic Hazard Quotient*				
				Ingestion	*Inhalation*	*Dermal*	*Exposure Routes Total*		*Primary Target Organ*	*Ingestion*	*Inhalation*	*Dermal*	*Exposure Routes Total*
Slag	Surface Soil/ Ambient Air	--	Aluminum	NC	NC	NC	NC	Aluminum	--	5.40E-02	1.91E-03	4.75E-03	6.06E-02
			Antimony	NC	NC	NC	NC	Antimony	blood system	5.94E-01	NC	3.49E-01	9.43E-01
			Arsenic	2.50E-06	8.82E-10	6.60E-07	3.16E-06	Arsenic	skin discoloration	3.24E-02	NC	8.55E-03	4.10E-02
			Barium	NC	NC	NC	NC	Barium	no effects	2.74E-03	4.83E-05	3.44E-06	2.79E-03
			Beryllium	NC	1.95E-11	NC	1.95E-11	Beryllium	chronic beryllium disease	1.92E-04	2.38E-06	2.42E-03	2.61E-03
			Cadmium	NC	5.65E-10	NC	5.65E-10	Cadmium	kidney	2.96E-02	9.18E-06	5.22E-03	3.49E-02
			Chromium Total	NC	NC	NC	NC	Chromium Total	no effects	3.92E-03	NC	2.65E-02	3.04E-02
			Chromium VI (Hexavalent)	NC	1.41E-08	NC	1.41E-08	Chromium VI (Hexavalent)	no effects	1.85E-02	7.01E-05	6.52E-02	8.38E-02
			Cobalt	NC	1.52E-09	NC	1.52E-09	Cobalt	--	1.28E-03	1.59E-04	1.13E-04	1.55E-03
			Copper	NC	NC	NC	NC	Copper	gastrointestinal system	2.97E-02	NC	2.62E-03	3.24E-02
			Iron	NC	NC	NC	NC	Iron	--	5.67E-02	NC	4.99E-03	6.17E-02
			Lead	NC	NC	NC	NC	Lead	--	NC	NC	NC	NC
			Manganese	NC	NC	NC	NC	Manganese	central nervous system	8.53E-02	9.83E-03	1.87E-01	2.83E-01
			Mercury	NC	NC	NC	NC	Mercury	autoimmune system	8.77E-04	1.08E-07	7.72E-05	9.54E-04
			Nickel	NC	NC	NC	NC	Nickel	body weight	1.81E-01	NC	3.98E-01	5.79E-01
			Selenium	NC	NC	NC	NC	Selenium	clinical selenosis	3.69E-03	NC	3.25E-04	4.01E-03
			Thallium	NC	NC	NC	NC	Thallium	liver	1.01E-01	NC	8.92E-03	1.10E-01
			Vanadium	NC	NC	NC	NC	Vanadium	--	1.31E-01	NC	4.43E-01	5.74E-01
			Zinc	NC	NC	NC	NC	Zinc	blood system	2.32E-03	NC	2.04E-04	2.53E-03
Surface Water	Surface Water	--	Aluminum	NC	--	NC	NC	Aluminum	--	8.06E-04	--	7.09E-04	1.51E-03
			Antimony	NC	--	NC	NC	Antimony	blood system	5.93E-03	--	3.48E-02	4.07E-02
			Arsenic	8.14E-07	--	7.16E-07	1.53E-06	Arsenic	skin discoloration	1.06E-02	--	9.29E-03	1.98E-02
			Barium	NC	--	NC	NC	Barium	no effects	6.75E-04	--	8.48E-03	9.15E-03
			Beryllium	NC	--	NC	NC	Beryllium	chronic beryllium disease	2.13E-04	--	2.68E-02	2.70E-02
			Chromium	NC	--	NC	NC	Chromium	no effects	6.40E-05	--	4.33E-03	4.40E-03
			Chromium VI (Hexavalent)	NC	--	NC	NC	Chromium VI (Hexavalent)	no effects	4.78E-03	--	3.37E-01	3.42E-01
			Copper	NC	--	NC	NC	Copper	gastrointestinal system	9.33E-04	--	8.21E-04	1.75E-03
			Iron	NC	--	NC	NC	Iron	--	1.47E-02	--	1.30E-02	2.77E-02
			Lead	NC	--	NC	NC	Lead	--	NC	--	NC	NC
			Manganese	NC	--	NC	NC	Manganese	central nervous system	5.74E-03	--	1.26E-01	1.32E-01
			Mercury	NC	--	NC	NC	Mercury	autoimmune system	1.87E-04	--	1.65E-04	3.52E-04
			Nickel	NC	--	NC	NC	Nickel	body weight	1.01E-03	--	4.44E-03	5.45E-03
			Selenium	NC	--	NC	NC	Selenium	clinical selenosis	7.23E-04	--	6.36E-04	1.36E-03
			Thallium	NC	--	NC	NC	Thallium	liver	6.85E-02	--	6.03E-02	1.29E-01
			Vanadium	NC	--	NC	NC	Vanadium	--	3.99E-03	--	1.35E-01	1.39E-01
			Zinc	NC	--	NC	NC	Zinc	blood system	1.24E-04	--	6.57E-05	1.90E-04

TABLE B.3.2.RME

SUMMARY OF CURRENT/FUTURE TRESPASSER RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent

Medium	*Exposure Medium*	*Exposure Point*	*Chemical*	*Carcinogenic Risk*				*Chemical*	*Non-Carcinogenic Hazard Quotient*				
				Ingestion	*Inhalation*	*Dermal*	*Exposure Routes Total*		*Primary Target Organ*	*Ingestion*	*Inhalation*	*Dermal*	*Exposure Routes Total*
Sediment	Sediment	--	Arsenic	2.41E-06	--	6.37E-07	3.05E-06	Arsenic	skin discoloration	3.13E-02	--	8.25E-03	3.95E-02
			Barium	NC	--	NC	NC	Barium	no effects	4.90E-03	--	6.16E-03	1.11E-02
			Beryllium	NC	--	NC	NC	Beryllium	chronic beryllium disease	2.21E-04	--	2.78E-03	3.00E-03
			Cadmium	NC	--	NC	NC	Cadmium	kidney	1.27E-03	--	2.24E-04	1.50E-03
			Chromium	NC	--	NC	NC	Chromium	no effects	4.77E-04	--	3.23E-03	3.71E-03
			Copper	NC	--	NC	NC	Copper	gastrointestinal disease	2.25E-03	--	1.98E-04	2.45E-03
			Iron	NC	--	NC	NC	Iron	--	5.58E-02	--	4.91E-03	6.07E-02
			Mercury	NC	--	NC	NC	Mercury	autoimmune system	3.71E-04	--	3.26E-05	4.03E-04
			Nickel	NC	--	NC	NC	Nickel	body weight	4.93E-03	--	1.08E-02	1.58E-02
			Selenium	NC	--	NC	NC	Selenium	clinical selenosis	1.80E-03	--	1.58E-04	1.96E-03
			Zinc	NC	--	NC	NC	Zinc	blood system	8.13E-04	--	7.15E-05	8.84E-04

Total Risk Across Surface Soil and Slag	4.1E-06
Total Risk Across Surface Soil	1.8E-06
Total Risk Across Slag	3.2E-06
Total Risk Across Surface Water	1.5E-06
Total Risk Across Sediment	3.0E-06

Total Risk Across All Media and All Exposure Routes (surface soil and slag)	8.7E-06
Total Risk Across All Media and All Exposure Routes (surface soil)	6.4E-06
Total Risk Across All Media and All Exposure Routes (slag)	7.8E-06

Total Hazard Index Across All Media and All Exposure Routes (surface soil and slag)	2.0E+00
Total Hazard Index Across All Media and All Exposure Routes (surface soil)	1.6E+00
Total Hazard Index Across All Media and All Exposure Routes (slag)	3.9E+00

Surface Soil and Slag

Total [blood system] HI =	1.5E-01
Total [skin discoloration] HI =	1.1E-01
Total [chronic beryllium disease] HI =	3.6E-02
Total [kidney] HI =	4.5E-02
Total [gastrointestinal system] HI =	2.9E-02
Total [central nervous system] HI =	4.0E-01
Total [autoimmune system] HI =	7.1E-03
Total [body weight] HI =	1.4E-01
Total [clinical selenosis] HI =	4.3E-03
Total [liver] HI =	1.7E-01

Note:
NC = Not Calculated

TABLE B.3.3.CT

SUMMARY OF FUTURE INDUSTRIAL/ COMMERCIAL WORKER RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Medium	*Exposure Medium*	*Exposure Point*	*Chemical*	*Carcinogenic Risk*				*Chemical*	*Non-Carcinogenic Hazard Quotient*				
				Ingestion	*Inhalation*	*Dermal*	*Exposure Routes Total*		*Primary Target Organ*	*Ingestion*	*Inhalation*	*Dermal*	*Exposure Routes Total*
Soil and Slag	Surface Soil/ Ambient Air	--	Aluminum	NC	NC	NC	NC	Aluminum	--	1.54E-02	7.53E-04	1.02E-04	1.63E-02
			Arsenic	1.15E-06	5.60E-10	2.27E-08	1.17E-06	Arsenic	skin discoloration	1.98E-02	NC	3.93E-04	2.02E-02
			Barium	NC	NC	NC	NC	Barium	no effects	1.77E-03	4.33E-05	1.67E-07	1.82E-03
			Beryllium	NC	3.46E-11	NC	3.46E-11	Beryllium	chronic beryllium disease	3.28E-04	5.63E-06	3.10E-04	6.44E-04
			Cadmium	NC	8.17E-11	NC	8.17E-11	Cadmium	kidney	4.13E-03	1.77E-06	5.45E-05	4.19E-03
			Chromium Total	NC	NC	NC	NC	Chromium Total	no effects	7.07E-04	NC	3.59E-04	1.07E-03
			Chromium VI (Hexavalent)	NC	3.84E-09	NC	3.84E-09	Chromium VI (Hexavalent)	no effects	4.86E-03	2.54E-05	1.28E-03	6.16E-03
			Cobalt	NC	9.39E-10	NC	9.39E-10	Cobalt	--	7.63E-04	1.31E-04	5.03E-06	8.99E-04
			Copper	NC	NC	NC	NC	Copper	gastrointestinal system	2.48E-03	NC	1.64E-05	2.50E-03
			Iron	NC	NC	NC	NC	Iron	--	6.55E-02	NC	4.32E-04	6.59E-02
			Lead	NC	NC	NC	NC	Lead	--	NC	NC	NC	NC
			Manganese	NC	NC	NC	NC	Manganese	central nervous system	2.62E-02	4.18E-03	4.32E-03	3.47E-02
			Mercury	NC	NC	NC	NC	Mercury	autoimmune system	1.03E-03	1.75E-07	6.79E-06	1.04E-03
			Nickel	NC	NC	NC	NC	Nickel	body weight	7.46E-03	NC	1.23E-03	8.69E-03
			Selenium	NC	NC	NC	NC	Selenium	clinical selenosis	7.37E-04	NC	4.87E-06	7.42E-04
			Thallium	NC	NC	NC	NC	Thallium	liver	4.59E-02	NC	3.03E-04	4.62E-02
			Vanadium	NC	NC	NC	NC	Vanadium	--	4.34E-02	NC	1.10E-02	5.45E-02
			Zinc	NC	NC	NC	NC	Zinc	blood system	4.85E-04	NC	3.20E-06	4.88E-04
Soil	Surface Soil/ Ambient Air	--	Arsenic	1.02E-06	4.97E-10	2.02E-08	1.04E-06	Arsenic	skin discoloration	1.76E-02	NC	3.48E-04	1.79E-02
			Barium	NC	NC	NC	NC	Barium	no effects	1.81E-03	4.42E-05	1.71E-07	1.85E-03
			Beryllium	NC	3.12E-11	NC	3.12E-11	Beryllium	chronic beryllium disease	2.96E-04	5.07E-06	2.79E-04	5.80E-04
			Cadmium	NC	4.14E-11	NC	4.14E-11	Cadmium	kidney	2.09E-03	8.96E-07	2.76E-05	2.12E-03
			Chromium Total	NC	NC	NC	NC	Chromium Total	no effects	9.43E-05	NC	4.79E-05	1.42E-04
			Cobalt	NC	9.44E-10	NC	9.44E-10	Cobalt	--	7.67E-04	1.31E-04	5.06E-06	9.04E-04
			Copper	NC	NC	NC	NC	Copper	gastrointestinal system	7.15E-04	NC	4.72E-06	7.20E-04
			Iron	NC	NC	NC	NC	Iron	--	6.92E-02	NC	4.57E-04	6.96E-02
			Lead	NC	NC	NC	NC	Lead	--	NC	NC	NC	NC
			Manganese	NC	NC	NC	NC	Manganese	--	1.93E-02	3.07E-03	3.18E-03	2.55E-02
			Mercury	NC	NC	NC	NC	Mercury	central nervous system	1.26E-03	2.14E-07	8.30E-06	1.27E-03
			Nickel	NC	NC	NC	NC	Nickel	autoimmune system	1.12E-03	NC	1.85E-04	1.31E-03
			Selenium	NC	NC	NC	NC	Selenium	clinical selenosis	4.03E-04	NC	2.66E-06	4.06E-04
			Zinc	NC	NC	NC	NC	Zinc	blood system	4.67E-04	NC	3.08E-06	4.70E-04

TABLE B.3.3.CT

SUMMARY OF FUTURE INDUSTRIAL/ COMMERCIAL WORKER RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Medium	*Exposure Medium*	*Exposure Point*	*Chemical*	*Carcinogenic Risk*				*Chemical*	*Non-Carcinogenic Hazard Quotient*				
				Ingestion	*Inhalation*	*Dermal*	*Exposure Routes Total*		*Primary Target Organ*	*Ingestion*	*Inhalation*	*Dermal*	*Exposure Routes Total*
Slag	Surface Soil/ Ambient Air	--	Aluminum	NC	NC	NC	NC	Aluminum	--	1.55E-02	7.57E-04	1.02E-04	1.64E-02
			Arsenic	1.05E-06	5.15E-10	2.09E-08	1.08E-06	Arsenic	skin discoloration	1.82E-02	NC	3.61E-04	1.86E-02
			Barium	NC	NC	NC	NC	Barium	no effects	1.58E-03	3.85E-05	1.49E-07	1.62E-03
			Beryllium	NC	2.74E-11	NC	2.74E-11	Beryllium	chronic beryllium disease	2.60E-04	4.46E-06	2.45E-04	5.10E-04
			Cadmium	NC	1.15E-10	NC	1.15E-10	Cadmium	kidney	5.83E-03	2.50E-06	7.69E-05	5.91E-03
			Chromium Total	NC	NC	NC	NC	Chromium Total	no effects	1.31E-03	NC	6.67E-04	1.98E-03
			Chromium VI (Hexavalent)	NC	7.12E-09	NC	7.12E-09	Chromium VI (Hexavalent)	no effects	9.00E-03	4.71E-05	2.38E-03	1.14E-02
			Cobalt	NC	6.82E-10	NC	6.82E-10	Cobalt	--	5.54E-04	9.49E-05	3.66E-06	6.53E-04
			Copper	NC	NC	NC	NC	Copper	gastrointestinal system	3.77E-03	NC	2.49E-05	3.80E-03
			Iron	NC	NC	NC	NC	Iron	--	4.68E-02	NC	3.09E-04	4.71E-02
			Lead	NC	NC	NC	NC	Lead	--	NC	NC	NC	NC
			Manganese	NC	NC	NC	NC	Manganese	central nervous system	6.34E-02	1.01E-02	1.04E-02	8.39E-02
			Mercury	NC	NC	NC	NC	Mercury	autoimmune system	2.26E-04	3.84E-08	1.49E-06	2.27E-04
			Nickel	NC	NC	NC	NC	Nickel	body weight	1.84E-02	NC	3.04E-03	2.14E-02
			Selenium	NC	NC	NC	NC	Selenium	clinical selenosis	9.94E-04	NC	6.56E-06	1.00E-03
			Thallium	NC	NC	NC	NC	Thallium	liver	6.99E-02	NC	4.61E-04	7.04E-02
			Vanadium	NC	NC	NC	NC	Vanadium	--	5.63E-02	NC	1.43E-02	7.06E-02
			Zinc	NC	NC	NC	NC	Zinc	blood system	3.67E-04	NC	2.42E-06	3.70E-04
Surface Water	Surface Water	--	Aluminum	NC	--	NC	NC	Aluminum	--	5.12E-05	--	3.38E-05	8.50E-05
			Antimony	NC	--	NC	NC	Antimony	blood system	8.04E-04	--	3.54E-03	4.34E-03
			Arsenic	8.08E-08	--	5.34E-08	1.34E-07	Arsenic	skin discoloration	1.40E-03	--	9.22E-04	2.32E-03
			Barium	NC	--	NC	NC	Barium	no effects	5.81E-05	--	5.48E-04	6.06E-04
			Beryllium	NC	--	NC	NC	Beryllium	chronic beryllium disease	3.26E-05	--	3.07E-03	3.10E-03
			Chromium	NC	--	NC	NC	Chromium	no effects	4.00E-06	--	2.03E-04	2.07E-04
			Chromium VI (Hexavalent)	NC	--	NC	NC	Chromium VI (Hexavalent)	no effects	4.50E-04	--	2.38E-02	2.42E-02
			Copper	NC	--	NC	NC	Copper	gastrointestinal system	2.25E-05	--	1.49E-05	3.74E-05
			Iron	NC	--	NC	NC	Iron	--	3.79E-04	--	2.50E-04	6.28E-04
			Lead	NC	--	NC	NC	Lead	--	NC	--	NC	NC
			Manganese	NC	--	NC	NC	Manganese	central nervous system	3.30E-04	--	5.45E-03	5.78E-03
			Mercury	NC	--	NC	NC	Mercury	autoimmune system	2.57E-05	--	1.70E-05	4.27E-05
			Nickel	NC	--	NC	NC	Nickel	body weight	2.57E-05	--	8.49E-05	1.11E-04
			Selenium	NC	--	NC	NC	Selenium	clinical selenosis	9.86E-05	--	6.51E-05	1.64E-04
			Thallium	NC	--	NC	NC	Thallium	liver	8.88E-03	--	5.86E-03	1.47E-02
			Vanadium	NC	--	NC	NC	Vanadium	--	4.50E-04	--	1.14E-02	1.19E-02
			Zinc	NC	--	NC	NC	Zinc	blood system	7.09E-06	--	2.81E-06	9.90E-06

TABLE B.3.3.CT

SUMMARY OF FUTURE INDUSTRIAL/ COMMERCIAL WORKER RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Medium	*Exposure Medium*	*Exposure Point*	*Chemical*	*Carcinogenic Risk*				*Chemical*	*Non-Carcinogenic Hazard Quotient*				
				Ingestion	*Inhalation*	*Dermal*	*Exposure Routes Total*		*Primary Target Organ*	*Ingestion*	*Inhalation*	*Dermal*	*Exposure Routes Total*
Sediment	Sediment		Arsenic	1.31E-06	--	2.60E-08	1.34E-06	Arsenic	skin discoloration	2.27E-02	--	4.49E-04	2.31E-02
			Barium	NC	--	NC	NC	Barium	no effects	2.35E-03	--	2.22E-04	2.58E-03
			Beryllium	NC	--	NC	NC	Beryllium	chronic beryllium disease	2.17E-04	--	2.04E-04	4.21E-04
			Cadmium	NC	--	NC	NC	Cadmium	kidney	1.29E-03	--	1.70E-05	1.31E-03
			Chromium	NC	--	NC	NC	Chromium	no effects	2.34E-04	--	1.19E-04	3.53E-04
			Copper	NC	--	NC	NC	Copper	gastrointestinal disease	1.16E-03	--	7.67E-06	1.17E-03
			Iron	NC	--	NC	NC	Iron	--	5.37E-02	--	3.55E-04	5.41E-02
			Mercury	NC	--	NC	NC	Mercury	autoimmune system	2.79E-04	--	1.84E-06	2.80E-04
			Nickel	NC	--	NC	NC	Nickel	body weight	2.49E-03	--	4.11E-04	2.90E-03
			Selenium	NC	--	NC	NC	Selenium	clinical selenosis	1.73E-03	--	1.14E-05	1.74E-03
			Zinc	NC	--	NC	NC	Zinc	blood system	5.58E-04	--	3.68E-06	5.62E-04

Total Risk Across Soil and Slag	1.2E-06
Total Risk Across Soil	1.0E-06
Total Risk Across Slag	1.1E-06
Total Risk Across Surface Water	1.3E-07
Total Risk Across Sediment	1.3E-06

Total Risk Across All Media and All Exposure Routes (soil and slag)	2.6E-06
Total Risk Across All Media and All Exposure Routes (soil)	2.5E-06
Total Risk Across All Media and All Exposure Routes (slag)	2.6E-06

Total Hazard Index Across All Media and All Exposure Routes (surface soil and slag)	4.2E-01
Total Hazard Index Across All Media and All Exposure Routes (surface soil)	2.8E-01
Total Hazard Index Across All Media and All Exposure Routes (slag)	5.1E-01

Surface Soil and Slag

Total [blood system] HI =	5.4E-03
Total [skin discoloration] HI =	4.6E-02
Total [chronic beryllium disease] HI =	4.2E-03
Total [kidney] HI =	5.5E-03
Total [gastrointestinal system] HI =	3.7E-03
Total [central nervous system] HI =	4.0E-02
Total [autoimmune system] HI =	1.4E-03
Total [body weight] HI =	1.2E-02
Total [clinical selenosis] HI =	2.6E-03
Total [liver] HI =	1.3E-01

Note:
NC = Not Calculated

TABLE B.3.3.RME

SUMMARY OF FUTURE INDUSTRIAL/ COMMERCIAL WORKER RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Medium	*Exposure Medium*	*Exposure Point*	*Chemical*	*Carcinogenic Risk*				*Chemical*	*Non-Carcinogenic Hazard Quotient*				
				Ingestion	*Inhalation*	*Dermal*	*Exposure Routes Total*		*Primary Target Organ*	*Ingestion*	*Inhalation*	*Dermal*	*Exposure Routes Total*
Soil and Slag	Surface Soil/ Ambient Air	--	Aluminum	NC	NC	NC	NC	Aluminum	--	2.83E-02	1.38E-03	1.87E-03	3.15E-02
			Arsenic	5.07E-06	2.48E-09	1.00E-06	6.08E-06	Arsenic	skin discoloration	3.16E-02	NC	6.25E-03	3.78E-02
			Barium	NC	NC	NC	NC	Barium	no effects	2.38E-03	5.81E-05	2.24E-06	2.44E-03
			Beryllium	NC	1.39E-10	NC	1.39E-10	Beryllium	chronic beryllium disease	4.75E-04	8.14E-06	4.48E-03	4.96E-03
			Cadmium	NC	1.44E-09	NC	1.44E-09	Cadmium	kidney	2.62E-02	1.12E-05	3.46E-03	2.97E-02
			Chromium Total	NC	NC	NC	NC	Chromium Total	no effects	1.04E-03	NC	5.27E-03	6.31E-03
			Chromium VI (Hexavalent)	NC	4.17E-08	NC	4.17E-08	Chromium VI (Hexavalent)	no effects	1.90E-02	9.93E-05	5.01E-02	6.92E-02
			Cobalt	NC	9.53E-09	NC	9.53E-09	Cobalt	--	2.79E-03	4.78E-04	1.84E-04	3.45E-03
			Copper	NC	NC	NC	NC	Copper	gastrointestinal system	1.31E-02	NC	8.67E-04	1.40E-02
			Iron	NC	NC	NC	NC	Iron	--	9.24E-02	NC	6.10E-03	9.85E-02
			Lead	NC	NC	NC	NC	Lead	--	NC	NC	NC	NC
			Manganese	NC	NC	NC	NC	Manganese	central nervous system	3.80E-02	6.06E-03	6.26E-02	1.07E-01
			Mercury	NC	NC	NC	NC	Mercury	autoimmune system	1.16E-02	1.98E-06	7.66E-04	1.24E-02
			Nickel	NC	NC	NC	NC	Nickel	body weight	3.02E-02	NC	4.98E-02	8.00E-02
			Selenium	NC	NC	NC	NC	Selenium	clinical selenosis	1.06E-03	NC	6.98E-05	1.13E-03
			Thallium	NC	NC	NC	NC	Thallium	liver	7.55E-02	NC	4.98E-03	8.04E-02
			Vanadium	NC	NC	NC	NC	Vanadium	--	5.72E-02	NC	1.45E-01	2.02E-01
			Zinc	NC	NC	NC	NC	Zinc	blood system	6.79E-04	NC	4.48E-05	7.24E-04
Soil	Surface Soil/ Ambient Air	--	Arsenic	3.70E-06	1.81E-09	7.33E-07	4.44E-06	Arsenic	skin discoloration	2.30E-02	NC	4.56E-03	2.76E-02
			Barium	NC	NC	NC	NC	Barium	no effects	4.70E-03	1.15E-04	4.43E-06	4.82E-03
			Beryllium	NC	1.13E-10	NC	1.13E-10	Beryllium	chronic beryllium disease	3.87E-04	6.62E-06	3.65E-03	4.04E-03
			Cadmium	NC	1.64E-10	NC	1.64E-10	Cadmium	kidney	2.98E-03	1.28E-06	3.93E-04	3.37E-03
			Chromium Total	NC	NC	NC	NC	Chromium Total	no effects	1.68E-04	NC	8.55E-04	1.02E-03
			Cobalt	NC	1.49E-08	NC	1.49E-08	Cobalt	--	4.35E-03	7.45E-04	2.87E-04	5.38E-03
			Copper	NC	NC	NC	NC	Copper	gastrointestinal system	1.14E-03	NC	7.55E-05	1.22E-03
			Iron	NC	NC	NC	NC	Iron	--	1.26E-01	NC	8.29E-03	1.34E-01
			Lead	NC	NC	NC	NC	Lead	--	NC	NC	NC	NC
			Manganese	NC	NC	NC	NC	Manganese	--	9.40E-02	1.50E-02	1.55E-01	2.64E-01
			Mercury	NC	NC	NC	NC	Mercury	central nervous system	2.75E-03	4.69E-07	1.82E-04	2.93E-03
			Nickel	NC	NC	NC	NC	Nickel	autoimmune system	1.38E-03	NC	2.28E-03	3.66E-03
			Selenium	NC	NC	NC	NC	Selenium	clinical selenosis	5.65E-04	NC	3.73E-05	6.02E-04
			Zinc	NC	NC	NC	NC	Zinc	blood system	6.78E-04	NC	4.48E-05	7.23E-04

TABLE B.3.3.RME

SUMMARY OF FUTURE INDUSTRIAL/ COMMERCIAL WORKER RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Medium	*Exposure Medium*	*Exposure Point*	*Chemical*	*Carcinogenic Risk*				*Chemical*	*Non-Carcinogenic Hazard Quotient*				
				Ingestion	*Inhalation*	*Dermal*	*Exposure Routes Total*		*Primary Target Organ*	*Ingestion*	*Inhalation*	*Dermal*	*Exposure Routes Total*
Slag	Surface Soil/ Ambient Air	--	Aluminum	NC	NC	NC	NC	Aluminum	--	3.37E-02	1.65E-03	2.23E-03	3.76E-02
			Arsenic	5.66E-06	2.76E-09	1.12E-06	6.78E-06	Arsenic	skin discoloration	3.52E-02	NC	6.97E-03	4.22E-02
			Barium	NC	NC	NC	NC	Barium	no effects	2.40E-03	5.86E-05	2.26E-06	2.46E-03
			Beryllium	NC	1.16E-10	NC	1.16E-10	Beryllium	chronic beryllium disease	3.96E-04	6.78E-06	3.73E-03	4.13E-03
			Cadmium	NC	7.92E-10	NC	7.92E-10	Cadmium	kidney	1.44E-02	6.18E-06	1.90E-03	1.63E-02
			Chromium Total	NC	NC	NC	NC	Chromium Total	no effects	1.97E-03	NC	9.99E-03	1.20E-02
			Chromium VI (Hexavalent)	NC	7.65E-08	NC	7.65E-08	Chromium VI (Hexavalent)	no effects	3.48E-02	1.82E-04	9.19E-02	1.27E-01
			Cobalt	NC	3.18E-09	NC	3.18E-09	Cobalt	--	9.30E-04	1.59E-04	6.14E-05	1.15E-03
			Copper	NC	NC	NC	NC	Copper	gastrointestinal system	2.39E-02	NC	1.57E-03	2.54E-02
			Iron	NC	NC	NC	NC	Iron	--	8.28E-02	NC	5.46E-03	8.83E-02
			Lead	NC	NC	NC	NC	Lead	--	NC	NC	NC	NC
			Manganese	NC	NC	NC	NC	Manganese	central nervous system	3.87E-01	6.17E-02	6.38E-01	1.09E+00
			Mercury	NC	NC	NC	NC	Mercury	autoimmune system	3.04E-04	5.18E-08	2.01E-05	3.24E-04
			Nickel	NC	NC	NC	NC	Nickel	body weight	5.37E-02	NC	8.85E-02	1.42E-01
			Selenium	NC	NC	NC	NC	Selenium	clinical selenosis	1.64E-03	NC	1.08E-04	1.75E-03
			Thallium	NC	NC	NC	NC	Thallium	liver	1.22E-01	NC	8.08E-03	1.31E-01
			Vanadium	NC	NC	NC	NC	Vanadium	--	7.98E-02	NC	2.03E-01	2.82E-01
			Zinc	NC	NC	NC	NC	Zinc	blood system	7.01E-04	NC	4.63E-05	7.47E-04
Surface Water	Surface Water	--	Aluminum	NC	--	NC	NC	Aluminum	--	2.81E-04	--	1.85E-04	4.67E-04
			Antimony	NC	--	NC	NC	Antimony	blood system	2.07E-03	--	9.09E-03	1.12E-02
			Arsenic	5.92E-07	--	3.90E-07	9.82E-07	Arsenic	skin discoloration	3.68E-03	--	2.43E-03	6.11E-03
			Barium	NC	--	NC	NC	Barium	no effects	2.35E-04	--	2.22E-03	2.45E-03
			Beryllium	NC	--	NC	NC	Beryllium	chronic beryllium disease	7.44E-05	--	7.01E-03	7.09E-03
			Chromium	NC	--	NC	NC	Chromium	no effects	2.23E-05	--	1.13E-03	1.16E-03
			Chromium VI (Hexavalent)	NC	--	NC	NC	Chromium VI (Hexavalent)	no effects	1.67E-03	--	8.81E-02	8.98E-02
			Copper	NC	--	NC	NC	Copper	gastrointestinal system	3.25E-04	--	2.15E-04	5.40E-04
			Iron	NC	--	NC	NC	Iron	--	5.14E-03	--	3.39E-03	8.54E-03
			Lead	NC	--	NC	NC	Lead	--	NC	--	NC	NC
			Manganese	NC	--	NC	NC	Manganese	central nervous system	2.00E-03	--	3.30E-02	3.50E-02
			Mercury	NC	--	NC	NC	Mercury	autoimmune system	6.52E-05	--	4.31E-05	1.08E-04
			Nickel	NC	--	NC	NC	Nickel	body weight	3.52E-04	--	1.16E-03	1.51E-03
			Selenium	NC	--	NC	NC	Selenium	clinical selenosis	2.52E-04	--	1.66E-04	4.19E-04
			Thallium	NC	--	NC	NC	Thallium	liver	2.39E-02	--	1.58E-02	3.97E-02
			Vanadium	NC	--	NC	NC	Vanadium	--	1.39E-03	--	3.53E-02	3.67E-02
			Zinc	NC	--	NC	NC	Zinc	blood system	4.34E-05	--	1.72E-05	6.06E-05

TABLE B.3.3.RME

SUMMARY OF FUTURE INDUSTRIAL/ COMMERCIAL WORKER RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Receptor Population: Industrial/Commercial Worker
Receptor Age: Adult

Medium	*Exposure Medium*	*Exposure Point*	*Chemical*	*Carcinogenic Risk*				*Chemical*	*Non-Carcinogenic Hazard Quotient*				
				Ingestion	*Inhalation*	*Dermal*	*Exposure Routes Total*		*Primary Target Organ*	*Ingestion*	*Inhalation*	*Dermal*	*Exposure Routes Total*
Sediment	Sediment		Arsenic	7.01E-06	--	1.39E-06	8.40E-06	Arsenic	skin discoloration	4.36E-02	--	8.63E-03	5.22E-02
			Barium	NC	--	NC	NC	Barium	no effects	6.84E-03	--	6.45E-03	1.33E-02
			Beryllium	NC	--	NC	NC	Beryllium	chronic beryllium disease	3.08E-04	--	2.91E-03	3.21E-03
			Cadmium	NC	--	NC	NC	Cadmium	kidney	1.78E-03	--	2.35E-04	2.01E-03
			Chromium	NC	--	NC	NC	Chromium	no effects	6.65E-04	--	3.38E-03	4.04E-03
			Copper	NC	--	NC	NC	Copper	gastrointestinal disease	3.14E-03	--	2.07E-04	3.35E-03
			Iron	NC	--	NC	NC	Iron	--	7.79E-02	--	5.14E-03	8.30E-02
			Mercury	NC	--	NC	NC	Mercury	autoimmune system	5.17E-04	--	3.41E-05	5.51E-04
			Nickel	NC	--	NC	NC	Nickel	body weight	6.88E-03	--	1.14E-02	1.82E-02
			Selenium	NC	--	NC	NC	Selenium	clinical selenosis	2.51E-03	--	1.66E-04	2.68E-03
			Zinc	NC	--	NC	NC	Zinc	blood system	1.13E-03	--	7.48E-05	1.21E-03

Total Risk Across Soil and Slag	6.1E-06
Total Risk Across Soil	4.5E-06
Total Risk Across Slag	6.9E-06
Total Risk Across Surface Water	9.8E-07
Total Risk Across Sediment	8.4E-06

Total Risk Across All Media and All Exposure Routes (soil and slag)	1.6E-05
Total Risk Across All Media and All Exposure Routes (soil)	1.4E-05
Total Risk Across All Media and All Exposure Routes (slag)	1.6E-05

Total Hazard Index Across All Media and All Exposure Routes (surface soil and slag)	1.2E+00
Total Hazard Index Across All Media and All Exposure Routes (surface soil)	8.8E-01
Total Hazard Index Across All Media and All Exposure Routes (slag)	2.4E+00

Surface Soil and Slag

Total [blood system] HI =	1.3E-02
Total [skin discoloration] HI =	9.6E-02
Total [chronic beryllium disease] HI =	1.5E-02
Total [kidney] HI =	3.2E-02
Total [gastrointestinal system] HI =	1.8E-02
Total [central nervous system] HI =	1.4E-01
Total [autoimmune system] HI =	1.3E-02
Total [body weight] HI =	1.0E-01
Total [clinical selenosis] HI =	4.2E-03
Total [liver] HI =	2.5E-01

Note:
NC = Not Calculated

TABLE B.3.4.CT

SUMMARY OF FUTURE CONSTRUCTION/ UTILITY WORKER RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Medium	*Exposure Medium*	*Exposure Point*	*Chemical*	*Carcinogenic Risk*				*Chemical*	*Non-Carcinogenic Hazard Quotient*				
				Ingestion	*Inhalation*	*Dermal*	*Exposure Routes Total*		*Primary Target Organ*	*Ingestion*	*Inhalation*	*Dermal*	*Exposure Routes Total*
Soil and Slag	Soil/ Ambient Air	--	Aluminum	NC	NC	NC	NC	Aluminum	--	2.32E-03	9.91E-04	2.32E-05	3.34E-03
			Arsenic	1.92E-08	8.19E-11	5.76E-10	1.99E-08	Arsenic	skin discoloration	2.99E-03	NC	8.96E-05	3.08E-03
			Barium	NC	NC	NC	NC	Barium	no effects	2.67E-04	5.69E-05	3.82E-08	3.24E-04
			Beryllium	NC	5.06E-12	NC	5.06E-12	Beryllium	chronic beryllium disease	4.95E-05	7.40E-06	7.07E-05	1.28E-04
			Cadmium	NC	1.19E-11	NC	1.19E-11	Cadmium	kidney	6.23E-04	2.33E-06	1.25E-05	6.37E-04
			Chromium Total	NC	NC	NC	NC	Chromium Total	no effects	1.07E-04	NC	8.20E-05	1.89E-04
			Chromium VI (Hexavalent)	NC	5.62E-10	NC	5.62E-10	Chromium VI (Hexavalent)	no effects	7.32E-04	3.34E-05	2.93E-04	1.06E-03
			Cobalt	NC	1.37E-10	NC	1.37E-10	Cobalt	--	1.15E-04	1.72E-04	1.15E-06	2.88E-04
			Copper	NC	NC	NC	NC	Copper	gastrointestinal system	3.74E-04	NC	3.74E-06	3.78E-04
			Iron	NC	NC	NC	NC	Iron	--	9.87E-03	NC	9.87E-05	9.97E-03
			Lead	NC	NC	NC	NC	Lead	--	NC	NC	NC	NC
			Manganese	NC	NC	NC	NC	Manganese	central nervous system	3.95E-03	5.49E-03	9.85E-04	1.04E-02
			Mercury	NC	NC	NC	NC	Mercury	autoimmune system	1.55E-04	2.30E-07	1.55E-06	1.57E-04
			Nickel	NC	NC	NC	NC	Nickel	body weight	1.12E-03	NC	2.81E-04	1.40E-03
			Selenium	NC	NC	NC	NC	Selenium	clinical selenosis	1.11E-04	NC	1.11E-06	1.12E-04
			Thallium	NC	NC	NC	NC	Thallium	liver	6.92E-03	NC	6.92E-05	6.99E-03
			Vanadium	NC	NC	NC	NC	Vanadium	--	6.55E-03	NC	2.52E-03	9.06E-03
			Zinc	NC	NC	NC	NC	Zinc	blood system	7.30E-05	NC	7.30E-07	7.38E-05
Soil	Soil/ Ambient Air	--	Arsenic	1.70E-08	7.27E-11	5.11E-10	1.76E-08	Arsenic	skin discoloration	2.65E-03	NC	7.96E-05	2.73E-03
			Barium	NC	NC	NC	NC	Barium	no effects	2.73E-04	5.81E-05	3.89E-08	3.31E-04
			Beryllium	NC	4.56E-12	NC	4.56E-12	Beryllium	chronic beryllium disease	4.46E-05	6.67E-06	6.37E-05	1.15E-04
			Cadmium	NC	6.05E-12	NC	6.05E-12	Cadmium	kidney	3.15E-04	1.18E-06	6.30E-06	3.23E-04
			Chromium Total	NC	NC	NC	NC	Chromium Total	no effects	1.42E-05	NC	1.09E-05	2.52E-05
			Cobalt	NC	1.38E-10	NC	1.38E-10	Cobalt	--	1.16E-04	1.73E-04	1.16E-06	2.90E-04
			Copper	NC	NC	NC	NC	Copper	gastrointestinal system	1.08E-04	NC	1.08E-06	1.09E-04
			Iron	NC	NC	NC	NC	Iron	--	1.04E-02	NC	1.04E-04	1.05E-02
			Lead	NC	NC	NC	NC	Lead	--	NC	NC	NC	NC
			Manganese	NC	NC	NC	NC	Manganese	--	2.90E-03	4.04E-03	7.25E-04	7.67E-03
			Mercury	NC	NC	NC	NC	Mercury	central nervous system	1.89E-04	2.82E-07	1.89E-06	1.92E-04
			Nickel	NC	NC	NC	NC	Nickel	autoimmune system	1.69E-04	NC	4.23E-05	2.11E-04
			Selenium	NC	NC	NC	NC	Selenium	clinical selenosis	6.07E-05	NC	6.07E-07	6.13E-05
			Zinc	NC	NC	NC	NC	Zinc	blood system	7.04E-05	NC	7.04E-07	7.11E-05

TABLE B.3.4.CT

SUMMARY OF FUTURE CONSTRUCTION/ UTILITY WORKER RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Slag	Soil/ Ambient Air	--	Aluminum	NC	NC	NC	NC	Aluminum	--	2.34E-03	9.95E-04	2.34E-05	3.35E-03
			Arsenic	1.77E-08	7.53E-11	5.30E-10	1.83E-08	Arsenic	skin discoloration	2.75E-03	NC	8.24E-05	2.83E-03
			Barium	NC	NC	NC	NC	Barium	no effects	2.38E-04	5.07E-05	3.40E-08	2.88E-04
			Beryllium	NC	4.01E-12	NC	4.01E-12	Beryllium	chronic beryllium disease	3.92E-05	5.86E-06	5.60E-05	1.01E-04
			Cadmium	NC	1.68E-11	NC	1.68E-11	Cadmium	kidney	8.78E-04	3.28E-06	1.76E-05	8.99E-04
			Chromium Total	NC	NC	NC	NC	Chromium Total	no effects	1.98E-04	NC	1.52E-04	3.50E-04
			Chromium VI (Hexavalent)	NC	1.04E-09	NC	1.04E-09	Chromium VI (Hexavalent)	no effects	1.36E-03	6.19E-05	5.42E-04	1.96E-03
			Cobalt	NC	9.96E-11	NC	9.96E-11	Cobalt	--	8.35E-05	1.25E-04	8.35E-07	2.09E-04
			Copper	NC	NC	NC	NC	Copper	gastrointestinal system	5.68E-04	NC	5.68E-06	5.74E-04
			Iron	NC	NC	NC	NC	Iron	--	7.06E-03	NC	7.06E-05	7.13E-03
			Lead	NC	NC	NC	NC	Lead	--	NC	NC	NC	NC
			Manganese	NC	NC	NC	NC	Manganese	central nervous system	9.55E-03	1.33E-02	2.38E-03	2.52E-02
			Mercury	NC	NC	NC	NC	Mercury	autoimmune system	3.40E-05	5.06E-08	3.40E-07	3.44E-05
			Nickel	NC	NC	NC	NC	Nickel	body weight	2.77E-03	NC	6.94E-04	3.47E-03
			Selenium	NC	NC	NC	NC	Selenium	clinical selenosis	1.50E-04	NC	1.50E-06	1.51E-04
			Thallium	NC	NC	NC	NC	Thallium	liver	1.05E-02	NC	1.05E-04	1.06E-02
			Vanadium	NC	NC	NC	NC	Vanadium	--	8.48E-03	NC	3.26E-03	1.17E-02
			Zinc	NC	NC	NC	NC	Zinc	blood system	5.53E-05	NC	5.53E-07	5.59E-05
Groundwater	Groundwater	--	Aluminum	NC	--	NC	NC	Aluminum	--	1.80E-05	--	1.19E-05	2.99E-05
			Antimony	NC	--	NC	NC	Antimony	blood system	4.89E-05	--	2.15E-04	2.64E-04
			Arsenic	9.27E-10	--	6.12E-10	1.54E-09	Arsenic	skin discoloration	1.44E-04	--	9.51E-05	2.39E-04
			Chromium	NC	--	NC	NC	Chromium	no effects	6.65E-08	--	3.38E-06	3.44E-06
			Chromium VI (Hexavalent)	NC	--	NC	NC	Chromium VI (Hexavalent)	no effects	1.63E-05	--	8.61E-04	8.77E-04
			Iron	NC	--	NC	NC	Iron	--	6.20E-05	--	4.09E-05	1.03E-04
			Lead	NC	--	NC	NC	Lead	--	NC	--	NC	NC
			Manganese	NC	--	NC	NC	Manganese	central nervous system	2.00E-05	--	3.29E-04	3.49E-04
			Selenium	NC	--	NC	NC	Selenium	clinical selenosis	1.08E-05	--	7.16E-06	1.80E-05
			Thallium	NC	--	NC	NC	Thallium	liver	4.42E-04	--	2.92E-04	7.33E-04
			Vanadium	NC	--	NC	NC	Vanadium	--	4.52E-05	--	1.15E-03	1.19E-03
			Zinc	NC	--	NC	NC	Zinc	blood system	1.40E-06	--	5.53E-07	1.95E-06

TABLE B.3.4.CT

SUMMARY OF FUTURE CONSTRUCTION/ UTILITY WORKER RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Medium	*Exposure Medium*	*Exposure Point*	*Chemical*	*Carcinogenic Risk*				*Chemical*	*Non-Carcinogenic Hazard Quotient*				
				Ingestion	*Inhalation*	*Dermal*	*Exposure Routes Total*		*Primary Target Organ*	*Ingestion*	*Inhalation*	*Dermal*	*Exposure Routes Total*
Surface Water	Surface Water	--	Aluminum	NC	--	NC	NC	Aluminum	--	4.68E-06	--	3.09E-06	7.76E-06
			Antimony	NC	--	NC	NC	Antimony	blood system	7.34E-05	--	3.23E-04	3.96E-04
			Arsenic	8.20E-10	--	5.41E-10	1.36E-09	Arsenic	skin discoloration	1.28E-04	--	8.42E-05	2.12E-04
			Barium	NC	--	NC	NC	Barium	no effects	5.31E-06	--	5.00E-05	5.53E-05
			Beryllium	NC	--	NC	NC	Beryllium	chronic beryllium disease	2.97E-06	--	2.80E-04	2.83E-04
			Chromium	NC	--	NC	NC	Chromium	no effects	3.66E-07	--	1.86E-05	1.89E-05
			Chromium VI (Hexavalent)	NC	--	NC	NC	Chromium VI (Hexavalent)	no effects	4.11E-05	--	2.17E-03	2.21E-03
			Copper	NC	--	NC	NC	Copper	gastrointestinal system	2.05E-06	--	1.36E-06	3.41E-06
			Iron	NC	--	NC	NC	Iron	--	3.46E-05	--	2.28E-05	5.74E-05
			Lead	NC	--	NC	NC	Lead	--	NC	--	NC	NC
			Manganese	NC	--	NC	NC	Manganese	central nervous system	3.01E-05	--	4.97E-04	5.27E-04
			Mercury	NC	--	NC	NC	Mercury	autoimmune system	2.35E-06	--	1.55E-06	3.90E-06
			Nickel	NC	--	NC	NC	Nickel	body weight	2.35E-06	--	7.75E-06	1.01E-05
			Selenium	NC	--	NC	NC	Selenium	clinical selenosis	9.00E-06	--	5.94E-06	1.49E-05
			Thallium	NC	--	NC	NC	Thallium	liver	8.11E-04	--	5.35E-04	1.35E-03
			Vanadium	NC	--	NC	NC	Vanadium	--	4.11E-05	--	1.04E-03	1.08E-03
			Zinc	NC	--	NC	NC	Zinc	blood system	6.47E-07	--	2.56E-07	9.04E-07
Sediment	Sediment		Arsenic	2.20E-08	--	6.59E-10	2.26E-08	Arsenic	skin discoloration	3.42E-03	--	1.03E-04	3.52E-03
			Barium	NC	--	NC	NC	Barium	no effects	3.55E-04	--	5.07E-05	4.06E-04
			Beryllium	NC	--	NC	NC	Beryllium	chronic beryllium disease	3.27E-05	--	4.67E-05	7.94E-05
			Cadmium	NC	--	NC	NC	Cadmium	kidney	1.94E-04	--	3.89E-06	1.98E-04
			Chromium	NC	--	NC	NC	Chromium	no effects	3.52E-05	--	2.71E-05	6.23E-05
			Copper	NC	--	NC	NC	Copper	gastrointestinal disease	1.75E-04	--	1.75E-06	1.77E-04
			Iron	NC	--	NC	NC	Iron	--	8.10E-03	--	8.10E-05	8.18E-03
			Mercury	NC	--	NC	NC	Mercury	autoimmune system	4.20E-05	--	4.20E-07	4.24E-05
			Nickel	NC	--	NC	NC	Nickel	body weight	3.75E-04	--	9.38E-05	4.69E-04
			Selenium	NC	--	NC	NC	Selenium	clinical selenosis	2.60E-04	--	2.60E-06	2.63E-04
			Zinc	NC	--	NC	NC	Zinc	blood system	8.41E-05	--	8.41E-07	8.50E-05

Total Risk Across Soil and Slag	2.1E-08
Total Risk Across Soil	1.8E-08
Total Risk Across Slag	1.9E-08
Total Risk Across Surface Water	1.4E-09
Total Risk Across Sediment	2.3E-08

Total Risk Across All Media and All Exposure Routes (soil and slag)	4.5E-08
Total Risk Across All Media and All Exposure Routes (soil)	4.2E-08
Total Risk Across All Media and All Exposure Routes (slag)	4.3E-08

Total Hazard Index Across All Media and All Exposure Routes (surface soil and slag)	7.1E-02
Total Hazard Index Across All Media and All Exposure Routes (surface soil)	4.6E-02
Total Hazard Index Across All Media and All Exposure Routes (slag)	9.3E-02

Surface Soil and Slag

Total [blood system] HI =	8.2E-04
Total [skin discoloration] HI =	7.0E-03
Total [chronic beryllium disease] HI =	4.9E-04
Total [kidney] HI =	8.4E-04
Total [gastrointestinal system] HI =	5.6E-04
Total [central nervous system] HI =	1.1E-02
Total [autoimmune system] HI =	2.0E-04
Total [body weight] HI =	1.9E-03
Total [clinical selenosis] HI =	4.1E-04
Total [liver] HI =	9.1E-03

Note:

TABLE B.3.4.CT

SUMMARY OF FUTURE CONSTRUCTION/ UTILITY WORKER RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Medium	*Exposure Medium*	*Exposure Point*	*Chemical*	*Carcinogenic Risk*				*Chemical*	*Non-Carcinogenic Hazard Quotient*				
				Ingestion	*Inhalation*	*Dermal*	*Exposure Routes Total*		*Primary Target Organ*	*Ingestion*	*Inhalation*	*Dermal*	*Exposure Routes Total*

NC = Not Calculated

TABLE B.3.4.RME

SUMMARY OF FUTURE CONSTRUCTION/ UTILITY WORKER RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Medium	*Exposure Medium*	*Exposure Point*	*Chemical*	*Carcinogenic Risk*				*Chemical*	*Non-Carcinogenic Hazard Quotient*				
				Ingestion	*Inhalation*	*Dermal*	*Exposure Routes Total*		*Primary Target Organ*	*Ingestion*	*Inhalation*	*Dermal*	*Exposure Routes Total*
Soil and Slag	Soil/ Ambient Air	--	Aluminum	NC	NC	NC	NC	Aluminum	--	7.46E-03	3.18E-03	2.24E-04	1.09E-02
			Arsenic	5.36E-08	2.28E-10	4.82E-09	5.86E-08	Arsenic	skin discoloration	8.33E-03	NC	7.50E-04	9.08E-03
			Barium	NC	NC	NC	NC	Barium	no effects	6.28E-04	1.34E-04	2.69E-07	7.63E-04
			Beryllium	NC	1.28E-11	NC	1.28E-11	Beryllium	chronic beryllium disease	1.25E-04	1.88E-05	5.38E-04	6.82E-04
			Cadmium	NC	1.33E-10	NC	1.33E-10	Cadmium	kidney	6.92E-03	2.59E-05	4.15E-04	7.36E-03
			Chromium Total	NC	NC	NC	NC	Chromium Total	no effects	2.74E-04	NC	6.33E-04	9.07E-04
			Chromium VI (Hexavalent)	NC	3.85E-09	NC	3.85E-09	Chromium VI (Hexavalent)	no effects	5.01E-03	2.29E-04	6.02E-03	1.13E-02
			Cobalt	NC	8.79E-10	NC	8.79E-10	Cobalt	--	7.36E-04	1.10E-03	2.21E-05	1.86E-03
			Copper	NC	NC	NC	NC	Copper	gastrointestinal system	3.47E-03	NC	1.04E-04	3.57E-03
			Iron	NC	NC	NC	NC	Iron	--	2.44E-02	NC	7.32E-04	2.51E-02
			Lead	NC	NC	NC	NC	Lead	--	NC	NC	NC	NC
			Manganese	NC	NC	NC	NC	Manganese	central nervous system	1.00E-02	1.40E-02	7.51E-03	3.15E-02
			Mercury	NC	NC	NC	NC	Mercury	autoimmune system	3.06E-03	4.56E-06	9.19E-05	3.16E-03
			Nickel	NC	NC	NC	NC	Nickel	body weight	7.97E-03	NC	5.98E-03	1.40E-02
			Selenium	NC	NC	NC	NC	Selenium	clinical selenosis	2.79E-04	NC	8.38E-06	2.88E-04
			Thallium	NC	NC	NC	NC	Thallium	liver	1.99E-02	NC	5.98E-04	2.05E-02
			Vanadium	NC	NC	NC	NC	Vanadium	--	1.51E-02	NC	1.74E-02	3.25E-02
			Zinc	NC	NC	NC	NC	Zinc	blood system	1.79E-04	NC	5.38E-06	1.85E-04
Soil	Soil/ Ambient Air	--	Arsenic	3.91E-08	1.67E-10	3.52E-09	4.28E-08	Arsenic	skin discoloration	6.08E-03	NC	5.47E-04	6.63E-03
			Barium	NC	NC	NC	NC	Barium	no effects	1.24E-03	2.65E-04	5.32E-07	1.51E-03
			Beryllium	NC	1.04E-11	NC	1.04E-11	Beryllium	chronic beryllium disease	1.02E-04	1.53E-05	4.37E-04	5.55E-04
			Cadmium	NC	1.51E-11	NC	1.51E-11	Cadmium	kidney	7.86E-04	2.94E-06	4.72E-05	8.36E-04
			Chromium Total	NC	NC	NC	NC	Chromium Total	no effects	4.45E-05	NC	1.03E-04	1.47E-04
			Cobalt	NC	1.37E-09	NC	1.37E-09	Cobalt	--	1.15E-03	1.72E-03	3.44E-05	2.90E-03
			Copper	NC	NC	NC	NC	Copper	gastrointestinal system	3.02E-04	NC	9.06E-06	3.11E-04
			Iron	NC	NC	NC	NC	Iron	--	3.32E-02	NC	9.95E-04	3.42E-02
			Lead	NC	NC	NC	NC	Lead	--	NC	NC	NC	NC
			Manganese	NC	NC	NC	NC	Manganese	--	2.48E-02	3.46E-02	1.86E-02	7.80E-02
			Mercury	NC	NC	NC	NC	Mercury	central nervous system	7.27E-04	1.08E-06	2.18E-05	7.50E-04
			Nickel	NC	NC	NC	NC	Nickel	autoimmune system	3.64E-04	NC	2.73E-04	6.38E-04
			Selenium	NC	NC	NC	NC	Selenium	clinical selenosis	1.49E-04	NC	4.47E-06	1.54E-04
			Zinc	NC	NC	NC	NC	Zinc	blood system	1.79E-04	NC	5.37E-06	1.84E-04

TABLE B.3.4.RME

SUMMARY OF FUTURE CONSTRUCTION/ UTILITY WORKER RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Medium	*Exposure Medium*	*Exposure Point*	*Chemical*	*Carcinogenic Risk*				*Chemical*	*Non-Carcinogenic Hazard Quotient*				
				Ingestion	*Inhalation*	*Dermal*	*Exposure Routes Total*		*Primary Target Organ*	*Ingestion*	*Inhalation*	*Dermal*	*Exposure Routes Total*
Slag	Soil/ Ambient Air	--	Aluminum	NC	NC	NC	NC	Aluminum	--	8.91E-03	3.80E-03	2.67E-04	1.30E-02
			Arsenic	5.97E-08	2.55E-10	5.38E-09	6.54E-08	Arsenic	skin discoloration	9.29E-03	NC	8.36E-04	1.01E-02
			Barium	NC	NC	NC	NC	Barium	no effects	6.34E-04	1.35E-04	2.72E-07	7.69E-04
			Beryllium	NC	1.07E-11	NC	1.07E-11	Beryllium	chronic beryllium disease	1.04E-04	1.56E-05	4.48E-04	5.68E-04
			Cadmium	NC	7.30E-11	NC	7.30E-11	Cadmium	kidney	3.81E-03	1.42E-05	2.28E-04	4.05E-03
			Chromium Total	NC	NC	NC	NC	Chromium Total	no effects	5.20E-04	NC	1.20E-03	1.72E-03
			Chromium VI (Hexavalent)	NC	7.05E-09	NC	7.05E-09	Chromium VI (Hexavalent)	no effects	9.19E-03	4.20E-04	1.10E-02	2.06E-02
			Cobalt	NC	2.93E-10	NC	2.93E-10	Cobalt	--	2.46E-04	3.67E-04	7.37E-06	6.20E-04
			Copper	NC	NC	NC	NC	Copper	gastrointestinal system	6.30E-03	NC	1.89E-04	6.49E-03
			Iron	NC	NC	NC	NC	Iron	--	2.19E-02	NC	6.56E-04	2.25E-02
			Lead	NC	NC	NC	NC	Lead	--	NC	NC	NC	NC
			Manganese	NC	NC	NC	NC	Manganese	central nervous system	1.02E-01	1.42E-01	7.65E-02	3.21E-01
			Mercury	NC	NC	NC	NC	Mercury	autoimmune system	8.02E-05	1.19E-07	2.41E-06	8.27E-05
			Nickel	NC	NC	NC	NC	Nickel	body weight	1.42E-02	NC	1.06E-02	2.48E-02
			Selenium	NC	NC	NC	NC	Selenium	clinical selenosis	4.33E-04	NC	1.30E-05	4.46E-04
			Thallium	NC	NC	NC	NC	Thallium	liver	3.23E-02	NC	9.70E-04	3.33E-02
			Vanadium	NC	NC	NC	NC	Vanadium	--	2.11E-02	NC	2.43E-02	4.54E-02
			Zinc	NC	NC	NC	NC	Zinc	blood system	1.85E-04	NC	5.55E-06	1.91E-04
Groundwater	Groundwater	--	Aluminum	NC	--	NC	NC	Aluminum	--	1.83E-04	--	1.21E-04	3.03E-04
			Antimony	NC	--	NC	NC	Antimony	blood system	2.09E-04	--	9.18E-04	1.13E-03
			Arsenic	4.32E-09	--	2.85E-09	7.17E-09	Arsenic	skin discoloration	6.71E-04	--	4.43E-04	1.11E-03
			Chromium	NC	--	NC	NC	Chromium	no effects	8.00E-07	--	4.06E-05	4.14E-05
			Chromium VI (Hexavalent)	NC	--	NC	NC	Chromium VI (Hexavalent)	no effects	9.18E-05	--	4.85E-03	4.94E-03
			Iron	NC	--	NC	NC	Iron	--	4.13E-04	--	2.73E-04	6.86E-04
			Lead	NC	--	NC	NC	Lead	--	NC	--	NC	NC
			Manganese	NC	--	NC	NC	Manganese	central nervous system	1.18E-04	--	1.95E-03	2.07E-03
			Selenium	NC	--	NC	NC	Selenium	clinical selenosis	5.21E-05	--	3.44E-05	8.66E-05
			Thallium	NC	--	NC	NC	Thallium	liver	1.77E-03	--	1.17E-03	2.93E-03
			Vanadium	NC	--	NC	NC	Vanadium	--	5.04E-04	--	1.28E-02	1.33E-02
			Zinc	NC	--	NC	NC	Zinc	blood system	8.99E-06	--	3.56E-06	1.26E-05

TABLE B.3.4.RME

SUMMARY OF FUTURE CONSTRUCTION/ UTILITY WORKER RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Medium	*Exposure Medium*	*Exposure Point*	*Chemical*	*Carcinogenic Risk*				*Chemical*	*Non-Carcinogenic Hazard Quotient*				
				Ingestion	*Inhalation*	*Dermal*	*Exposure Routes Total*		*Primary Target Organ*	*Ingestion*	*Inhalation*	*Dermal*	*Exposure Routes Total*
Surface Water	Surface Water	--	Aluminum	NC	--	NC	NC	Aluminum	--	4.50E-05	--	2.97E-05	7.46E-05
			Antimony	NC	--	NC	NC	Antimony	blood system	3.31E-04	--	1.46E-03	1.79E-03
			Arsenic	3.79E-09	--	2.50E-09	6.29E-09	Arsenic	skin discoloration	5.89E-04	--	3.89E-04	9.78E-04
			Barium	NC	--	NC	NC	Barium	no effects	3.76E-05	--	3.55E-04	3.93E-04
			Beryllium	NC	--	NC	NC	Beryllium	chronic beryllium disease	1.19E-05	--	1.12E-03	1.13E-03
			Chromium	NC	--	NC	NC	Chromium	no effects	3.57E-06	--	1.81E-04	1.85E-04
			Chromium VI (Hexavalent)	NC	--	NC	NC	Chromium VI (Hexavalent)	no effects	2.67E-04	--	1.41E-02	1.44E-02
			Copper	NC	--	NC	NC	Copper	gastrointestinal system	5.21E-05	--	3.44E-05	8.64E-05
			Iron	NC	--	NC	NC	Iron	--	8.23E-04	--	5.43E-04	1.37E-03
			Lead	NC	--	NC	NC	Lead	--	NC	--	NC	NC
			Manganese	NC	--	NC	NC	Manganese	central nervous system	3.20E-04	--	5.28E-03	5.60E-03
			Mercury	NC	--	NC	NC	Mercury	autoimmune system	1.04E-05	--	6.89E-06	1.73E-05
			Nickel	NC	--	NC	NC	Nickel	body weight	5.63E-05	--	1.86E-04	2.42E-04
			Selenium	NC	--	NC	NC	Selenium	clinical selenosis	4.04E-05	--	2.66E-05	6.70E-05
			Thallium	NC	--	NC	NC	Thallium	liver	3.82E-03	--	2.52E-03	6.35E-03
			Vanadium	NC	--	NC	NC	Vanadium	--	2.22E-04	--	5.65E-03	5.87E-03
			Zinc	NC	--	NC	NC	Zinc	blood system	6.94E-06	--	2.75E-06	9.69E-06
Sediment	Sediment		Arsenic	7.40E-08	--	6.66E-09	8.07E-08	Arsenic	skin discoloration	1.15E-02	--	1.04E-03	1.25E-02
			Barium	NC	--	NC	NC	Barium	no effects	1.81E-03	--	7.74E-04	2.58E-03
			Beryllium	NC	--	NC	NC	Beryllium	chronic beryllium disease	8.14E-05	--	3.49E-04	4.30E-04
			Cadmium	NC	--	NC	NC	Cadmium	kidney	4.69E-04	--	2.82E-05	4.97E-04
			Chromium	NC	--	NC	NC	Chromium	no effects	1.76E-04	--	4.05E-04	5.81E-04
			Copper	NC	--	NC	NC	Copper	gastrointestinal disease	8.29E-04	--	2.49E-05	8.53E-04
			Iron	NC	--	NC	NC	Iron	--	2.06E-02	--	6.17E-04	2.12E-02
			Mercury	NC	--	NC	NC	Mercury	autoimmune system	1.36E-04	--	4.09E-06	1.41E-04
			Nickel	NC	--	NC	NC	Nickel	body weight	1.82E-03	--	1.36E-03	3.18E-03
			Selenium	NC	--	NC	NC	Selenium	clinical selenosis	6.63E-04	--	1.99E-05	6.83E-04
			Zinc	NC	--	NC	NC	Zinc	blood system	2.99E-04	--	8.98E-06	3.08E-04

Total Risk Across Soil and Slag	6.3E-08
Total Risk Across Soil	4.4E-08
Total Risk Across Slag	7.3E-08
Total Risk Across Surface Water	6.3E-09
Total Risk Across Sediment	8.1E-08

Total Risk Across All Media and All Exposure Routes (soil and slag)	1.5E-07
Total Risk Across All Media and All Exposure Routes (soil)	1.3E-07
Total Risk Across All Media and All Exposure Routes (slag)	1.6E-07

Total Hazard Index Across All Media and All Exposure Routes (surface soil and slag)	2.8E-01
Total Hazard Index Across All Media and All Exposure Routes (surface soil)	2.3E-01
Total Hazard Index Across All Media and All Exposure Routes (slag)	6.1E-01

Surface Soil and Slag

Total [blood system] HI =	3.4E-03
Total [skin discoloration] HI =	2.4E-02
Total [chronic beryllium disease] HI =	2.2E-03
Total [kidney] HI =	7.9E-03
Total [gastrointestinal system] HI =	4.5E-03
Total [central nervous system] HI =	3.9E-02
Total [autoimmune system] HI =	3.3E-03
Total [body weight] HI =	1.7E-02
Total [clinical selenosis] HI =	1.1E-03
Total [liver] HI =	3.0E-02

Note:

TABLE B.3.4.RME

SUMMARY OF FUTURE CONSTRUCTION/ UTILITY WORKER RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
OPERABLE UNIT 3
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK

Scenario Timeframe: Future
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Medium	*Exposure Medium*	*Exposure Point*	*Chemical*	*Carcinogenic Risk*				*Chemical*	*Non-Carcinogenic Hazard Quotient*				
				Ingestion	*Inhalation*	*Dermal*	*Exposure Routes Total*		*Primary Target Organ*	*Ingestion*	*Inhalation*	*Dermal*	*Exposure Routes Total*

NC = Not Calculated

APPENDIX C

DATA VALIDATION REPORTS

ANALYTICAL DATA ASSESSMENT AND VALIDATION
REMEDIAL INVESTIGATION
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
JULY TO AUGUST 2003

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TABLE 6	QUALIFIED SAMPLE RESULTS DUE TO ANALYTE CONCENTRATIONS IN THE RINSE BLANKS

1.0 INTRODUCTION

The following document details an assessment and validation of analytical results reported by Ecology and Environment, Inc. (E&E), located in Lancaster, New York, for samples collected at the Vanadium Site (Site) located in Niagara Falls, New York. Groundwater, surface water, surface soil, sediment, and borehole soils were collected during July and August 2003 to conduct a Remedial Investigation (RI). For sample identification, a sampling and analysis summary is presented in Table 1.

The quality assurance/quality control (QA/QC) criteria by which these data have been assessed are outlined in the analytical methods and the document entitled "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review", February 1994, EPA-540/R-94-013.

The data quality assessment and validation presented in the following subsections were performed based on information from data sheets including matrix spike (MS) recoveries, duplicate results, laboratory control sample (LCS) recoveries, and blank results for all parameters.

All soil, surface soil and sediment results are reported on a dry weight basis.

2.0 SAMPLE HOLDING TIMES

The method-specified holding time criteria for this program were as follows:

Parameter	*Matrix*	*Holding Time*
TAL Metals (except Mercury)	Water	180 days from collection to analysis
TAL Metals (except Mercury)	Soil/Sediment	180 days from collection to analysis
Mercury	Water	28 days from collection to analysis
Mercury	Soil/Sediment	28 days from collection to analysis
Chromium VI	Water	24 hours from collection to analysis
Chromium VI	Soil/Sediment	30 days from collection to extraction 7 days from extraction to analysis
Cyanide	Water	14 days from collection to analysis
Cyanide	Soil/Sediment	14 days from collection to analysis
pH	Soil/Sediment	ASAP

A holding time of 48 hours from collection to analysis was utilized for the pH analysis. All sample analyses were performed within the required holding times with the

exception of various soils/sediments for pH analysis. All associated results were qualified as estimated (see Table 2). All samples were properly preserved and cooled at 4°C (±2°C) after collection and all samples were received by the laboratory in good condition.

3.0 LABORATORY BLANK ANALYSES

The purpose of assessing the results of laboratory blank analyses is to determine the existence and magnitude of sample contamination introduced during analysis. Laboratory blanks are prepared from deionized water and analyzed as samples.

Most blank results were non-detect for the analytes of interest with the exception of metals and cyanide present at low concentrations. All associated sample results with concentrations similar to the blank concentrations were qualified as non-detect (see Table 3).

For this study, laboratory blanks were analyzed at a minimum frequency of one per analytical batch.

4.0 LABORATORY CONTROL SAMPLE ANALYSES

The LCS serves as a monitor of the overall performance of all steps in the analysis, including the sample preparation. LCSs were analyzed using the same sample preparation, analytical methods, and QA/QC procedures employed for the investigative samples.

LCSs were reported for all inorganic analyses. All LCS samples yielded recoveries within the established control limits, indicating acceptable overall analytical accuracy.

5.0 MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD) ANALYSES

The recoveries of MS/MSD analyses are used to assess the analytical accuracy achieved on individual sample matrices. The relative percent difference (RPD) between the MS and MSD is used to assess analytical precision.

An MS/MSD was analyzed at the required frequency for all parameters.

Most recoveries were acceptable indicating adequate analytical accuracy and precision with the exception of some outlying results. The associated samples were qualified as follows:

i) where high recoveries were observed, all positive results were qualified as estimated and all non-detect results would not have been impacted by the implied high bias;

ii) where low recoveries were observed, all associated results were qualified as estimated to reflect the implied low bias;

iii) where extremely low recoveries were observed (<30 percent), all positive results were qualified as estimated and all non-detect results were rejected due to the poor analyte efficiency; and

iv) where a high RPD is observed, all positive results were qualified as estimated and all non-detect results would not have been impacted by the implied variability.

A summary of the outlying recoveries and qualified samples is presented in Table 4.

6.0 DUPLICATE ANALYSES

To assess analytical precision, samples were analyzed in duplicate for chromium VI and pH. The results were compared and must agree within 35 percent difference to be acceptable.

All results were acceptable indicating adequate analytical precision.

7.0 FIELD QA/QC

7.1 FIELD DUPLICATES

To assess the analytical and sampling protocol precision, field duplicates (as identified in Table 1) were collected and submitted "blind" to the laboratory. All data outside of estimated regions of detection demonstrated acceptable agreement indicating adequate sampling and analytical procedures with the exception of variability observed between some metal results. The results were qualified as estimated to reflect the implied variability (see Table 5).

7.2 RINSE BLANKS

Rinse blanks were submitted for analysis of all parameters to assess the possibility of cross-contamination during sample collection. Most results were non-detect with the exception of low concentration of metals and cyanide. All associated results with similar concentrations were qualified as non-detect (see Table 6).

8.0 CONCLUSION

Based on the assessment detailed in the foregoing, the data produced by E&E are acceptable with the noted qualifications and exceptions.

TABLES

TABLE 1

COLLECTION AND ANALYSIS SUMMARY
REMEDIAL INVESTIGATION
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
JULY - AUGUST 2003

Sample I.D.	*Location I.D.*	*Matrix*	*Collection Date (mm/dd/yy)*	*Collection Time (hr:min)*	*Analysis/Parameters*	*Comment*
SS-19867-0703-PK-001	SS-40	Surface Soil	07/18/03	10:05	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SS-19867-0703-PK-002	SS-39	Surface Soil	07/18/03	10:15	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SS-19867-0703-PK-003	SS-38	Surface Soil	07/18/03	10:30	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SS-19867-0703-PK-004	SS-31	Surface Soil	07/18/03	10:45	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	MS/MSD
SS-19867-0703-PK-005	SS-37	Surface Soil	07/18/03	10:55	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SS-19867-0703-PK-006	SS-37	Surface Soil	07/18/03	11:00	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	Duplicate of 005 (from SS-37)
SS-19867-0703-PK-007	SS-32	Surface Soil	07/18/03	11:05	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SS-19867-0703-PK-008	SS-30	Surface Soil	07/18/03	11:15	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SS-19867-0703-PK-009	SS-27	Surface Soil	07/18/03	11:20	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SS-19867-0703-PK-010	SS-23	Surface Soil	07/18/03	11:30	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SS-19867-0703-PK-011	SS-24	Surface Soil	07/18/03	11:35	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SS-19867-0703-PK-012	SS-22	Surface Soil	07/18/03	11:45	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SS-19867-0703-PK-013	SS-15	Surface Soil	07/18/03	11:55	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SS-19867-0703-PK-014	SS-11	Surface Soil	07/18/03	12:10	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SS-19867-0703-PK-015	SS-36	Surface Soil	07/18/03	13:25	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SS-19867-0703-PK-016	SS-35	Surface Soil	07/18/03	13:35	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SS-19867-0703-PK-017	SS-29	Surface Soil	07/18/03	13:40	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SS-19867-0703-PK-018	SS-33	Surface Soil	07/18/03	13:45	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SS-19867-0703-PK-019	SS-34	Surface Soil	07/18/03	13:55	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SS-19867-0703-PK-020	SS-28	Surface Soil	07/18/03	14:00	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SS-19867-0703-PK-021	SS-26	Surface Soil	07/18/03	14:10	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SS-19867-0703-PK-022	SS-21	Surface Soil	07/18/03	14:20	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SS-19867-0703-PK-023	SS-20	Surface Soil	07/18/03	14:30	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SS-19867-0703-PK-024	SS-16	Surface Soil	07/18/03	14:40	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SS-19867-0703-PK-025	SS-16	Surface Soil	07/18/03	14:45	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SS-19867-0703-PK-026	SS-12	Surface Soil	07/21/03	13:10	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SS-19867-0703-PK-027	SS-10	Surface Soil	07/21/03	9:20	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SS-19867-0703-PK-028	SS-18	Surface Soil	07/21/03	12:20	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SS-19867-0703-PK-029	SS-13	Surface Soil	07/21/03	12:30	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	MS/MSD
SS-19867-0703-PK-030	SS-14	Surface Soil	07/21/03	12:40	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SS-19867-0703-PK-031	SS-17	Surface Soil	07/21/03	12:50	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SS-19867-0703-PK-032	SS-19	Surface Soil	07/21/03	13:00	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SS-19867-0703-PK-033	SS-25	Surface Soil	07/21/03	13:20	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	

TABLE 1

COLLECTION AND ANALYSIS SUMMARY
REMEDIAL INVESTIGATION
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
JULY - AUGUST 2003

Sample I.D.	*Location I.D.*	*Matrix*	*Collection Date (mm/dd/yy)*	*Collection Time (hr:min)*	*Analysis/Parameters*	*Comment*
SS-19867-0703-PK-RB	Rinsate Blank	-	07/18/03	16:10	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SS-19867-0703-PK-RB	Rinsate Blank	-	07/21/03	13:50	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
S-19867-0703-PK-001	BH-8/MW-22	6-8' BGS	07/22/03	13:20	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
S-19867-0703-PK-002	BH-8/MW-22	13-14' BGS	07/22/03	14:30	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
S-19867-0703-PK-003	BH-11/MW-25	2-3' BGS	07/23/03	8:30	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
S-19867-0703-PK-004	BH-11/MW-25	8-10' BGS	07/23/03	9:30	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
S-19867-0703-PK-005	BH-13/MW-26	2-4' BGS	07/23/03	10:30	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
S-19867-0703-PK-006	BH-13/MW-26	10-12' BGS	07/23/03	11:30	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
S-19867-0703-PK-007	BH-12	4-6.5' BGS	07/23/03	14:30	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
S-19867-0703-PK-008	BH-12	8-10' BGS	07/23/03	15:00	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
S-19867-0703-PK-009	BH-5/MW-19	0.5-2' BGS	07/23/03	15:45	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
S-19867-0703-PK-010	BH-5/MW-19	10-12' BGS	07/23/03	16:50	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
S-19867-0703-PK-011	BH-1/MW15	2-4' BGS	07/24/03	15:00	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	MS/MSD
S-19867-0703-PK-012	BH-1/MW15	10-12' BGS	07/24/03	15:45	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
S-19867-0703-PK-013	BH-1/MW15	10-12' BGS	07/24/03	16:15	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	Duplicate of -012
S-19867-0703-PK-014	BH-2/MW-16	2-4' BGS	07/24/03	16:00	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
S-19867-0703-PK-015	BH-2/MW-16	10-11' BGS	07/24/03	16:20	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
S-19867-0703-PK-016	BH-6/MW-20	4.5-6' BGS	07/25/03	8:45	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
S-19867-0703-PK-017	BH-6/MW-20	8-10' BGS	07/25/03	9:15	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
S-19867-0703-PK-018	BH-9/MW-23	4-6' BGS	07/25/03	11:35	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	MS/MS
S-19867-0703-PK-019	BH-9/MW-23	22-24' BGS	07/25/03	14:00	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
S-19867-0703-PK-020	BH-10/MW-24	2-4' BGS	07/28/03	8:25	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
S-19867-0703-PK-021	BH-10/MW-24	2-4' BGS	07/28/03	8:30	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	Duplicate of -020
S-19867-0703-PK-022	BH-10/MW-24	18-20' BGS	07/28/03	9:35	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
S-19867-0703-PK-023	BH-4/MW-18	2-4' BGS	07/28/03	11:50	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
S-19867-0703-PK-024	BH-4/MW-18	12-14' BGS	07/28/03	11:45	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
S-19867-0703-PK-025	BH-7/MW-21	8-10' BGS	07/28/03	14:25	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
S-19867-0703-PK-026	BH-7/MW-21	18-20' BGS	07/28/03	15:15	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
S-19867-0703-PK-027	BH-15/MW-28	1-2' BGS	07/29/03	8:20	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
S-19867-0703-PK-028	BH-15/MW-28	7-8' BGS	07/29/03	8:30	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
S-19867-0703-PK-029	BH-14/MW-27	1.5'-4' BGS	07/29/03	9:50	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
S-19867-0703-PK-030	BH-14/MW-27	7-8' BGS	07/29/03	10:05	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
S-19867-0703-PK-031	Next to TP-20	just below surface	08/18/03	17:20	TAL Metals, Cyanide, Hex. Chromium	

TABLE 1

COLLECTION AND ANALYSIS SUMMARY
REMEDIAL INVESTIGATION
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
JULY - AUGUST 2003

Sample I.D.	*Location I.D.*	*Matrix*	*Collection Date (mm/dd/yy)*	*Collection Time (hr:min)*	*Analysis/Parameters*	*Comment*
S-19867-0703-PK-032	BH-3/MW-17	0-4' BGS	08/20/03	11:40	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
S-19867-0703-PK-033	BH-3/MW-17	11-13' BGS	08/20/03	11:45	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
S-19867-0703-PK-RB 1	Rinsate Blank	-	07/25/03	15:00	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
S-19867-0703-PK-RB 2	Rinsate Blank	-	07/25/03	15:05	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
GW-19867-0803-PK-001	MW-22	Groundwater	08/15/03	8:50	TAL Metals, Cyanide, Hex. Chromium	
GW-19867-0803-PK-002	MW-22	Groundwater	08/15/03	9:00	TAL Metals, Cyanide, Hex. Chromium	Field Filtered
GW-19867-0803-PK-003	MW-19	Groundwater	08/15/03	9:30	TAL Metals, Cyanide, Hex. Chromium	
GW-19867-0803-PK-004	MW-15	Groundwater	08/15/03	10:20	TAL Metals, Cyanide, Hex. Chromium	
GW-19867-0803-PK-005	MW-15	Groundwater	08/15/03	10:30	TAL Metals, Cyanide, Hex. Chromium	Field Filtered
RINSATE BLANK	Rinsate Blank	-	08/15/03	-	TAL Metals, Cyanide, Hex. Chromium	
GW-19867-0803-PK-006	MW-25	Groundwater	08/18/03	15:40	TAL Metals, Cyanide, Hex. Chromium	
GW-19867-0803-PK-007	MW-25	Groundwater	08/18/03	15:50	TAL Metals, Hex. Chromium	Field Filtered
GW-19867-0803-PK-008	MW-25	Groundwater	08/18/03	16:00	TAL Metals, Cyanide, Hex. Chromium	Duplicate of 006
GW-19867-0803-PK-009	MW-20	Groundwater	08/18/03	16:40	TAL Metals, Cyanide, Hex. Chromium	MS/MSD
GW-19867-0803-PK-010	MW-20	Groundwater	08/18/03	16:50	TAL Metals, Hex. Chromium	Field Filtered
GW-19867-0803-PK-011	MW-27	Groundwater	08/18/03	17:20	TAL Metals, Cyanide, Hex. Chromium	
GW-19867-0803-PK-012	MW-27	Groundwater	08/18/03	17:30	TAL Metals, Hex. Chromium	Field Filtered
GW-19867-0803-PK-013	MW-26	Groundwater	08/20/03	15:30	TAL Metals, Cyanide, Hex. Chromium	
GW-19867-0803-PK-014	MW-23	Groundwater	08/20/03	16:10	TAL Metals, Cyanide, Hex. Chromium	
GW-19867-0803-PK-015	MW-23	Groundwater	08/20/03	16:30	TAL Metals, Cyanide, Hex. Chromium	Field Filtered
GW-19867-0803-PK-016	MW-24	Groundwater	08/20/03	17:00	TAL Metals, Cyanide, Hex. Chromium	
GW-19867-0803-PK-017	MW-104A	Groundwater	08/25/03	13:00	TAL Metals, Cyanide, Hex. Chromium	Field Filtered
GW-19867-0803-PK-018	MW-104A	Groundwater	08/25/03	13:10	TAL Metals, Cyanide, Hex. Chromium	
GW-19867-0803-PK-019	MW-16	Groundwater	08/25/03	14:30	TAL Metals, Cyanide, Hex. Chromium	
GW-19867-0803-PK-020	MW-105A	Groundwater	08/28/03	11:40	TAL Metals, Cyanide, Hex. Chromium	
GW-19867-0803-PK-021	MW-28	Groundwater	08/28/03	12:00	TAL Metals, Cyanide, Hex. Chromium	
GW-19867-0803-PK-022	MW-21	Groundwater	08/28/03	12:30	TAL Metals, Cyanide, Hex. Chromium	
GW-19867-0803-PK-023	MW-18	Groundwater	08/28/03	12:50	TAL Metals, Cyanide, Hex. Chromium	
GW-19867-0803-PK-024	MW-17	Groundwater	08/28/03	13:10	TAL Metals, Cyanide, Hex. Chromium	
GW-19867-0803-PK-025	MW-103A	Groundwater	08/28/03	14:00	TAL Metals, Cyanide, Hex. Chromium	
GW-19867-0803-PK-026	MW-103A	Groundwater	08/28/03	14:15	TAL Metals, Cyanide, Hex. Chromium	Field Filtered
GW-19867-0803-PK-027	MW-106A	Groundwater	08/28/03	14:45	TAL Metals, Cyanide, Hex. Chromium	
GW-19867-0803-PK-028	MW-107A	Groundwater	08/28/03	15:00	TAL Metals, Cyanide, Hex. Chromium	

TABLE 1

COLLECTION AND ANALYSIS SUMMARY
REMEDIAL INVESTIGATION
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
JULY - AUGUST 2003

Sample I.D.	*Location I.D.*	*Matrix*	*Collection Date (mm/dd/yy)*	*Collection Time (hr:min)*	*Analysis/Parameters*	*Comment*
SW-19867-08-03-011	SW-11	Surface Water	08/21/03	12:20	TAL Metals, Cyanide, Hex. Chromium	
SW-19867-08-03-013	SW-13	Surface Water	08/21/03	10:00	TAL Metals, Cyanide, Hex. Chromium	
SW-19867-08-03-014	SW-14	Surface Water	08/21/03	10:20	TAL Metals, Cyanide, Hex. Chromium	
SW-19867-08-03-015	SW-15	Surface Water	08/21/03	13:00	TAL Metals, Cyanide, Hex. Chromium	
SW-19867-08-03-019	SW-19	Surface Water	08/21/03	13:10	TAL Metals, Cyanide, Hex. Chromium	
SW-19867-08-03-020	SW-20	Surface Water	08/21/03	10:40	TAL Metals, Cyanide, Hex. Chromium	
SW-19867-08-03-021	SW-21	Surface Water	08/21/03	11:00	TAL Metals, Cyanide, Hex. Chromium	
SW-19867-08-03-022	SW-22	Surface Water	08/28/03	14:20	TAL Metals, Cyanide, Hex. Chromium	
SW-19867-08-03-023	SW-23	Surface Water	08/21/03	11:15	TAL Metals, Cyanide, Hex. Chromium	MS/MSD
SW-19867-08-03-024	SW-24	Surface Water	08/21/03	13:30	TAL Metals, Cyanide, Hex. Chromium	
SW-19867-08-03-025	SW-23	Surface Water	08/21/03	13:40	TAL Metals, Cyanide, Hex. Chromium	Duplicate of -023
Rinsate Blank	Rinsate Blank	-	08/28/03	-	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
S-19867-0803-PK-009	SW-9	Soil	08/14/08	8:40	TAL Metals, Cyanide, Hex. Chromium	
S-19867-0803-PK-008	SW-8	Soil	08/14/08	8:50	TAL Metals, Cyanide, Hex. Chromium	
S-19867-0803-PK-017	SW-17	Soil	08/14/08	10:50	TAL Metals, Cyanide, Hex. Chromium	
S-19867-0803-PK-016	SW-16	Soil	08/14/08	11:00	TAL Metals, Cyanide, Hex. Chromium	
SED-19867-08-03-010	SW-10	Sediment	08/21/03	12:10	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SED-19867-08-03-011	SW-11	Sediment	08/21/03	12:20	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SED-19867-08-03-013	SW-13	Sediment	08/21/03	10:00	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SED-19867-08-03-014	SW-14	Sediment	08/21/03	10:20	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SED-19867-08-03-015	SW-15	Sediment	08/21/03	13:00	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SED-19867-08-03-018	SW-18	Sediment	08/21/03	13:05	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SED-19867-08-03-019	SW-19	Sediment	08/21/03	13:10	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SED-19867-08-03-020	SW-20	Sediment	08/21/03	10:40	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SED-19867-08-03-021	SW-21	Sediment	08/21/03	11:00	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SED-19867-08-03-022	SW-22	Sediment	08/28/03	14:20	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SED-19867-08-03-023	SW-23	Sediment	08/21/03	11:15	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	MS-MSD
SED-19867-08-03-024	SW-24	Sediment	08/21/03	13:30	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	
SED-19867-08-03-025	SW-23	Sediment	08/21/03	13:40	TAL Metals, Cyanide, Hex. Chromium, Corrosivity (pH)	Duplicate of -023

Notes:
' BGS Feet Below Ground Surface.
Hex. Hexavalent.

TABLE 1

COLLECTION AND ANALYSIS SUMMARY
REMEDIAL INVESTIGATION
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
JULY - AUGUST 2003

Sample I.D.	*Location I.D.*	*Matrix*	*Collection Date (mm/dd/yy)*	*Collection Time (hr:min)*	*Analysis/Parameters*	*Comment*

MS Matrix Spike.
MSD Matrix Spike Duplicate.
TAL Target Analyte List.

TABLE 2

QUALIFIED SAMPLE DATA DUE TO HOLDING TIME EXCEEDANCES
REMEDIAL INVESTIGATION
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
JULY - AUGUST 2003

Parameter	*Sample ID*	Holding *Time (days)*	*Holding Time Criteria (days)*	*Sample Result*	*Units*	*Qualifier*
pH	SS-19867-0703-PK-003	4	2	8.0	S.U.	J
	S-19867-07-03-PK-006	7	2	11	S.U.	J
	S-19867-07-03-PK-005	7	2	9.9	S.U.	J
	SS-19867-0703-PK-002	4	2	6.9	S.U.	J
	S-19867-07-03-PK-007	7	2	9.1	S.U.	J
	S-19867-07-03-PK-008	7	2	9.8	S.U.	J
	SS-19867-0703-PK-018	4	2	7.3	S.U.	J
	SS-19867-0703-PK-001	4	2	8.0	S.U.	J
	SS-19867-0703-PK-004	4	2	8.0	S.U.	J
	S-19867-07-03-PK-001	8	2	12	S.U.	J
	SS-19867-0703-PK-014	4	2	6.7	S.U.	J
	SS-19867-0703-PK-025	4	2	7.7	S.U.	J
	SS-19867-0703-PK-024	5	2	7.5	S.U.	J
	SS-19867-0703-PK-013	4	2	8.2	S.U.	J
	SS-19867-0703-PK-015	4	2	7.6	S.U.	J
	SS-19867-0703-PK-012	4	2	8.3	S.U.	J
	SS-19867-0703-PK-023	4	2	7.8	S.U.	J
	SS-19867-0703-PK-011	4	2	8.0	S.U.	J
	SS-19867-0703-PK-022	4	2	7.2	S.U.	J
	SS-19867-0703-PK-010	4	2	7.7	S.U.	J
	S-19867-07-03-PK-002	8	2	9.1	S.U.	J
	SS-19867-0703-PK-016	4	2	8.0	S.U.	J
	S-19867-07-03-PK-003	7	2	8.9	S.U.	J
	SS-19867-0703-PK-007	4	2	7.8	S.U.	J
	SS-19867-0703-PK-005	4	2	8.2	S.U.	J
	SS-19867-0703-PK-020	4	2	6.5	S.U.	J
	SS-19867-0703-PK-006	4	2	8.3	S.U.	J
	SS-19867-0703-PK-009	4	2	8.8	S.U.	J
	SS-19867-0703-PK-017	4	2	7.7	S.U.	J
	SS-19867-0703-PK-019	4	2	7.6	S.U.	J
	SS-19867-0703-PK-008	4	2	8.4	S.U.	J
	SS-19867-0703-PK-021	4	2	7.2	S.U.	J
	S-19867-07-03-PK-004	7	2	9.6	S.U.	J
	SED-19867-08-03-PK-022	5	2	7.7	S.U.	J

Notes:
J Estimated.
S.U. Standard Units.

TABLE 3

QUALIFIED SAMPLE RESULTS DUE TO ANALYTE CONCENTRATIONS IN THE METHOD BLANKS
REMEDIAL INVESTIGATION
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
JULY - AUGUST 2003

Parameter	*Blank ID/Date*	*Analyte*	*Blank Result*	*Sample ID*	*Sample Result*	*Qualified Sample Result*	*Units*
Metals	07/31/03	Sodium	14.24 J	SS-19867-0703-PK-019	68.8 J	ND 68.8	mg/Kg
				SS-19867-0703-PK-016	49.4 J	ND 49.4	mg/Kg
				SS-19867-0703-PK-018	35.6 J	ND 35.6	mg/Kg
				SS-19867-0703-PK-004	58.9 J	ND 58.9	mg/Kg
				SS-19867-0703-PK-007	64.9 J	ND 64.9	mg/Kg
				SS-19867-0703-PK-013	27.0 J	ND 27.0	mg/Kg
				SS-19867-0703-PK-006	64.6 J	ND 64.6	mg/Kg
				SS-19867-0703-PK-031	28.2 J	ND 28.2	mg/Kg
				SS-19867-0703-PK-027	66.8 J	ND 66.8	mg/Kg
				SS-19867-0703-PK-028	41.5 J	ND 41.5	mg/Kg
				SS-19867-0703-PK-029	47.4 J	ND 47.4	mg/Kg
				SS-19867-0703-PK-026	67.0 J	ND 67.0	mg/Kg
				SS-19867-0703-PK-030	27.5 J	ND 27.5	mg/Kg
				SS-19867-0703-PK-032	33.4 J	ND 33.4	mg/Kg
				SS-19867-0703-PK-033	41.4 J	ND 41.4	mg/Kg
				SS-19867-0703-PK-020	35.0 J	ND 35.0	mg/Kg
Metals	08/30/03	Aluminum	27.88	GW-9867-08-03-PK-013	48.5 J	ND 200	µg/L
Metals	09/04/03	Aluminum	85.97	GW-9867-08-03-PK-008	357	ND 400	µg/L
				GW-9867-08-03-PK-005	71.8 J	ND 200	µg/L
				GW-9867-08-03-PK-007	92.7 J	ND 200	µg/L
Metals	08/30/03	Zinc	2.802	GW-9867-08-03-PK-016	3.27 J	ND 10.0	µg/L
				GW-9867-08-03-PK-013	7.77 J	ND 10.0	µg/L
Metals	09/11/03	Iron	46.49	GW-9867-08-03-PK-019	134 J	ND 200	µg/L
Metals	09/11/03	Nickel	2.197	GW-9867-08-03-PK-019	9.02 J	ND 20.0	µg/L
				GW-9867-08-03-PK-018	10.5 J	ND 20.0	µg/L
				GW-9867-08-03-PK-017	10.2 J	ND 20.0	µg/L
Metals	09/12/03	Aluminum	78.93	GW-19867-08-03-PK-026	88.0 J	ND 200	µg/L
Metals	09/12/03	Cobalt	0.7059	GW-19867-08-03-PK-020	2.22 J	ND 20.0	µg/L
				GW-19867-08-03-PK-026	1.34 J	ND 20.0	µg/L
				GW-19867-08-03-PK-021	1.68 J	ND 20.0	µg/L
				GW-19867-08-03-PK-022	1.61 J	ND 20.0	µg/L
Metals	09/12/03	Copper	4.314	GW-19867-08-03-PK-020	17.2 J	ND 20.0	µg/L
				GW-19867-08-03-PK-027	18.6 J	ND 20.0	µg/L
				GW-19867-08-03-PK-021	9.34 J	ND 20.0	µg/L
Metals	09/15/03	Zinc	16.13	GW-19867-08-03-PK-021	19.9 J	ND 19.9	µg/L
				GW-19867-08-03-PK-026	11.3	ND 11.3	µg/L
				GW-19867-08-03-PK-022	18.7	ND 18.7	µg/L
Metals	08/29/03	Zinc	2.257	SW-19867-08-03-021	9.61 J	ND 10	µg/L
Gen Chem	08/22/03	Cyanide	0.004142	GW-9867-08-03-PK-001	0.00613 J	ND 0.01	mg/L
				GW-9867-08-03-PK-002	0.00418 J	ND 0.01	mg/L
				GW-9867-08-03-PK-003	0.00343 J	ND 0.01	mg/L
				GW-9867-08-03-PK-004	0.00334 J	ND 0.01	mg/L

TABLE 3

QUALIFIED SAMPLE RESULTS DUE TO ANALYTE CONCENTRATIONS IN THE METHOD BLANKS
REMEDIAL INVESTIGATION
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
JULY - AUGUST 2003

Parameter	*Blank ID/Date*	*Analyte*	*Blank Result*	*Sample ID*	*Sample Result*	*Qualified Sample Result*	*Units*
Gen Chem	08/20/03	Cyanide	0.4239	S-9867-08-03-PK-008	0.924	ND 0.924	mg/Kg
				S-9867-08-03-PK-009	0.465	ND 0.862	mg/Kg
				S-9867-08-03-PK-017	0.242	ND 0.607	mg/Kg
				S-9867-08-03-PK-031	0.603	ND 0.603	mg/Kg

Notes:
J Estimated.
ND Non-detect at associated value.

TABLE 4

QUALIFIED SAMPLE RESULTS DUE TO OUTLYING MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES
REMEDIAL INVESTIGATION
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
JULY - AUGUST 2003

Parameter	*Analyte*	*Sample ID*	*MS Recovery (percent)*	*MSD Recovery (percent)*	*RPD*	*Control Limits (percent)*	*RPD Control Limits (percent)*	*Associated Sample ID*	*Sample Result*	*Units*	*Qualifier*
Metals	Antimony	SS-19867-0703-PK-029	49	50	2	75-125	35	SS-19867-0703-PK-024	ND 0.980	mg/Kg	J
								SS-19867-0703-PK-026	ND 0.962	mg/Kg	J
								SS-19867-0703-PK-027	ND 0.926	mg/Kg	J
								SS-19867-0703-PK-028	ND 0.943	mg/Kg	J
								SS-19867-0703-PK-029	ND 1.03	mg/Kg	J
								SS-19867-0703-PK-030	ND 0.962	mg/Kg	J
								SS-19867-0703-PK-031	ND 0.997	mg/Kg	J
								SS-19867-0703-PK-032	ND 0.909	mg/Kg	J
								SS-19867-0703-PK-033	ND 0.893	mg/Kg	J
Metals	Antimony	SS-19867-0703-PK-004	27	28	4	75-125	35	SS-19867-0703-PK-001	ND 1.03	mg/Kg	R
								SS-19867-0703-PK-002	ND 1.22	mg/Kg	R
								SS-19867-0703-PK-003	ND 1.52	mg/Kg	R
								SS-19867-0703-PK-004	ND 1.23	mg/Kg	R
								SS-19867-0703-PK-006	ND 1.22	mg/Kg	R
								SS-19867-0703-PK-007	ND 2.79	mg/Kg	R
								SS-19867-0703-PK-008	ND 1.26	mg/Kg	R
								SS-19867-0703-PK-011	ND 1.07	mg/Kg	R
								SS-19867-0703-PK-014	ND 1.83	mg/Kg	R
								SS-19867-0703-PK-015	ND 1.30	mg/Kg	R
								SS-19867-0703-PK-016	ND 3.18	mg/Kg	R
								SS-19867-0703-PK-017	ND 2.15	mg/Kg	R
								SS-19867-0703-PK-018	ND 2.62	mg/Kg	R
								SS-19867-0703-PK-019	ND 2.63	mg/Kg	R
								SS-19867-0703-PK-020	ND 2.91	mg/Kg	R
								SS-19867-0703-PK-005	ND 2.31	mg/Kg	R
								SS-19867-0703-PK-009	ND 2.10	mg/Kg	R
								SS-19867-0703-PK-010	ND 2.24	mg/Kg	R
								SS-19867-0703-PK-012	ND 2.52	mg/Kg	R
								SS-19867-0703-PK-013	ND 3.33	mg/Kg	R

TABLE 4

QUALIFIED SAMPLE RESULTS DUE TO OUTLYING MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES
REMEDIAL INVESTIGATION
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
JULY - AUGUST 2003

Parameter	*Analyte*	*Sample ID*	*MS Recovery (percent)*	*MSD Recovery (percent)*	*RPD*	*Control Limits (percent)*	*RPD Control Limits (percent)*	*Associated Sample ID*	*Sample Result*	*Units*	*Qualifier*
Metals	Antimony	S-19867-0703-PK-011	50	49	2	75-125	35	S-19867-0703-PK-011	ND 1.22	mg/Kg	J
								S-19867-0703-PK-012	ND 2.03	mg/Kg	J
								S-19867-0703-PK-013	ND 1.21	mg/Kg	J
								S-19867-0703-PK-014	ND 1.13	mg/Kg	J
								S-19867-0703-PK-015	ND 1.33	mg/Kg	J
								S-19867-0703-PK-017	ND 1.19	mg/Kg	J
								S-19867-0703-PK-019	ND 1.92	mg/Kg	J
								S-19867-0703-PK-016	ND 24.2	mg/Kg	J
Metals	Antimony	S-19867-07-03-PK-020	39	41	5	75-125	35	S-19867-0703-PK-001	5.55	mg/Kg	J
								S-19867-0703-PK-002	ND 0.736	mg/Kg	J
								S-19867-0703-PK-003	ND 3.54	mg/Kg	J
								S-19867-0703-PK-004	ND 0.931	mg/Kg	J
								S-19867-0703-PK-005	3.01	mg/Kg	J
								S-19867-0703-PK-006	2.82	mg/Kg	J
								S-19867-0703-PK-007	1.77	mg/Kg	J
								S-19867-0703-PK-008	4.37	mg/Kg	J
								S-19867-0703-PK-009	3.83	mg/Kg	J
								S-19867-0703-PK-018	4.49	mg/Kg	J
								S-19867-0703-PK-020	ND 2.74	mg/Kg	J
								S-19867-0703-PK-021	3.85	mg/Kg	J
								S-19867-0703-PK-022	ND 0.995	mg/Kg	J
								S-19867-0703-PK-023	4.91	mg/Kg	J
								S-19867-0703-PK-024	ND 2.57	mg/Kg	J
								S-19867-0703-PK-025	5.98	mg/Kg	J
								S-19867-0703-PK-026	ND 3.17	mg/Kg	J
								S-19867-0703-PK-027	3.85	mg/Kg	J
								S-19867-0703-PK-028	ND 1.74	mg/Kg	J
								S-19867-0703-PK-029	3.44	mg/Kg	J
								S-19867-0703-PK030	ND 2.58	mg/Kg	J

TABLE 4

QUALIFIED SAMPLE RESULTS DUE TO OUTLYING MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES
REMEDIAL INVESTIGATION
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
JULY - AUGUST 2003

Parameter	*Analyte*	*Sample ID*	*MS Recovery (percent)*	*MSD Recovery (percent)*	*RPD*	*Control Limits (percent)*	*RPD Control Limits (percent)*	*Associated Sample ID*	*Sample Result*	*Units*	*Qualifier*
Metals	Barium	SS-19867-0703-PK-029	200	116	53	35	75-125	SS-19867-0703-PK-024	215 J	mg/Kg	*
								SS-19867-0703-PK-026	81.4 J	mg/Kg	*
								SS-19867-0703-PK-027	99.8 J	mg/Kg	*
								SS-19867-0703-PK-028	94.2 J	mg/Kg	*
								SS-19867-0703-PK-029	107 J	mg/Kg	*
								SS-19867-0703-PK-030	104 J	mg/Kg	*
								SS-19867-0703-PK-031	118 J	mg/Kg	*
								SS-19867-0703-PK-032	97.5 J	mg/Kg	*
								SS-19867-0703-PK-033	118 J	mg/Kg	*
Metals	Barium	SS-19867-0703-PK-018	219	95	79	35	75-125	S-19867-0703-PK-018	66.7 J	mg/Kg	*
Metals	Barium	S-19867-07-03-PK-020	207	328	45	35	75-125	S-19867-07-03-PK-001	49.5 J	mg/Kg	*
								S-19867-07-03-PK-002	110 J	mg/Kg	*
								S-19867-07-03-PK-003	169 J	mg/Kg	*
								S-19867-07-03-PK-004	108 J	mg/Kg	*
								S-19867-07-03-PK-005	174 J	mg/Kg	*
								S-19867-07-03-PK-006	37.4 J	mg/Kg	*
								S-19867-07-03-PK-007	131 J	mg/Kg	*
								S-19867-07-03-PK-008	11.3 J	mg/Kg	*
								S-19867-07-03-PK-009	34.4 J	mg/Kg	*
								S-19867-07-03-PK-020	208 J	mg/Kg	*
								S-19867-07-03-PK-021	95.7 J	mg/Kg	*
								S-19867-07-03-PK-022	100 J	mg/Kg	*
								S-19867-07-03-PK-023	19.9 J	mg/Kg	*
								S-19867-07-03-PK-024	158 J	mg/Kg	*
								S-19867-07-03-PK-025	24.7 J	mg/Kg	*
								S-19867-07-03-PK-026	102 J	mg/Kg	*
								S-19867-07-03-PK-027	29.4 J	mg/Kg	*
								S-19867-07-03-PK-028	224 J	mg/Kg	*
								S-19867-07-03-PK-029	62.2 J	mg/Kg	*
								S-19867-07-03-PK-030	159 J	mg/Kg	*

TABLE 4

QUALIFIED SAMPLE RESULTS DUE TO OUTLYING MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES
REMEDIAL INVESTIGATION
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
JULY - AUGUST 2003

Parameter	*Analyte*	*Sample ID*	*MS Recovery (percent)*	*MSD Recovery (percent)*	*RPD*	*Control Limits (percent)*	*RPD Control Limits (percent)*	*Associated Sample ID*	*Sample Result*	*Units*	*Qualifier*
Metals	Chromium Total	SS-19867-0703-PK-029	91	146	46	75-125	35	SS-19867-0703-PK-033	45.5 J	mg/Kg	*
								SS-19867-0703-PK-031	57.8 J	mg/Kg	*
								SS-19867-0703-PK-030	36.1 J	mg/Kg	*
								SS-19867-0703-PK-029	35.7 J	mg/Kg	*
								SS-19867-0703-PK-032	44.5 J	mg/Kg	*
								SS-19867-0703-PK-027	60.1 J	mg/Kg	*
								SS-19867-0703-PK-026	85.5 J	mg/Kg	*
								SS-19867-0703-PK-028	29.6 J	mg/Kg	*
								SS-19867-0703-PK-024	997 J	mg/Kg	*
Metals	Manganese	SS-19867-0703-PK-018	425	131	106	75-125	35	SS-19867-0703-PK-018	510	mg/Kg	J
Metals	Nickel	S-19867-07-03-PK-020	64	62	3	75-125	35	S-19867-07-03-PK-001	68.5 J	mg/Kg	*
								S-19867-07-03-PK-006	9.97 J	mg/Kg	*
								S-19867-07-03-PK-005	11.7 J	mg/Kg	*
								S-19867-07-03-PK-002	22.6 J	mg/Kg	*
								S-19867-07-03-PK-004	27.4 J	mg/Kg	*
								S-19867-07-03-PK-003	261 J	mg/Kg	*
								S-19867-07-03-PK-028	28.5 J	mg/Kg	*
								S-19867-07-03-PK-025	33.9 J	mg/Kg	*
								S-19867-07-03-PK-021	21.7 J	mg/Kg	*
								S-19867-07-03-PK-029	21.8 J	mg/Kg	*
								S-19867-07-03-PK-024	34.9 J	mg/Kg	*
								S-19867-07-03-PK-027	9.71 J	mg/Kg	*
								S-19867-07-03-PK-023	7.27 J	mg/Kg	*
								S-19867-07-03-PK-022	27.4 J	mg/Kg	*
								S-19867-07-03-PK-008	6.21 J	mg/Kg	*
								S-19867-07-03-PK-026	26.8 J	mg/Kg	*
								S-19867-07-03-PK-007	51.0 J	mg/Kg	*
								S-19867-07-03-PK-020	51.8 J	mg/Kg	*
								S-19867-07-03-PK-030	32.8 J	mg/Kg	*
								S-19867-07-03-PK-009	42.7 J	mg/Kg	*
								S-19867-07-03-PK-021	21.7 J	mg/Kg	*
								S-19867-07-03-PK-020	51.8 J	mg/Kg	*

TABLE 4

QUALIFIED SAMPLE RESULTS DUE TO OUTLYING MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES
REMEDIAL INVESTIGATION
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
JULY - AUGUST 2003

Parameter	*Analyte*	*Sample ID*	*MS Recovery (percent)*	*MSD Recovery (percent)*	*RPD*	*Control Limits (percent)*	*RPD Control Limits (percent)*	*Associated Sample ID*	*Sample Result*	*Units*	*Qualifier*
Metals	Silver	S-19867-07-03-PK-020	126	118	7	75-125	35	S-19867-07-03-PK-001	0.283 J	mg/Kg	*
								S-19867-07-03-PK-003	0.575 J	mg/Kg	*
								S-19867-07-03-PK-021	0.525 J	mg/Kg	*
								S-19867-07-03-PK-025	0.262 J	mg/Kg	*
								S-19867-07-03-PK-023	0.371 J	mg/Kg	*
								S-19867-07-03-PK-008	0.172 J	mg/Kg	*
								S-19867-07-03-PK-007	0.321 J	mg/Kg	*
								S-19867-07-03-PK-020	0.763 J	mg/Kg	*
								S-19867-07-03-PK-009	0.279 J	mg/Kg	*
								S-19867-07-03-PK-007	0.321 J	mg/Kg	*
								S-19867-07-03-PK-003	0.575 J	mg/Kg	*
								S-19867-07-03-PK-001	0.283 J	mg/Kg	*
								S-19867-07-03-PK-008	0.172 J	mg/Kg	*
								S-19867-07-03-PK-025	0.262 J	mg/Kg	*
								S-19867-07-03-PK-023	0.371 J	mg/Kg	*
								S-19867-07-03-PK-020	0.763 J	mg/Kg	*
								S-19867-07-03-PK-009	0.279 J	mg/Kg	*
								S-19867-07-03-PK-021	0.525 J	mg/Kg	*
Metals	Vanadium	SS-19867-0703-PK-004	103	131	24	75-125	35	SS-19867-0703-PK-001	19.7	mg/Kg	J
								SS-19867-0703-PK-002	17.1	mg/Kg	J
								SS-19867-0703-PK-003	21.2	mg/Kg	J
								SS-19867-0703-PK-004	82.2	mg/Kg	J
								SS-19867-0703-PK-005	36.3	mg/Kg	J
								SS-19867-0703-PK-006	38.4	mg/Kg	J
								SS-19867-0703-PK-007	40.7	mg/Kg	J
								SS-19867-0703-PK-008	86.6	mg/Kg	J
								SS-19867-0703-PK-009	42.9	mg/Kg	J
								SS-19867-0703-PK-010	227	mg/Kg	J
								SS-19867-0703-PK-011	44.5	mg/Kg	J
								SS-19867-0703-PK-012	202	mg/Kg	J
								SS-19867-0703-PK-014	35.3	mg/Kg	J
								SS-19867-0703-PK-015	30.0	mg/Kg	J
								SS-19867-0703-PK-016	41.3	mg/Kg	J
								SS-19867-0703-PK-017	33.8	mg/Kg	J

TABLE 4

QUALIFIED SAMPLE RESULTS DUE TO OUTLYING MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES
REMEDIAL INVESTIGATION
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
JULY - AUGUST 2003

Parameter	*Analyte*	*Sample ID*	*MS Recovery (percent)*	*MSD Recovery (percent)*	*RPD*	*Control Limits (percent)*	*RPD Control Limits (percent)*	*Associated Sample ID*	*Sample Result*	*Units*	*Qualifier*
Metals (Cont'd.)	Vanadium	SS-19867-0703-PK-004	103	131	24	75-125	35	SS-19867-0703-PK-018	41.3	mg/Kg	J
								SS-19867-0703-PK-019	37.1	mg/Kg	J
								SS-19867-0703-PK-020	40.4	mg/Kg	J
								SS-19867-0703-PK-013	191	mg/Kg	J
Metals	Vanadium	S-19867-0703-PK-018	132	118	11	75-125	35	S-19867-0703-PK-018	80.9	mg/Kg	J
Metals	Vanadium	S-19867-07-03-PK-020	327	74	126	75-125	35	S-19867-07-03-PK-001	82.7	mg/Kg	J
								S-19867-07-03-PK-002	28.9	mg/Kg	J
								S-19867-07-03-PK-003	74.4	mg/Kg	J
								S-19867-07-03-PK-004	32.8	mg/Kg	J
								S-19867-07-03-PK-005	15.7	mg/Kg	J
								S-19867-07-03-PK-006	13.6	mg/Kg	J
								S-19867-07-03-PK-007	29.3	mg/Kg	J
								S-19867-07-03-PK-008	6.48	mg/Kg	J
								S-19867-07-03-PK-009	62.8	mg/Kg	J
								S-19867-07-03-PK-020	107	mg/Kg	J
								S-19867-07-03-PK-021	74.3	mg/Kg	J
								S-19867-07-03-PK-022	31.1	mg/Kg	J
								S-19867-07-03-PK-023	16.3	mg/Kg	J
								S-19867-07-03-PK-024	45.9	mg/Kg	J
								S-19867-07-03-PK-025	73.9	mg/Kg	J
								S-19867-07-03-PK-026	48.1	mg/Kg	J
								S-19867-07-03-PK-027	35.7	mg/Kg	J
								S-19867-07-03-PK-028	38.2	mg/Kg	J
								S-19867-07-03-PK-029	48.9	mg/Kg	J
								S-19867-07-03-PK-030	40.0	mg/Kg	J
Metals	Zinc	S-19867-07-03-PK-020	95	34	94	75-125	35	S-19867-07-03-PK-001	15.0	mg/Kg	J
								S-19867-07-03-PK-002	53.9	mg/Kg	J
								S-19867-07-03-PK-003	106	mg/Kg	J
								S-19867-07-03-PK-004	60.3	mg/Kg	J
								S-19867-07-03-PK-005	1160	mg/Kg	J
								S-19867-07-03-PK-006	387	mg/Kg	J
								S-19867-07-03-PK-007	87.6	mg/Kg	J

TABLE 4

QUALIFIED SAMPLE RESULTS DUE TO OUTLYING MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES
REMEDIAL INVESTIGATION
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
JULY - AUGUST 2003

Parameter	*Analyte*	*Sample ID*	*MS Recovery (percent)*	*MSD Recovery (percent)*	*RPD*	*Control Limits (percent)*	*RPD Control Limits (percent)*	*Associated Sample ID*	*Sample Result*	*Units*	*Qualifier*
Metals (Cont'd.)	Zinc	S-19867-07-03-PK-020	95	34	94	75-125	35	S-19867-07-03-PK-008	86.8	mg/Kg	J
								S-19867-07-03-PK-009	24.4	mg/Kg	J
								S-19867-07-03-PK-020	28.1	mg/Kg	J
								S-19867-07-03-PK-021	132	mg/Kg	J
								S-19867-07-03-PK-021	132	mg/Kg	J
								S-19867-07-03-PK-022	52.1	mg/Kg	J
								S-19867-07-03-PK-023	ND 1.86	mg/Kg	J
								S-19867-07-03-PK-024	78.8	mg/Kg	J
								S-19867-07-03-PK-025	26.5	mg/Kg	J
								S-19867-07-03-PK-026	79.5	mg/Kg	J
								S-19867-07-03-PK-027	41.6	mg/Kg	J
								S-19867-07-03-PK-028	225	mg/Kg	J
								S-19867-07-03-PK-029	66.3	mg/Kg	J
								S-19867-07-03-PK-030	323	mg/Kg	J
Metals	Mercury	GW-9867-08-03-PK-017	56	58	4	80-120	20	GW-9867-08-03-PK-019	ND 0.400	ug/L	J
								GW-9867-08-03-PK-018	ND 0.400	ug/L	J
								GW-9867-08-03-PK-017	ND 0.400	ug/L	J
								GW-19867-08-03-PK-025	ND 0.400	ug/L	J
								GW-19867-08-03-PK-028	ND 0.400	ug/L	J
								GW-19867-08-03-PK-020	ND 0.400	ug/L	J
								GW-19867-08-03-PK-022	ND 0.400	ug/L	J
								GW-19867-08-03-PK-027	ND 0.400	ug/L	J
								GW-19867-08-03-PK-026	ND 0.400	ug/L	J
								GW-19867-08-03-PK-024	0.291 J	ug/L	*
								GW-19867-08-03-PK-021	0.144 J	ug/L	*
								GW-19867-08-03-PK-023	0.0911 J	ug/L	*
Metals	Chromium Total	SED-19867-08-03-PK-023	95	13	152	75-125	35	S-19867-08-03-PK-008	312	mg/Kg	J
								S-19867-08-03-PK-009	125	mg/Kg	J
								S-19867-08-03-PK-016	11.8	mg/Kg	J
								S-19867-08-03-PK-017	46.9	mg/Kg	J
								S-19867-08-03-PK-031	317	mg/Kg	J
								S-19867-08-03-PK-032	33.6	mg/Kg	J
								S-19867-08-03-PK-033	18.3	mg/Kg	J

TABLE 4

QUALIFIED SAMPLE RESULTS DUE TO OUTLYING MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES
REMEDIAL INVESTIGATION
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
JULY - AUGUST 2003

Parameter	*Analyte*	*Sample ID*	*MS Recovery (percent)*	*MSD Recovery (percent)*	*RPD*	*Control Limits (percent)*	*RPD Control Limits (percent)*	*Associated Sample ID*	*Sample Result*	*Units*	*Qualifier*
Metals (Cont'd.)	Chromium Total	SED-19867-08-03-PK-023	95	13	152	75-125	35	SED-19867-08-03-PK-014	97.7	mg/Kg	J
								SED-19867-08-03-PK-015	266	mg/Kg	J
								SED-19867-08-03-PK-018	65.4	mg/Kg	J
								SED-19867-08-03-PK-019	49.1	mg/Kg	J
								SED-19867-08-03-PK-020	483	mg/Kg	J
								SED-19867-08-03-PK-021	63.5	mg/Kg	J
								SED-19867-08-03-PK-023	364	mg/Kg	J
								SED-19867-08-03-PK-010	335	mg/Kg	J
								SED-19867-08-03-PK-011	1840	mg/Kg	J
								SED-19867-08-03-PK-013	90.3	mg/Kg	J
								SED-19867-08-03-PK-024	55.1	mg/Kg	J
								SED-19867-08-03-PK-025	289	mg/Kg	J
Metals	Magnesium	SED-19867-08-03-PK-023	NA	NA	67	NA	35	S-19867-08-03-PK-008	22100	mg/Kg	J
								S-19867-08-03-PK-009	7920	mg/Kg	J
								S-19867-08-03-PK-016	721	mg/Kg	J
								S-19867-08-03-PK-017	4680	mg/Kg	J
								S-19867-08-03-PK-031	9740	mg/Kg	J
								S-19867-08-03-PK-032	8480	mg/Kg	J
								S-19867-08-03-PK-033	11100	mg/Kg	J
								SED-19867-08-03-PK-014	8890	mg/Kg	J
								SED-19867-08-03-PK-015	5390	mg/Kg	J
								SED-19867-08-03-PK-018	8000	mg/Kg	J
								SED-19867-08-03-PK-019	13000	mg/Kg	J
								SED-19867-08-03-PK-020	10700	mg/Kg	J
								SED-19867-08-03-PK-021	9620	mg/Kg	J
								SED-19867-08-03-PK-023	26900	mg/Kg	J
								SED-19867-08-03-PK-010	8870	mg/Kg	J
								SED-19867-08-03-PK-011	16700	mg/Kg	J
								SED-19867-08-03-PK-013	11300	mg/Kg	J
								SED-19867-08-03-PK-024	11900	mg/Kg	J
								SED-19867-08-03-PK-025	28100	mg/Kg	J

TABLE 4

QUALIFIED SAMPLE RESULTS DUE TO OUTLYING MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES
REMEDIAL INVESTIGATION
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
JULY - AUGUST 2003

Parameter	*Analyte*	*Sample ID*	*MS Recovery (percent)*	*MSD Recovery (percent)*	*RPD*	*Control Limits (percent)*	*RPD Control Limits (percent)*	*Associated Sample ID*	*Sample Result*	*Units*	*Qualifier*
Metals	Manganese	SED-19867-08-03-PK-023	85	37	79	75-125	35	S-19867-08-03-PK-008	1320	mg/Kg	J
								S-19867-08-03-PK-009	738	mg/Kg	J
								S-19867-08-03-PK-016	47.3	mg/Kg	J
								S-19867-08-03-PK-017	679	mg/Kg	J
								S-19867-08-03-PK-031	2330	mg/Kg	J
								S-19867-08-03-PK-032	997	mg/Kg	J
								S-19867-08-03-PK-033	597	mg/Kg	J
								SED-19867-08-03-PK-014	564	mg/Kg	J
								SED-19867-08-03-PK-015	979	mg/Kg	J
								SED-19867-08-03-PK-018	583	mg/Kg	J
								SED-19867-08-03-PK-019	690	mg/Kg	J
								SED-19867-08-03-PK-020	606	mg/Kg	J
								SED-19867-08-03-PK-021	215	mg/Kg	J
								SED-19867-08-03-PK-023	558	mg/Kg	J
								SED-19867-08-03-PK-010	1180	mg/Kg	J
								SED-19867-08-03-PK-011	6330	mg/Kg	J
								SED-19867-08-03-PK-013	246	mg/Kg	J
								SED-19867-08-03-PK-024	923	mg/Kg	J
								SED-19867-08-03-PK-025	562	mg/Kg	J
Metals	Mercury	S-19867-08-03-PK-009	162	101	46	83-122	35	S-19867-08-03-PK-008	2.02	mg/Kg	J
								S-19867-08-03-PK-009	1.71	mg/Kg	J
								S-19867-08-03-PK-017	0.101	mg/Kg	J
								S-19867-08-03-PK-031	0.216	mg/Kg	J
Metals	Potassium	SED-19867-08-03-PK-023	132	112	16	75-125	35	S-19867-08-03-PK-008	1170	mg/Kg	J
								S-19867-08-03-PK-009	1860	mg/Kg	J
								S-19867-08-03-PK-016	223	mg/Kg	J
								S-19867-08-03-PK-017	2020	mg/Kg	J
								S-19867-08-03-PK-031	1450	mg/Kg	J
								S-19867-08-03-PK-032	3460	mg/Kg	J
								S-19867-08-03-PK-033	2740	mg/Kg	J
								SED-19867-08-03-PK-014	1740	mg/Kg	J
								SED-19867-08-03-PK-015	2840	mg/Kg	J
								SED-19867-08-03-PK-018	1700	mg/Kg	J

TABLE 4

QUALIFIED SAMPLE RESULTS DUE TO OUTLYING MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES
REMEDIAL INVESTIGATION
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
JULY - AUGUST 2003

Parameter	*Analyte*	*Sample ID*	*MS Recovery (percent)*	*MSD Recovery (percent)*	*RPD*	*Control Limits (percent)*	*RPD Control Limits (percent)*	*Associated Sample ID*	*Sample Result*	*Units*	*Qualifier*
Metals (Cont'd.)	Potassium	SED-19867-08-03-PK-023	132	112	16	75-125	35	SED-19867-08-03-PK-019	4580	mg/Kg	J
								SED-19867-08-03-PK-020	1010	mg/Kg	J
								SED-19867-08-03-PK-021	300	mg/Kg	J
								SED-19867-08-03-PK-023	779	mg/Kg	J
								SED-19867-08-03-PK-010	2350	mg/Kg	J
								SED-19867-08-03-PK-011	3200	mg/Kg	J
								SED-19867-08-03-PK-013	2130	mg/Kg	J
								SED-19867-08-03-PK-024	3520	mg/Kg	J
								SED-19867-08-03-PK-025	1070	mg/Kg	J
Gen Chem	Chromium, Hexavalent	S-19867-08-03-PK-009	9	-	-	75-125	-	S-19867-08-03-PK-008	ND 4.9	mg/Kg	R
								S-19867-08-03-PK-009	ND 7.1	mg/Kg	R
								S-19867-08-03-PK-016	ND 6	mg/Kg	R
								S-19867-08-03-PK-017	ND 5.3	mg/Kg	R
								S-19867-08-03-PK-032	ND 4.5	mg/Kg	R
								S-19867-08-03-PK-033	ND 5.7	mg/Kg	R
Gen Chem	Chromium, Hexavalent	SED-19867-08-03-PK-022	43	-	-	75-125	-	SED-19867-08-03-PK-022	2.3 J	mg/Kg	*
Gen Chem	Chromium, Hexavalent	S-19867-07-03-PK-007	24	-	-	75-125	-	S-19867-07-03-PK-007	ND 4.8	mg/Kg	R
Gen Chem	Cyanide (total)	SS-19867-0703-PK-024	77	100	26	79-130	35	SS-19867-0703-PK-026	0.368 J	mg/Kg	*
								SS-19867-0703-PK-017	0.398 J	mg/Kg	*
								SS-19867-0703-PK-028	ND 0.535	mg/Kg	J
								SS-19867-0703-PK-019	ND 0.536	mg/Kg	J
								SS-19867-0703-PK-015	0.258 J	mg/Kg	*
								SS-19867-0703-PK-016	0.323 J	mg/Kg	*
								SS-19867-0703-PK-017	0.398 J	mg/Kg	*
								SS-19867-0703-PK-018	0.334 J	mg/Kg	*
								SS-19867-0703-PK-019	ND 0.536	mg/Kg	J
								SS-19867-0703-PK-020	0.359 J	mg/Kg	*
								SS-19867-0703-PK-021	0.604	mg/Kg	J
								SS-19867-0703-PK-022	0.193 J	mg/Kg	*
								SS-19867-0703-PK-023	ND 0.587	mg/Kg	J
								SS-19867-0703-PK-024	0.303 J	mg/Kg	*

TABLE 4

QUALIFIED SAMPLE RESULTS DUE TO OUTLYING MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES
REMEDIAL INVESTIGATION
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
JULY - AUGUST 2003

Parameter	*Analyte*	*Sample ID*	*MS Recovery (percent)*	*MSD Recovery (percent)*	*RPD*	*Control Limits (percent)*	*RPD Control Limits (percent)*	*Associated Sample ID*	*Sample Result*	*Units*	*Qualifier*
Gen Chem (Cont'd.)	Cyanide (total)	SS-19867-0703-PK-024	77	100	26	79-130	35	SS-19867-0703-PK-025	0.176 J	mg/Kg	*
								SS-19867-0703-PK-026	0.368 J	mg/Kg	*
								SS-19867-0703-PK-027	0.311 J	mg/Kg	*
								SS-19867-0703-PK-028	ND 0.535	mg/Kg	J
Gen Chem	Chromium, Hexavalent	SS-19867-0703-PK-004	40	-	-	75-125	-	SS-19867~-0703-PK-001	ND 4.7	mg/Kg	J
								SS-19867~-0703-PK-002	ND 4.5	mg/Kg	J
								SS-19867~-0703-PK-003	ND 4.2	mg/Kg	J
								SS-19867~-0703-PK-004	4.3 J	mg/Kg	*
								SS-19867~-0703-PK-005	ND 5.6	mg/Kg	J
								SS-19867~-0703-PK-006	2.0 J	mg/Kg	*
								SS-19867~-0703-PK-007	ND 4.8	mg/Kg	J
								SS-19867~-0703-PK-008	3.2 J	mg/Kg	*
								SS-19867~-0703-PK-009	10	mg/Kg	J
								SS-19867~-0703-PK-010	16	mg/Kg	J
								SS-19867~-0703-PK-011	2.0 J	mg/Kg	*
								SS-19867~-0703-PK-012	15	mg/Kg	J
								SS-19867~-0703-PK-013	5.6	mg/Kg	J
								SS-19867~-0703-PK-014	ND 6.7	mg/Kg	J
								SS-19867~-0703-PK-015	ND 5.3	mg/Kg	J
								SS-19867~-0703-PK-016	ND 5.5	mg/Kg	J
								SS-19867~-0703-PK-017	ND 6.0	mg/Kg	J
								SS-19867~-0703-PK-018	ND 4.9	mg/Kg	J
								SS-19867~-0703-PK-019	ND 4.2	mg/Kg	J
								SS-19867~-0703-PK-020	ND 4.9	mg/Kg	J

Notes:

* Sample results were previously qualified as estimated by the laboratory.
J Estimated.
ND Non-detect at associated value.
R Rejected.
RPD Relative Percent Difference.

TABLE 5

QUALIFIED SAMPLE DATA DUE TO VARIABILITY IN FIELD DUPLICATE RESULTS
REMEDIAL INVESTIGATION
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
JULY - AUGUST 2003

		Original		*Duplicate*				
Parameter	*Analyte*	*Sample ID*	*Result*	*Sample ID*	*Result*	*RPD*	*Units*	*Qualifier* [(1)]
Metals	Thallium	SS-19867-0703-PK-005	16.2	SS-19867-0703-PK-006	ND 1.22	NA	mg/Kg	J
Metals	Magnesium	S-9867-07-03-PK-020	114000	S-9867-07-03-PK-021	65300	54	mg/Kg	J
	Zinc	S-9867-07-03-PK-020	28.1	S-9867-07-03-PK-021	132	130	mg/Kg	J
	Barium	S-9867-07-03-PK-020	208	S-9867-07-03-PK-021	95.7	74	mg/Kg	J
	Sodium	S-9867-07-03-PK-020	578	S-9867-07-03-PK-021	250	79	mg/Kg	J
	Nickel	S-9867-07-03-PK-020	51.8	S-9867-07-03-PK-021	21.7	82	mg/Kg	J

Notes:
(1)

J Estimated.
NA Not Applicable.
ND Non-detect at associated value.
RPD Relative Percent Difference.

TABLE 6

QUALIFIED SAMPLE RESULTS DUE TO ANALYTE CONCENTRATIONS IN THE RINSE BLANKS
REMEDIAL INVESTIGATION
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
JULY - AUGUST 2003

Parameter	*Rinse Blank Date*	*Analyte*	*Blank Result*	*Sample ID*	*Sample Result*	*Qualified Sample Result*	*Units*
Metals	07/18/03	Antimony	0.734	SS-19867-0703-PK-002	1.22	ND 1.04	mg/Kg
				SS-19867-0703-PK-003	1.52	ND 1.04	mg/Kg
				SS-19867-0703-PK-007	2.79	ND 1.26	mg/Kg
				SS-19867-0703-PK-012	1.54	ND 2.52	mg/Kg
				SS-19867-0703-PK-014	1.83	ND 1.37	mg/Kg
				SS-19867-0703-PK-015	1.3	ND 1.23	mg/Kg
				SS-19867-0703-PK-016	3.18	ND 1.15	mg/Kg
				SS-19867-0703-PK-017	2.15	ND 1.08	mg/Kg
				SS-19867-0703-PK-018	2.62	ND 1.21	mg/Kg
				SS-19867-0703-PK-019	2.63	ND 1.11	mg/Kg
				SS-19867-0703-PK-020	2.91	ND 1.01	mg/Kg
				SS-19867-0703-PK-021	1.09	ND 1.26	mg/Kg
				SS-19867-0703-PK-022	3.03	ND 1.19	mg/Kg
				SS-19867-0703-PK-025	2.12	ND 1.04	mg/Kg
Metals	07/21/03	Antimony	0.479	SS-19867-0703-PK-026	0.91	ND 0.962	mg/Kg
				SS-19867-0703-PK-027	0.631	ND 0.926	mg/Kg
				SS-19867-0703-PK-028	0.669	ND 0.943	mg/Kg
				SS-19867-0703-PK-029	1.03	ND 0.943	mg/Kg
				SS-19867-0703-PK-031	0.997	ND 0.926	mg/Kg
				SS-19867-0703-PK-032	0.671	ND 0.909	mg/Kg
				SS-19867-0703-PK-033	0.597	ND 0.893	mg/Kg
Metals	07/24/03	Antimony	0.664	S-19867-0703-PK-011	0.848	ND 1.22	mg/Kg
				S-19867-0703-PK-012	2.03	ND 1.23	mg/Kg
				S-19867-0703-PK-013	1.2	ND 1.21	mg/Kg
				S-19867-0703-PK-014	0.958	ND 1.13	mg/Kg
				S-19867-0703-PK-015	1.33	ND 1.14	mg/Kg
				S-19867-0703-PK-017	1.19	ND 1.06	mg/Kg
				S-19867-0703-PK-019	1.92	ND 1.15	mg/Kg
Metals	07/28/03	Antimony	0.664	S-19867-07-03-PK-010	2.74	ND 1.24	mg/Kg
				S-19867-07-03-PK-020	2.09	ND 1.21	mg/Kg
Metals	07/18/03	Arsenic	0.436	SS-19867-0703-PK-010	2.06	ND 2.06	mg/Kg
				SS-19867-0703-PK-011	1.97	ND 1.97	mg/Kg
				SS-19867-0703-PK-005	0.805	ND 1.15	mg/Kg
				SS-19867-0703-PK-009	0.969	ND 1.05	mg/Kg
				SS-19867-0703-PK-006	1.07	ND 1.22	mg/Kg
Metals	07/18/03	Sodium	35.3	SS-19867-0703-PK-011	144	ND 144	mg/Kg
				SS-19867-0703-PK-015	79.8	ND 123	mg/Kg
				SS-19867-0703-PK-014	92.3	ND 137	mg/Kg
				SS-19867-0703-PK-012	109	ND 126	mg/Kg
				SS-19867-0703-PK-001	168	ND 168	mg/Kg
				SS-19867-0703-PK-005	72.6	ND 115	mg/Kg
				SS-19867-0703-PK-002	87.4	ND 104	mg/Kg
				SS-19867-0703-PK-009	152	ND 152	mg/Kg
				SS-19867-0703-PK-017	83.1	ND 108	mg/Kg
				SS-19867-0703-PK-025	132	ND 132	mg/Kg
				SS-19867-0703-PK-023	69.3	ND 110	mg/Kg
				SS-19867-0703-PK-022	40.6	ND 119	mg/Kg
				SS-19867-0703-PK-021	150	ND 150	mg/Kg

TABLE 6

QUALIFIED SAMPLE RESULTS DUE TO ANALYTE CONCENTRATIONS IN THE RINSE BLANKS
REMEDIAL INVESTIGATION
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
JULY - AUGUST 2003

Parameter	*Rinse Blank Date*	*Analyte*	*Blank Result*	*Sample ID*	*Sample Result*	*Qualified Sample Result*	*Units*
Metals	7/18/2003	Thallium	9.46	GW-9867-08-03-PK-007	10.9 J	ND 20.0	µg/L
				GW-9867-08-03-PK-008	10.9 J	ND 20.0	µg/L
				GW-9867-08-03-PK-005	8.34 J	ND 20.0	µg/L
				GW-9867-08-03-PK-010	8.88 J	ND 20.0	µg/L
				GW-9867-08-03-PK-006	7.98 J	ND 20.0	µg/L
Metals	08/28/03	Barium	23.3	GW-19867-08-03-PK-021	82.5	ND 82.5	ug/L
				GW-19867-08-03-PK-023	49.0	ND 49.0	ug/L
				GW-19867-08-03-PK-026	77.6	ND 77.6	ug/L
Metals	08/28/03	Nickel	1.62	GW-19867-08-03-PK-021	2.76 J	ND 20.0	ug/L
Gen Chem	8/15/2003	Cyanide	0.00233	GW-9867-08-03-PK-005	0.00196 J	ND 0.01	mg/L
				GW-9867-08-03-PK-006	0.00528 J	ND 0.01	mg/L
				GW-9867-08-03-PK-014	0.00252 J	ND 0.01	mg/L
				GW-9867-08-03-PK-008	0.00254 J	ND 0.01	mg/L
				GW-9867-08-03-PK-011	0.00283 J	ND 0.01	mg/L
				GW-9867-08-03-PK-015	0.00217 J	ND 0.01	mg/L
Gen Chem	08/28/03	Cyanide	0.00613	GW-19867-08-03-PK-025	0.00211 J	ND 0.01	mg/L
				GW-19867-08-03-PK-027	0.00195 J	ND 0.01	mg/L
				GW-19867-08-03-PK-026	0.00219 J	ND 0.01	mg/L
				GW-19867-08-03-PK-024	0.00331 J	ND 0.01	mg/L

Notes:
J Estimated.
ND Non-detect at associated value.

ANALYTICAL DATA ASSESSMENT AND VALIDATION
SURFACE WATER AND GROUNDWATER SAMPLING EVENT
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
OCTOBER 2003

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1.0 INTRODUCTION

The following document details an assessment and validation of analytical results reported by Ecology and Environment, Inc. (E&E), located in Lancaster, New York, for samples collected at the Vanadium Site (Site) located in Niagara Falls, New York. Groundwater and surface water samples were collected during October 2003. For sample identification, a sampling and analysis summary is presented in Table 1.

The quality assurance/quality control (QA/QC) criteria by which these data have been assessed are outlined in the analytical methods and the document entitled "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review," February 1994, EPA-540/R-94-013.

The data quality assessment and validation presented in the following subsections were performed based on information from data sheets including matrix spike (MS) recoveries, duplicate results, laboratory control sample (LCS) recoveries, and blank results for all parameters.

2.0 SAMPLE HOLDING TIMES

The method-specified holding time criteria for this program were as follows:

Parameter	*Matrix*	*Holding Time*
TAL Metals (except Mercury)	Water	180 days from collection to analysis
Mercury	Water	28 days from collection to analysis
Chromium VI	Water	24 hours from collection to analysis
Cyanide	Water	14 days from collection to analysis

All sample analyses were performed within the required holding times. All samples were properly preserved and cooled at 4°C (±2°C) after collection, and all samples were received by the laboratory in good condition.

3.0 LABORATORY BLANK ANALYSES

The purpose of assessing the results of laboratory blank analyses is to determine the existence and magnitude of sample contamination introduced during analysis. Laboratory blanks are prepared from deionized water and analyzed as samples.

Most blank results were non-detect for the analytes of interest with the exception of metals and cyanide present at low concentrations. All associated sample results with concentrations similar to the blank concentrations were qualified as non-detect (see Table 2).

For this study, laboratory blanks were analyzed at a minimum frequency of one per analytical batch.

4.0 LABORATORY CONTROL SAMPLE ANALYSES

The LCS serves as a monitor of the overall performance of all steps in the analysis, including the sample preparation. LCSs were analyzed using the same sample preparation, analytical methods, and QA/QC procedures employed for the investigative samples.

LCSs were reported for all inorganic analyses. All LCS samples yielded recoveries within the established control limits, indicating acceptable overall analytical accuracy.

5.0 MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD) ANALYSES

The recoveries of MS/MSD analyses are used to assess the analytical accuracy achieved on individual sample matrices. The relative percent difference (RPD) between the MS and MSD is used to assess analytical precision.

An MS/MSD was analyzed at the required frequency for all parameters.

Most recoveries were acceptable indicating adequate analytical accuracy and precision with the exception of one low cyanide recovery for sample GW-19867-10-03-PK-013. All associated cyanide results were qualified as estimated to reflect the implied low bias (see Table 3).

6.0 DUPLICATE ANALYSES

To assess analytical precision, samples were analyzed in duplicate for chromium VI. The results were compared and must agree within 35 percent difference to be acceptable.

All results were acceptable indicating adequate analytical precision.

7.0 FIELD QA/QC-FIELD DUPLICATES

To assess the analytical and sampling protocol precision, field duplicates (as identified in Table 1) were collected and submitted "blind" to the laboratory. All data outside of estimated regions of detection demonstrated acceptable agreement indicating adequate sampling and analytical procedures with the exception of variability observed between the iron results for sample GW-19867-10-03-PK-012 and its duplicate. The results were qualified as estimated to reflect the implied variability (see Table 4).

8.0 CONCLUSION

Based on the assessment detailed in the foregoing, the data produced by E&E are acceptable with the noted qualifications.

TABLES

TABLE 1

COLLECTION AND ANALYSIS SUMMARY
REMEDIAL INVESTIGATION
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
OCTOBER 2003

Sample I.D.	*Location I.D.*	*Matrix*	*Collection Date (mm/dd/yy)*	*Collection Time (hr:min)*	*Analysis/Parameters*	*Comment*
GW-19867-1003-PK-001	MW-19	Groundwater	10/01/03	14:20	TAL Metals, Cyanide, Hex. Chromium	
GW-19867-1003-PK-003	MW-22	Groundwater	10/01/03	14:50	TAL Metals, Cyanide, Hex. Chromium	
GW-19867-1003-PK-004	MW-22	Groundwater	10/01/03	14:55	TAL Metals, Cyanide, Hex. Chromium	Field Filtered
GW-19867-1003-PK-005	MW-20	Groundwater	10/01/03	15:20	TAL Metals, Cyanide, Hex. Chromium	
GW-19867-1003-PK-006	MW-20	Groundwater	10/01/03	15:30	TAL Metals, Cyanide, Hex. Chromium	Field Filtered
GW-19867-1003-PK-RB1	Rinsate Blank	-	10/01/03	16:50	Chromium VI	
GW-19867-1003-PK-002	MW-25	Groundwater	10/03/03	12:30	TAL Metals, Cyanide, Hex. Chromium	
GW-19867-1003-PK-007	MW-25	Groundwater	10/03/03	12:45	TAL Metals, Cyanide, Hex. Chromium	Field Filtered
GW-19867-1003-PK-008	MW-27	Groundwater	10/03/03	13:10	TAL Metals, Cyanide, Hex. Chromium	
GW-19867-1003-PK-009	MW-27	Groundwater	10/03/03	13:20	TAL Metals, Cyanide, Hex. Chromium	Field Filtered
GW-19867-1003-PK-010	MW-104A	Groundwater	10/03/03	13:40	TAL Metals, Cyanide, Hex. Chromium	
GW-19867-1003-PK-011	MW-104A	Groundwater	10/03/03	14:00	TAL Metals, Cyanide, Hex. Chromium	Field Filtered
GW-19867-1003-PK-012	MW-103A	Groundwater	10/06/03	14:25	TAL Metals, Cyanide, Hex. Chromium	
GW-19867-1003-PK-014	MW-103A	Groundwater	10/06/03	15:00	TAL Metals, Cyanide, Hex. Chromium	Duplicate of -012
GW-19867-1003-PK-013	MW-103A	Groundwater	10/06/03	14:35	TAL Metals, Cyanide, Hex. Chromium	MS/MSD
GW-19867-1003-PK-015	MW-17	Groundwater	10/06/03	15:50	TAL Metals, Cyanide, Hex. Chromium	
GW-19867-1003-PK-016	MW-28	Groundwater	10/06/03	16:15	TAL Metals, Cyanide, Hex. Chromium	
GW-19867-1003-PK-017	MW-21	Groundwater	10/06/03	16:40	TAL Metals, Cyanide, Hex. Chromium	
GW-19867-1003-PK-018	MW-18	Groundwater	10/06/03	17:00	TAL Metals, Cyanide, Hex. Chromium	
SW-19867-08-03-011	SW-11	Surface Water	10/07/03	12:45	TAL Metals, Cyanide, Hex. Chromium	
SW-19867-08-03-013	SW-13	Surface Water	10/07/03	14:00	TAL Metals, Cyanide, Hex. Chromium	
SW-19867-08-03-014	SW-14	Surface Water	10/07/03	14:05	TAL Metals, Cyanide, Hex. Chromium	
SW-19867-08-03-015	SW-15	Surface Water	10/07/03	14:15	TAL Metals, Cyanide, Hex. Chromium	
SW-19867-08-03-019	SW-19	Surface Water	10/07/03	14:20	TAL Metals, Cyanide, Hex. Chromium	
SW-19867-08-03-020	SW-20	Surface Water	10/07/03	13:50	TAL Metals, Cyanide, Hex. Chromium	
SW-19867-08-03-021	SW-21	Surface Water	10/07/03	13:40	TAL Metals, Cyanide, Hex. Chromium	
SW-19867-08-03-023	SW-23	Surface Water	10/07/03	13:05	TAL Metals, Cyanide, Hex. Chromium	MS/MSD
SW-19867-08-03-024	SW-24	Surface Water	10/07/03	13:15	TAL Metals, Cyanide, Hex. Chromium	
SW-19867-08-03-025	SW-25	Surface Water	10/07/03	14:30	TAL Metals, Cyanide, Hex. Chromium	Duplicate of -023
GW-19867-1003-PK-019	MW-26	Groundwater	10/22/2003	13:30	TAL Metals, Cyanide, Hex. Chromium	
GW-19867-1003-PK-020	MW-105A	Groundwater	10/22/2003	13:50	TAL Metals, Cyanide, Hex. Chromium	
GW-19867-1003-PK-021	MW-23	Groundwater	10/22/2003	14:15	TAL Metals, Cyanide, Hex. Chromium	
GW-19867-1003-PK-022	MW-24	Groundwater	10/22/2003	14:35	TAL Metals, Cyanide, Hex. Chromium	
GW-19867-1003-PK-023	MW-106A	Groundwater	10/22/2003	15:10	TAL Metals, Cyanide, Hex. Chromium	
GW-19867-1003-PK-024	MW-15	Groundwater	10/22/2003	15:30	TAL Metals, Cyanide, Hex. Chromium	
GW-19867-0803-PK-025	MW-16	Groundwater	10/22/2003	16:00	TAL Metals, Cyanide, Hex. Chromium	

Notes:
MS/MSD Matrix Spike/Matrix Spike Duplicate.
TAL Target Analyte List.

TABLE 2

QUALIFIED SAMPLE RESULTS DUE TO ANALYTE CONCENTRATIONS IN THE METHOD BLANKS
REMEDIAL INVESTIGATION
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
OCTOBER 2003

Parameter	*Blank ID/Date*	*Analyte*	*Blank Result*	*Sample ID*	*Sample Result*	*Qualified Sample Result*	*Units*
Metals	10/14/03	Aluminum	50.25	GW-19867-10-03-PK-013	59.1 J	ND 200	ug/L
				GW-19867-10-03-PK-012	41.0 J	ND 200	ug/L
				GW-19867-10-03-PK-013	59.1 J	ND 200	ug/L
				GW-19867-10-03-PK-012	41.0 J	ND 200	ug/L
Metals	10/07/03	Arsenic	7.768	GW-19867-10-03-PK-011	14.8 J	ND 25.0	ug/L
				GW-19867-10-03-PK-007	14.3 J	ND 25.0	ug/L
				GW-19867-10-03-PK-002	14.7 J	ND 25.0	ug/L
				GW-19867-10-03-PK-010	18.5 J	ND 25.0	ug/L
Metals	10/07/03	Beryllium	0.201	GW-19867-10-03-PK-008	0.196 J	ND 5.00	ug/L
				GW-19867-10-03-PK-007	0.186 J	ND 5.00	ug/L
				GW-19867-10-03-PK-002	0.205 J	ND 5.00	ug/L
Metals	10/09/03	Chromium Total	0.8219	GW-19867-10-03-PK-006	1.17 J	ND 10.0	ug/L
Metals	10/14/03	Chromium Total	0.8593	GW-19867-10-03-PK-016	2.90 J	ND 10.0	ug/L
Metals	10/14/03	Iron	56.95	GW-19867-10-03-PK-017	98.0 J	ND 200	ug/L
Metals	10/09/03	Magnesium	77.33	GW-19867-10-03-PK-003	82.3 J	ND 1500	ug/L
Metals	10/14/03	Magnesium	122.1	GW-19867-10-03-PK-017	121 J	ND 1500	ug/L
Metals	10/14/03	Nickel	2.03	GW-19867-10-03-PK-016	3.54 J	ND 20.0	ug/L
				GW-19867-10-03-PK-018	9.45 J	ND 20.0	ug/L

QUALIFIED SAMPLE RESULTS DUE TO ANALYTE CONCENTRATIONS IN THE METHOD BLANKS
REMEDIAL INVESTIGATION
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
OCTOBER 2003

Parameter	*Blank ID/Date*	*Analyte*	*Blank Result*	*Sample ID*	*Sample Result*	*Qualified Sample Result*	*Units*
Metals	10/07/03	Zinc	2.657	GW-19867-10-03-PK-007	6.34 J	ND 10.0	ug/L
				GW-19867-10-03-PK-011	6.44 J	ND 10.0	ug/L
Metals	10/14/03	Zinc	1.908	GW-19867-10-03-PK-013	9.35 J	ND 10.0	ug/L
				GW-19867-10-03-PK-012	6.67 J	ND 10.0	ug/L
				GW-19867-10-03-PK-014	3.30 J	ND 10.0	ug/L
Metals	10/28/03	Aluminum	47.30	GW-19867-10-03-PK-025	92.9 J	ND 200	ug/L
				GW-19867-10-03-PK-020	133 J	ND 200	ug/L
				GW-19867-10-03-PK-019	158 J	ND 200	ug/L
Metals	10/28/03	Iron	79.92	GW-19867-10-03-PK-021	305 J	ND 200	ug/L
				GW-19867-10-03-PK-020	174 J	ND 200	ug/L
Gen Chem	10/15/03	Cyanide (total)	0.0104	SW-19867-10-03-PK-024	0.0107	ND 0.01	mg/L
				SW-19867-10-03-PK-023	0.00805 J	ND 0.01	mg/L
				SW-19867-10-03-PK-021	0.00727 J	ND 0.01	mg/L
				SW-19867-10-03-PK-020	0.0178	ND 0.01	mg/L
				SW-19867-10-03-PK-025	0.0110	ND 0.01	mg/L
				SW-19867-10-03-PK-021	0.00727 J	ND 0.01	mg/L
				SW-19867-10-03-PK-023	0.00805 J	ND 0.01	mg/L

Notes:
J Estimated.
ND Non-detect at associated value.

TABLE 3

QUALIFIED SAMPLED RESULTS DUE TO OUTLYING MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES
REMEDIAL INVESTIGATION
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
OCTOBER 2003

Parameter	*Analyte*	*MS Recovery (percent)*	*MSD Recovery (percent)*	*RPD*	*Control Limits (percent)*	*RPD Control Limits (percent)*	*Associated Sample ID*	*Sample Result*	*Units*	*Qualifier*
Gen Chem	Cyanide (total)	79	106	29	82-122	20	SW-19867-10-03-PK-019	ND 0.01	mg/L	J
							SW-19867-10-03-PK-014	ND 0.01	mg/L	J
							SW-19867-10-03-PK-013	ND 0.01	mg/L	J
							SW-19867-10-03-PK-011	ND 0.01	mg/L	J
							SW-19867-10-03-PK-015	0.00364 J	mg/L	J

Notes:
J Estimated.
MS Matrix spike.
MSD Matrix spike duplicate.
ND Non-detect at associated value.
RPD Relative percent difference.

TABLE 4

QUALIFIED SAMPLE DATA DUE TO VARIABILITY IN FIELD DUPLICATE RESULTS
REMEDIAL INVESTIGATION
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
OCTOBER 2003

		Original		*Duplicate*				
Parameter	*Analyte*	*Sample ID*	*Result*	*Sample ID*	*Result*	*RPD*	*Units*	*Qualifier*[(1)]
Metals	Iron	GW-19867-10-03-PK-012	762	GW-19867-10-03-PK-014	544	33	µg/L	J

Notes:
RPD Relative percent difference.
(1) Qualifier is associated with both original and duplicate results.

ANALYTICAL DATA ASSESSMENT AND VALIDATION
SURFACE WATER SAMPLING EVENT
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
DECEMBER 2003

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TABLE 2	ANALYTICAL RESULTS SUMMARY – SURFACE WATER
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1.0 INTRODUCTION

The following document details an assessment and validation of analytical results reported by Ecology and Environment, Inc. (E&E), located in Lancaster, New York, for samples collected at the Vanadium Site (Site) located in Niagara Falls, New York. Surface water samples were collected during December 2003. For sample identification, a sampling and analysis summary is presented in Table 1.

A summary of the analytical data is presented in Table 2. The quality assurance/quality control (QA/QC) criteria by which these data have been assessed are outlined in the analytical methods and the document entitled "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review," February 1994, EPA-540/R-94-013.

The data quality assessment and validation presented in the following subsections were performed based on information from data sheets including matrix spike (MS) recoveries, duplicate results, laboratory control sample (LCS) recoveries, and blank results for all parameters.

2.0 SAMPLE HOLDING TIMES

The method-specified holding time criteria for this program were as follows:

Parameter	*Matrix*	*Holding Time*
TAL Metals (except Mercury)	Water	180 days from collection to analysis
Mercury	Water	28 days from collection to analysis
Chromium VI	Water	24 hours from collection to analysis
Cyanide	Water	14 days from collection to analysis

All sample analyses were performed within the required holding times. All samples were properly preserved and cooled at 4°C (±2°C) after collection, and all samples were received by the laboratory in good condition.

3.0 LABORATORY BLANK ANALYSES

The purpose of assessing the results of laboratory blank analyses is to determine the existence and magnitude of sample contamination introduced during analysis. Laboratory blanks are prepared from deionized water and analyzed as samples.

Most blank results were non-detect for the analytes of interest with the exception of chromium present at a low concentration. All associated sample results had concentrations significantly greater than the blank and would not have been impacted.

For this study, laboratory blanks were analyzed at a minimum frequency of one per analytical batch.

4.0 LABORATORY CONTROL SAMPLE ANALYSES

The LCS serves as a monitor of the overall performance of all steps in the analysis, including the sample preparation. LCSs were analyzed using the same sample preparation, analytical methods, and QA/QC procedures employed for the investigative samples.

LCSs were reported for all inorganic analyses. All LCS samples yielded recoveries within the established control limits, indicating acceptable overall analytical accuracy.

5.0 MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD) ANALYSES

The recoveries of MS/MSD analyses are used to assess the analytical accuracy achieved on individual sample matrices. The relative percent difference (RPD) between the MS and MSD is used to assess analytical precision.

An MS/MSD was analyzed at the required frequency for all parameters except Chromium VI.

All recoveries were acceptable indicating adequate analytical accuracy and precision.

A matrix spike (MS) was analyzed for Chromium IV and the recovery was acceptable, indicating adequate analytical accuracy.

6.0 DUPLICATE ANALYSES

To assess analytical precision, samples were analyzed in duplicate for chromium VI. The results were compared and must agree within 35 percent difference to be acceptable.

All results were acceptable indicating adequate analytical precision.

7.0 FIELD QA/QC-FIELD DUPLICATES

To assess the analytical and sampling protocol precision, field duplicates (as identified in Table 1) were collected and submitted "blind" to the laboratory. All data outside of estimated regions of detection demonstrated acceptable agreement indicating adequate sampling and analytical procedures with the exception of variability observed between the aluminum and iron results for sample GW-19867-1203-023 and its duplicate. The results were qualified as estimated to reflect the implied variability (see Table 3).

8.0 CONCLUSION

Based on the assessment detailed in the foregoing, the data produced by E&E are acceptable with the noted qualifications.

TABLES

TABLE 1

COLLECTION AND ANALYSIS SUMMARY
SURFACE WATER SAMPLING EVENT
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
DECEMBER 2003

Sample I.D.	*Location I.D.*	*Collection Date (mm/dd/yy)*	*Collection Time (hr:min)*	*Analysis/Parameters*	*Comment*
SW-19867-1203-009	SW-9	12/17/03	13:15	TAL Metals, Cyanide, Hex. Chromium	
SW-19867-1203-011	SW-11	12/17/03	13:00	TAL Metals, Cyanide, Hex. Chromium	
SW-19867-1203-012	SW-12	12/17/03	12:00	TAL Metals, Cyanide, Hex. Chromium	
SW-19867-1203-013	SW-13	12/17/03	11:45	TAL Metals, Cyanide, Hex. Chromium	
SW-19867-1203-014	SW-14	12/17/03	10:40	TAL Metals, Cyanide, Hex. Chromium	
SW-19867-1203-015	SW-15	12/17/03	10:50	TAL Metals, Cyanide, Hex. Chromium	
SW-19867-1203-016	SW-16	12/17/03	11:00	TAL Metals, Cyanide, Hex. Chromium	
SW-19867-1203-017	SW-17	12/17/03	11:10	TAL Metals, Cyanide, Hex. Chromium	
SW-19867-1203-018	SW-18	12/17/03	10:30	TAL Metals, Cyanide, Hex. Chromium	
SW-19867-1203-019	SW-19	12/17/03	10:15	TAL Metals, Cyanide, Hex. Chromium	
SW-19867-1203-020	SW-20	12/17/03	10:05	TAL Metals, Cyanide, Hex. Chromium	
SW-19867-1203-021	SW-21	12/17/03	9:45	TAL Metals, Cyanide, Hex. Chromium	MS/MSD
SW-19867-1203-022	SW-22	12/17/03	9:30	TAL Metals, Cyanide, Hex. Chromium	
SW-19867-1203-023	SW-23	12/17/03	8:45	TAL Metals, Cyanide, Hex. Chromium	
SW-19867-1203-024	SW-24	12/17/03	8:55	TAL Metals, Cyanide, Hex. Chromium	
SW-19867-1203-025	SW-23	12/17/03	9:00	TAL Metals, Cyanide, Hex. Chromium	Duplicate of SW-19867-1203-023

Notes:
Hex. Hexavalent.
MS Matrix Spike.
MSD Matrix Spike Duplicate.
TAL Target Analyte List.

TABLE 2

ANALYTICAL RESULTS SUMMARY - SURFACE WATER
SURFACE WATER SAMPLING EVENT
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
DECEMBER 2003

Sample Location:		*SW-9*	*SW-11*	*SW-12*	*SW-13*	*SW-14*	*SW-15*	*SW-16*	*SW-17*
Sample ID:		*SW-19867-1203-009*	*SW-19867-1203-011*	*SW-19867-1203-012*	*SW-19867-1203-013*	*SW-19867-1203-014*	*SW-19867-1203-015*	*SW-19867-1203-016*	*SW-19867-1203-017*
Sample Date:		*12/17/2003*	*12/17/2003*	*12/17/2003*	*12/17/2003*	*12/17/2003*	*12/17/2003*	*12/17/2003*	*12/17/2003*
Parameters	*Units*								
Metals									
Aluminum	mg/L	1.55	0.912	0.0879 J	1.33	0.0426 J	2.07	0.618	21.9
Antimony	mg/L	ND 0.01	ND 0.01	ND 0.01	ND 0.01	ND 0.01	ND 0.025	ND 0.05	ND 0.01
Arsenic	mg/L	0.023 J	0.0203 J	0.0191 J	0.0317	0.0211 J	0.0285	0.0191 J	0.0155 J
Barium	mg/L	0.103	0.14	0.0457	0.0545	0.0609	0.0763	0.266	0.173
Beryllium	mg/L	0.000294 J	0.000156 J	ND 0.005	ND 0.005	ND 0.005	ND 0.005	ND 0.005	0.000916 J
Cadmium	mg/L	ND 0.005	ND 0.005	ND 0.005	ND 0.005	ND 0.005	ND 0.005	ND 0.005	ND 0.005
Calcium	mg/L	143	66.5	56.7	180	137	187	600	28.5
Chromium Total	mg/L	0.0531	0.135	0.008 J	0.0219	0.0812	0.372	0.0887	0.0432
Chromium VI (Hexavalent)	mg/L	0.0160	ND 0.01	ND 0.01	ND 0.01	0.0650	0.204	0.0350	0.0120
Cobalt	mg/L	0.00462 J	0.00618 J	0.00124 J	0.00253 J	0.00662 J	0.00139 J	0.00198 J	0.00821 J
Copper	mg/L	0.097	0.0157 J	ND 0.02	ND 0.02	ND 0.02	0.0395	0.0061 J	0.0313
Cyanide (total)	mg/L	ND 0.01	ND 0.01	ND 0.01	ND 0.01	ND 0.01	ND 0.01	ND 0.01	ND 0.01
Iron	mg/L	2.52	2.19	ND 0.2	8.26	ND 0.2	1.03	ND 0.2	23.4
Lead	mg/L	0.0591	0.0101	ND 0.005	ND 0.005	ND 0.005	0.00523	ND 0.005	0.0451
Magnesium	mg/L	35.9	61.7	27.3	19.1	0.429 J	1.14 J	0.324 J	13.3
Manganese	mg/L	0.551	4.63	0.00807 J	0.272	0.00247 J	0.193	0.0229	0.564
Mercury	mg/L	0.00032 J	ND 0.0004	ND 0.0004	ND 0.0004	ND 0.0004	ND 0.0004	ND 0.0004	ND 0.0004
Nickel	mg/L	0.0113 J	ND 0.02	ND 0.02	ND 0.02	ND 0.02	0.00255 J	ND 0.02	0.0186 J
Potassium	mg/L	8.29	13.3	11.8	13	2.75	5.58	12.1	10.7
Selenium	mg/L	ND 0.02	0.0164 J	ND 0.02	ND 0.02	ND 0.02	ND 0.02	0.0254 J	0.0123 J
Silver	mg/L	ND 0.01	ND 0.01	ND 0.01	ND 0.01	ND 0.01	ND 0.01	ND 0.01	ND 0.01
Sodium	mg/L	140	21	28.1	29.4	43.7	34.3	22.3	1.47 J
Thallium	mg/L	ND 0.02	ND 0.02	ND 0.02	ND 0.02	ND 0.02	ND 0.02	ND 0.02	ND 0.02
Vanadium	mg/L	ND 0.02	ND 0.02	ND 0.02	ND 0.02	ND 0.02	0.0122 J	ND 0.02	0.037
Zinc	mg/L	0.313	0.0316	0.00498 J	0.0124 J	0.00657 J	0.0148 J	0.0192 J	0.333

TABLE 2

ANALYTICAL RESULTS SUMMARY - SURFACE WATER
SURFACE WATER SAMPLING EVENT
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
DECEMBER 2003

Sample Location:		*SW-18*	*SW-19*	*SW-20*	*SW-21*	*SW-22*	*SW-23*	*SW-23*	*SW-24*
Sample ID:		*SW-19867-1203-018*	*SW-19867-1203-019*	*SW-19867-1203-020*	*SW-19867-1203-021*	*SW-19867-1203-022*	*SW-19867-1203-023*	*SW-19867-1203-025*	*SW-19867-1203-024*
Sample Date:		*12/17/2003*	*12/17/2003*	*12/17/2003*	*12/17/2003*	*12/17/2003*	*12/17/2003*	*12/17/2003*	*12/17/2003*
								Duplicate	
Parameters	*Units*								
Metals									
Aluminum	mg/L	0.0415 J	0.0277 J	0.218	0.221	8.28	0.264 J	0.512 J	0.164 J
Antimony	mg/L	ND 0.02	ND 0.02	ND 0.02	ND 0.01	ND 0.02	ND 0.01	ND 0.01	ND 0.01
Arsenic	mg/L	0.0254	0.0219 J	0.0239 J	0.019 J	0.0278	0.0147 J	0.014 J	0.0115 J
Barium	mg/L	0.0569	0.0413	0.0455	0.0941	0.204	0.0298	0.0307	0.0369
Beryllium	mg/L	ND 0.005	ND 0.005	ND 0.005	ND 0.005	0.000469 J	ND 0.005	ND 0.005	ND 0.005
Cadmium	mg/L	ND 0.005	ND 0.005	ND 0.005	ND 0.005	ND 0.005	ND 0.005	ND 0.005	ND 0.005
Calcium	mg/L	140	109	131	63.1	103	30.5	32.4	42.3
Chromium Total	mg/L	0.0783	0.0396	0.0292	0.00603 J	0.285	0.104	0.0958	0.00783 J
Chromium VI (Hexavalent)	mg/L	0.0290	0.0240	0.00800 J	ND 0.01	0.00500 J	0.0560	0.0720	ND 0.01
Cobalt	mg/L	ND 0.02	ND 0.02	ND 0.02	ND 0.02	0.00238 J	ND 0.02	ND 0.02	ND 0.02
Copper	mg/L	ND 0.02	ND 0.02	ND 0.02	ND 0.02	0.0418	ND 0.02	ND 0.02	ND 0.02
Cyanide (total)	mg/L	ND 0.01	ND 0.01	ND 0.01	ND 0.01	ND 0.01	ND 0.01	ND 0.01	ND 0.01
Iron	mg/L	ND 0.2	ND 0.2	0.0727 J	0.409	11.1	0.2 J	0.513 J	0.113 J
Lead	mg/L	ND 0.005	ND 0.005	ND 0.005	0.0159	0.0976	ND 0.005	ND 0.005	ND 0.005
Magnesium	mg/L	0.56 J	1.58	1.45 J	6.92	24.1	6.57	6.64	13.6
Manganese	mg/L	0.00347 J	0.00847 J	0.0136	0.0758	0.38	0.0201	0.0295	0.0154
Mercury	mg/L	ND 0.0004	ND 0.0004	ND 0.0004	ND 0.0004	ND 0.0004	ND 0.0004	ND 0.0004	ND 0.0004
Nickel	mg/L	ND 0.02	ND 0.02	ND 0.02	ND 0.02	0.0231	ND 0.02	ND 0.02	ND 0.02
Potassium	mg/L	2.88	2.56	2.12	3.03	2.87	1.72	1.83	0.341 J
Selenium	mg/L	ND 0.04	ND 0.02	ND 0.04	ND 0.02	ND 0.02	ND 0.02	ND 0.02	ND 0.02
Silver	mg/L	ND 0.01	ND 0.01	ND 0.01	ND 0.01	ND 0.01	ND 0.01	ND 0.01	ND 0.01
Sodium	mg/L	43.7	41.4	36.9	59.1	25.7	35.5	35	41.9
Thallium	mg/L	ND 0.02	ND 0.02	ND 0.02	ND 0.02	ND 0.02	ND 0.02	ND 0.02	ND 0.02
Vanadium	mg/L	ND 0.02	ND 0.02	ND 0.02	ND 0.02	0.0229	ND 0.02	ND 0.02	ND 0.02
Zinc	mg/L	0.00773 J	0.00887 J	0.0301	0.0181 J	0.247	0.0277	0.0356	0.0569

Notes:
J Estimated.
ND Not detected at or above x.

TABLE 3

QUALIFIED SAMPLE DATA DUE TO VARIABILITY IN FIELD DUPLICATE RESULTS
SURFACE WATER SAMPLING EVENT
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
DECEMBER 2003

		Original		*Duplicate*				
Parameter	*Analyte*	*Sample ID*	*Result*	*Sample ID*	*Result*	*RPD*	*Units*	*Qualifier* [(1)]
Metals	Aluminum	SW-19867-1203-023	264	SW-19867-1203-025	512	64	µg/L	J
	Iron	SW-19867-1203-023	200	SW-19867-1203-025	513	88	µg/L	J

Notes:

(1) Qualifier is associated with both original and duplicate result.

J Estimated.

RPD Relative Percent Difference.

CONESTOGA-ROVERS
& ASSOCIATES

ANALYTICAL DATA ASSESSMENT AND VALIDATION
SEDIMENT/SURFACE WATER SAMPLING EVENT
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
MAY 2004

PREPARED BY:
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1.0 INTRODUCTION

The following document details an assessment and validation of analytical results reported by Ecology and Environment, Inc. (E&E), located in Lancaster, New York, for samples collected at the Vanadium Site (Site) located in Niagara Falls, New York. Sediment and surface water samples were collected during May 2004. For sample identification, a sampling and analysis summary is presented in Table 1.

A summary of the analytical data is presented in Tables 2A and 2B. The quality assurance/quality control (QA/QC) criteria by which these data have been assessed are outlined in the analytical methods and the document entitled "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review," February 1994, EPA-540/R-94-013.

The data quality assessment and validation presented in the following subsections were performed based on information from data sheets including matrix spike (MS) recoveries, duplicate results, laboratory control sample (LCS) recoveries, and blank results for all parameters.

2.0 SAMPLE HOLDING TIMES

The method-specified holding time criteria for this program were as follows:

Parameter	*Matrix*	*Holding Time*
TAL Metals (except Mercury)	Water/Sediment	180 days from collection to analysis
Mercury	Water/Sediment	28 days from collection to analysis
Hardness	Water	180 days from collection to analysis
Chromium VI	Water	24 hours from collection to analysis
Chromium VI	Sediment	30 days from collection to digestion 7 days from digestion to analysis
Cyanide	Water/Sediment	14 days from collection to analysis

All sample analyses were performed within the required holding times. All samples were properly preserved and cooled at 4°C (±2°C) after collection, and all samples were received by the laboratory in good condition.

3.0 LABORATORY BLANK ANALYSES

The purpose of assessing the results of laboratory blank analyses is to determine the existence and magnitude of sample contamination introduced during analysis. Laboratory blanks are prepared from deionized water and analyzed as samples.

Most blank results were non-detect for the analytes of interest with the exception of some metals present at a low concentration. All associated sample results with similar concentrations were qualified as non-detect (see Table 3).

For this study, laboratory blanks were analyzed at a minimum frequency of one per analytical batch.

4.0 LABORATORY CONTROL SAMPLE ANALYSES

The LCS serves as a monitor of the overall performance of all steps in the analysis, including the sample preparation. LCSs were analyzed using the same sample preparation, analytical methods, and QA/QC procedures employed for the investigative samples.

LCSs were reported for all inorganic analyses. All LCS samples yielded recoveries within the established control limits, indicating acceptable overall analytical accuracy with the exception of one high cyanide recovery. All associated positive results were qualified as estimated (see Table 4) and all non-detect results would not have been impacted by the implied high bias.

5.0 MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD) ANALYSES

The recoveries of MS/MSD analyses are used to assess the analytical accuracy achieved on individual sample matrices. The relative percent difference (RPD) between the MS and MSD is used to assess analytical precision.

An MS/MSD was analyzed at the required frequency for all parameters except Chromium VI and hardness.

All recoveries were acceptable indicating adequate analytical accuracy and precision.

A matrix spike (MS) was analyzed for Chromium IV and the recovery was acceptable, indicating adequate analytical accuracy.

6.0 DUPLICATE ANALYSES

To assess analytical precision, samples were analyzed in duplicate for Chromium VI and hardness. The results were compared and must agree within 35 percent difference to be acceptable.

All results were acceptable indicating adequate analytical precision.

7.0 FIELD QA/QC-FIELD DUPLICATES

To assess the analytical and sampling protocol precision, field duplicates (as identified in Table 1) were collected and submitted "blind" to the laboratory. All data outside of estimated regions of detection demonstrated acceptable agreement indicating adequate sampling and analytical procedures.

8.0 CONCLUSION

Based on the assessment detailed in the foregoing, the data produced by E&E are acceptable with the noted qualifications.

TABLES

TABLE 1

SAMPLE COLLECTION AND ANALYSIS SUMMARY
SEDIMENT/SURFACE WATER SAMPLING EVENT
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
MAY 2004

					Analysis/Parameters					
Sample I.D.	*Location I.D.*	*Matrix*	*Collection Date (mm/dd/yy)*	*Collection Time (hr:min)*	*TAL Metals*	*Cyanide*	*Hex. Chromium*	*pH*	*Hardness*	*Comments*
SW-19867-0504-009	SW-9	Surface Water	05/12/04	13:15	X	X	X		X	
SW-19867-0504-011	SW-11	Surface Water	05/12/04	12:30	X	X	X		X	
SW-19867-0504-012	SW-12	Surface Water	05/12/04	11:25	X	X	X		X	
SW-19867-0504-013	SW-13	Surface Water	05/12/04	11:15	X	X	X		X	
SW-19867-0504-014	SW-14	Surface Water	05/12/04	11:10	X	X	X		X	
SW-19867-0504-015	SW-15	Surface Water	05/12/04	10:00	X	X	X		X	
SW-19867-0504-016	SW-16	Surface Water	05/12/04	10:10	X	X	X		X	
SW-19867-0504-017	SW-17	Surface Water	05/12/04	10:20	X	X	X		X	
SW-19867-0504-018	SW-18	Surface Water	05/12/04	9:50	X	X	X		X	
SW-19867-0504-019	SW-19	Surface Water	05/12/04	9:40	X	X	X		X	
SW-19867-0504-020	SW-20	Surface Water	05/12/04	9:30	X	X	X		X	MS/MSD
SW-19867-0504-021	SW-21	Surface Water	05/12/04	9:05	X	X	X		X	
SW-19867-0504-022	SW-22	Surface Water	05/12/04	8:55	X	X	X		X	
SW-19867-0504-023	SW-23	Surface Water	05/12/04	8:30	X	X	X		X	
SW-19867-0504-024	SW-24	Surface Water	05/12/04	8:45	X	X	X		X	
SW-19867-0504-025	SW-23	Surface Water	05/12/04	8:40	X	X	X		X	Duplicate of SW-19867-0504-023
SD-19867-0504-008	SD-8	Sediment	05/12/04	13:30	X	X	X	X		
SD-19867-0504-009	SD-9	Sediment	05/12/04	13:20	X	X	X	X		
SD-19867-0504-012	SD-12	Sediment	05/12/04	11:25	X	X	X	X		
SD-19867-0504-016	SD-16	Sediment	05/12/04	10:15	X	X	X	X		
SD-19867-0504-017	SD-17	Sediment	05/12/04	10:25	X	X	X	X		

Notes:
Hex. Hexavalent.
MS Matrix Spike.
MSD Matrix Spike Duplicate.
TAL Target Analyte List.

TABLE 2A

ANAYLTICAL RESULTS SUMMARY - SEDIMENT SAMPLES
SEDIMENT/SURFACE WATER SAMPLING EVENT
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
MAY 2004

	Sample Location:	*SD-8*	*SD-9*	*SD-12*	*SD-16*	*SD-17*
	Sample ID:	*SD-19867-0504-008*	*SD-19867-0504-009*	*SD-19867-0504-012*	*SD-19867-0504-016*	*SD-19867-0504-017*
	Sample Date:	*5/12/2004*	*5/12/2004*	*5/12/2004*	*5/12/2004*	*5/12/2004*
Parameters	*Units*					
Metals						
Aluminum	mg/Kg	7250	8320 J	846 J	334	17500
Antimony	mg/Kg	ND 2.21	3.79 J	4.2 J	6.21	ND 2.66
Arsenic	mg/Kg	8.58	ND 3.42 J	ND 17.2 J	ND 15.6	5.63
Barium	mg/Kg	328	209 J	109 J	98.9	113
Beryllium	mg/Kg	0.575	0.42 J	ND 0.686 J	ND 0.623	0.847
Cadmium	mg/Kg	7.55	6.95 J	0.0526 J	ND 0.623	0.542 J
Calcium	mg/Kg	38000	220000 J	319000 J	353000	4870
Chromium Total	mg/Kg	297	167 J	46 J	7.17	48.7
Chromium VI (Hexavalent)	mg/Kg	ND 5.1	ND 8.4 J	ND 7.4 J	ND 6.8	ND 5.9
Cobalt	mg/Kg	13	7.36 J	ND 2.75 J	ND 2.49	10.9
Copper	mg/Kg	122	323 J	2.65 J	ND 4.99	26.8
Cyanide (total)	mg/Kg	0.847	ND 1.13 J	ND 0.988 J	ND 0.986	ND 0.79
Iron	mg/Kg	25500	13800 J	1020 J	417	26200
Lead	mg/Kg	1490	257 J	17.2 J	10.4	33.1
Magnesium	mg/Kg	20400	7440 J	1850 J	385	4980
Manganese	mg/Kg	1390	669 J	47.5 J	20.4	514
Mercury	mg/Kg	0.959	2.77 J	ND 0.0599 J	ND 0.0572	0.0766
Nickel	mg/Kg	188	51.2 J	ND 2.75 J	ND 4.99	26.2
Potassium	mg/Kg	775	1340 J	279 J	73.3 J	2290
Selenium	mg/Kg	ND 2.21	ND 5.47 J	ND 5.49 J	ND 4.99	ND 2.66
Silver	mg/Kg	0.985 J	4.79 J	1.8 J	2.18	ND 1.33
Sodium	mg/Kg	267	824 J	213 J	243	ND 199
Thallium	mg/Kg	0.988 J	ND 8.21 J	ND 13.7 J	ND 12.5	2.51 J
Vanadium	mg/Kg	37	32.4 J	3.62 J	1.72 J	35.5
Zinc	mg/Kg	1060	2220 J	16.5 J	23.7	232
General Chemistry						
Hardness	mg/Kg	--	--	--	--	--
Percent Moisture	%	20.5	57.5	52.7	44.3	40.3
pH (soil)	S.U.	8.2	7.1	8.2	11	7.3

Notes:
- Not applicable.
J Estimated.
ND Not detected at or above x.

TABLE 2B

ANALYTICAL RESULTS SUMMARY - SURFACE WATER SAMPLES
SEDIMENT/SURFACE WATER SAMPLING EVENT
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
MAY 2004

Sample Location:		*SW-9*	*SW-11*	*SW-12*	*SW-13*	*SW-14*	*SW-15*	*SW-16*	*SW-17*	*SW-18*
Sample ID:		*SW-19867-0504-009*	*SW-19867-0504-011*	*SW-19867-0504-012*	*SW-19867-0504-013*	*SW-19867-0504-014*	*SW-19867-0504-015*	*SW-19867-0504-016*	*SW-19867-0504-017*	*SW-19867-0504-018*
Sample Date:		*5/12/2004*	*5/12/2004*	*5/12/2004*	*5/12/2004*	*5/12/2004*	*5/12/2004*	*5/12/2004*	*5/12/2004*	*5/12/2004*
Parameters	*Units*									
Metals										
Aluminum	mg/L	0.183 J	2.13	ND 0.2	0.312	0.0493 J	2.01	0.656	0.541	0.125 J
Antimony	mg/L	ND 0.02	ND 0.02	ND 0.02	ND 0.02	ND 0.02	ND 0.02	ND 0.02	ND 0.02	ND 0.02
Arsenic	mg/L	0.0158 J	0.0139 J	0.00868 J	ND 0.025	0.0108 J	ND 0.025	ND 0.025	0.0151 J	0.0095 J
Barium	mg/L	0.076	0.193	0.0393	0.0301	0.0868	0.048	0.299	0.0238	0.055
Beryllium	mg/L	ND 0.005	ND 0.005	ND 0.005	ND 0.005	ND 0.005	ND 0.005	ND 0.005	ND 0.005	ND 0.005
Cadmium	mg/L	ND 0.005	ND 0.005	ND 0.005	ND 0.005	ND 0.005	ND 0.005	ND 0.005	ND 0.005	ND 0.005
Calcium	mg/L	130	59.2	33.9	31.1	166	294	662	63.1	116
Chromium Total	mg/L	0.0264	0.611	0.00171 J	0.00365 J	0.114	0.347	0.0727	0.000768 J	0.0803
Chromium VI (Hexavalent)	mg/L	ND 0.01	ND 0.01	ND 0.01	ND 0.01	0.107	0.292	0.058	ND 0.01	0.065
Cobalt	mg/L	0.00118 J	0.00244 J	ND 0.02	ND 0.02	ND 0.02	ND 0.02	ND 0.02	ND 0.02	ND 0.02
Copper	mg/L	0.0174 J	0.0471	ND 0.02	ND 0.02	ND 0.02	0.0368	0.0118 J	ND 0.02	ND 0.02
Cyanide (total)	mg/L	ND 0.01	ND 0.01	ND 0.01	ND 0.01	0.00464 J	ND 0.01	ND 0.01	ND 0.01	ND 0.01
Iron	mg/L	1.37	4.04	0.0533 J	0.848	ND 0.2	ND 0.2	0.148 J	3.06	0.146 J
Lead	mg/L	0.0114	0.0473	ND 0.005	ND 0.005	ND 0.005	ND 0.005	ND 0.005	0.00531	0.00535
Magnesium	mg/L	33.2	54.1	13.7	9.6	0.194 J	ND 1.5	0.227 J	22.4	1.79
Manganese	mg/L	0.533	1.94	0.119	0.031	ND 0.01	0.00165 J	0.00608 J	0.267	0.0143
Mercury	mg/L	ND 0.0002	ND 0.0002	ND 0.0002	ND 0.0002	ND 0.0002	ND 0.0002	ND 0.0002	ND 0.0002	ND 0.0002
Nickel	mg/L	0.00577 J	0.0187 J	0.00295 J	0.00332 J	0.00181 J	0.00645 J	0.00329 J	0.00291 J	ND 0.02
Potassium	mg/L	10.6	9.65	13.6	10	3.6	6.27	14.8	6.95	3.36
Selenium	mg/L	0.0251	0.0434	0.00904 J	ND 0.02	ND 0.02	ND 0.02	ND 0.02	0.024	ND 0.02
Silver	mg/L	ND 0.01	ND 0.01	ND 0.01	ND 0.01	ND 0.01	ND 0.01	ND 0.01	ND 0.01	ND 0.01
Sodium	mg/L	223	27.7	38	29.7	67.6	39.5	23.3	2.36	66.4
Thallium	mg/L	ND 0.04	ND 0.02	ND 0.03	ND 0.02	ND 0.03	ND 0.02	ND 0.02	ND 0.02	ND 0.03
Vanadium	mg/L	0.00474 J	0.0138 J	ND 0.02	ND 0.02	ND 0.02	0.00391 J	ND 0.02	ND 0.02	ND 0.02
Zinc	mg/L	0.0464	0.129	0.00519 J	0.00559 J	0.0059 J	0.00697 J	0.0169 J	0.0171 J	0.013 J
General Chemistry										
Hardness	mg/L	505	416	198	166	436	776	1600	319	356
Percent Moisture	%	--	--	--	--	--	--	--	--	--
pH (soil)	S.U.	--	--	--	--	--	--	--	--	--

Notes:
- Not applicable.
J Estimated.
ND Not detected at or above x.

TABLE 2B

ANALYTICAL RESULTS SUMMARY - SURFACE WATER SAMPLES
SEDIMENT/SURFACE WATER SAMPLING EVENT
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
MAY 2004

Sample Location:		*SW-19*	*SW-20*	*SW-21*	*SW-22*	*SW-23*	*SW-23*	*SW-24*
Sample ID:		*SW-19867-0504-019*	*SW-19867-0504-020*	*SW-19867-0504-021*	*SW-19867-0504-022*	*SW-19867-0504-023*	*SW-19867-0504-025*	*SW-19867-0504-024*
Sample Date:		*5/12/2004*	*5/12/2004*	*5/12/2004*	*5/12/2004*	*5/12/2004*	*5/12/2004*	*5/12/2004*
							Duplicate	
Parameters	*Units*							
Metals								
Aluminum	mg/L	ND 0.2	0.0258 J	ND 0.2	0.043 J	0.407	0.459	0.339
Antimony	mg/L	ND 0.02	ND 0.02	ND 0.02	ND 0.02	ND 0.02	ND 0.02	ND 0.02
Arsenic	mg/L	0.00985 J	0.009 J	0.0077 J	0.00825 J	0.00793 J	0.00974 J	0.00964 J
Barium	mg/L	0.0433	0.0584	0.0525	0.0412	0.0603	0.0611	0.0698
Beryllium	mg/L	ND 0.005	ND 0.005	ND 0.005	ND 0.005	ND 0.005	ND 0.005	ND 0.005
Cadmium	mg/L	ND 0.005	ND 0.005	ND 0.005	ND 0.005	ND 0.005	ND 0.005	ND 0.005
Calcium	mg/L	101	117	113	32.6	83.8	86.9	60
Chromium Total	mg/L	0.048	0.0554	0.0547	0.00208 J	0.158	0.167	0.00199 J
Chromium VI (Hexavalent)	mg/L	0.03	0.037	0.036	ND 0.01	0.124	0.156	ND 0.01
Cobalt	mg/L	ND 0.02	ND 0.02	ND 0.02	ND 0.02	ND 0.02	ND 0.02	0.00133 J
Copper	mg/L	ND 0.02	0.00343 J	ND 0.02	0.00389 J	0.00729 J	0.0073 J	0.0038 J
Cyanide (total)	mg/L	ND 0.01	ND 0.01	ND 0.01	ND 0.01	ND 0.01	ND 0.01	ND 0.01
Iron	mg/L	ND 0.2	ND 0.2	0.226	0.146 J	0.233	0.252	3.37
Lead	mg/L	0.0051	0.00601	0.00594	0.00557	0.00676	0.00941	0.0127
Magnesium	mg/L	0.833 J	0.0581 J	1.6	3.57	2.23	2.21	18.3
Manganese	mg/L	0.00467 J	ND 0.01	0.0121	0.208	0.0284	0.0278	0.559
Mercury	mg/L	ND 0.0002	ND 0.0002	ND 0.0002	ND 0.0002	ND 0.0002	ND 0.0002	ND 0.0002
Nickel	mg/L	ND 0.02	ND 0.02	ND 0.02	0.00271 J	0.00261 J	0.0025 J	0.00257 J
Potassium	mg/L	3.14	3.69	3.13	1.5	3.28	3.39	1.35 J
Selenium	mg/L	ND 0.02	ND 0.02	ND 0.02	ND 0.02	ND 0.02	ND 0.02	0.0148 J
Silver	mg/L	ND 0.01	ND 0.01	ND 0.01	ND 0.01	ND 0.01	ND 0.01	ND 0.01
Sodium	mg/L	68.6	60.4	63.8	50.1	110	112	70.3
Thallium	mg/L	ND 0.03	ND 0.03	ND 0.02	ND 0.02	ND 0.03	ND 0.025	ND 0.03
Vanadium	mg/L	ND 0.02	ND 0.02	ND 0.02	ND 0.02	0.00363 J	ND 0.02	0.00539 J
Zinc	mg/L	0.00691 J	0.0129 J	0.00536 J	0.0351	0.0288	0.0289	0.062
General Chemistry								
Hardness	mg/L	283	319	311	166	259	287	275
Percent Moisture	%	--	--	--	--	--	--	--
pH (soil)	S.U.	--	--	--	--	--	--	--

Notes:
- Not applicable.
J Estimated.
ND Not detected at or above x.

TABLE 3

QUALIFIED SAMPLE RESULTS DUE TO ANALYTE CONCENTRATIONS IN THE METHOD BLANKS
SEDIMENT/SURFACE WATER SAMPLING EVENT
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
MAY 2004

Parameter	*Analysis Date*	*Analyte*	*Blank Result*	*Sample ID*	*Sample Result*	*Qualified Result*
Metals	05/25/04	Sodium	31.9	SD-19867-0504-017	79.8 J	79.8 U

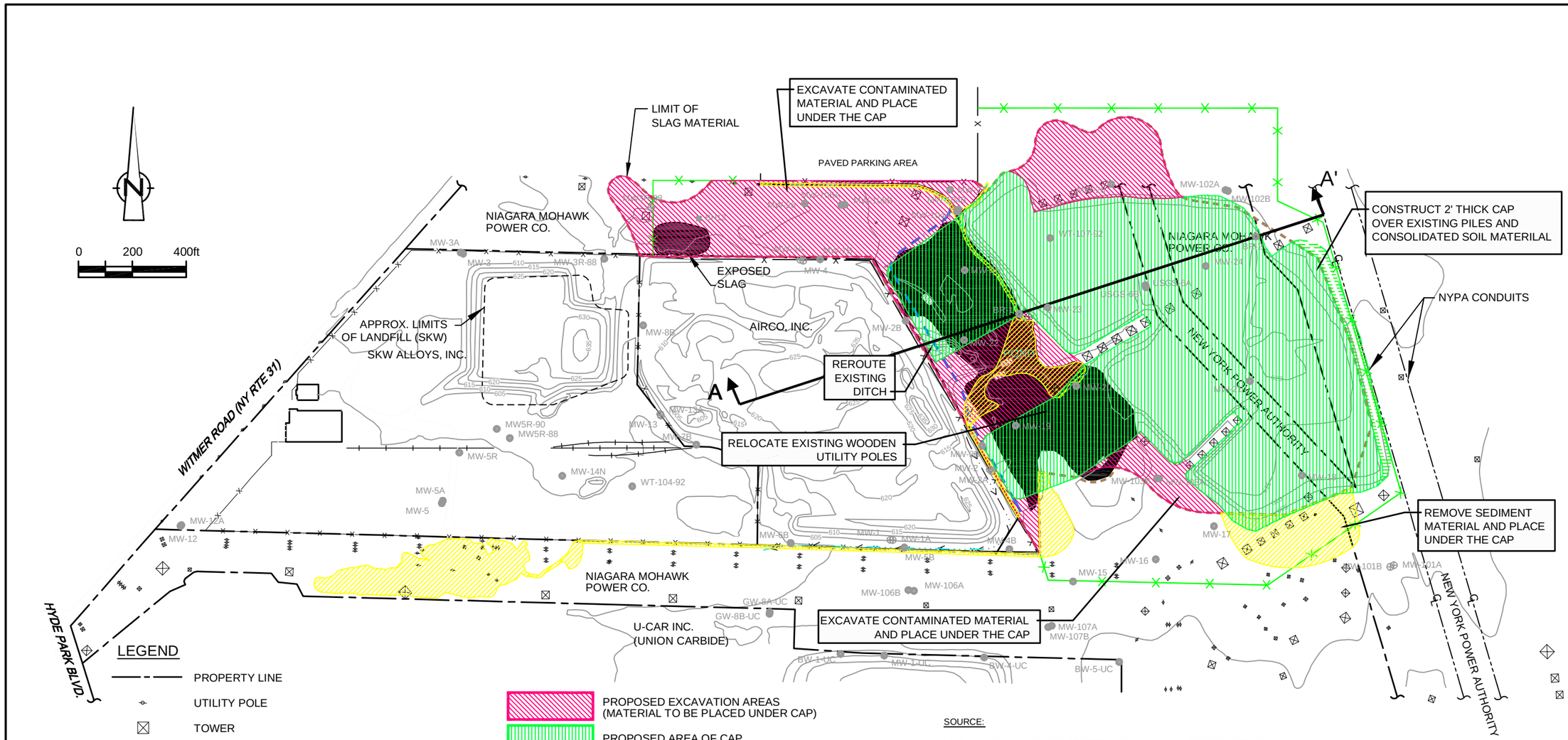
Notes:
J Estimated.
U Non-detect at associated value.

TABLE 4

QUALIFIED SAMPLE RESULTS DUE TO OUTLYING LABORATORY CONTROL SAMPLE RESULTS
SEDIMENT/SURFACE WATER SAMPLING EVENT
VANADIUM CORPORATION OF AMERICA
NIAGARA FALLS, NEW YORK
MAY 2004

Parameter	*LCS Date*	*Compound*	*% Rec*	*Acceptable Limits*	*Associated Sample ID*	*Sample Results*	*Units*	*Qualifier*
General Chemistry	05/18/04	Cyanide (total)	114	90-110	SW-19867-0504-014	0.00464 J	mg/L	J

Notes:
%Rec Percent Recovery.
J Estimated.
LCS Laboratory Control Sample.



SOURCE:

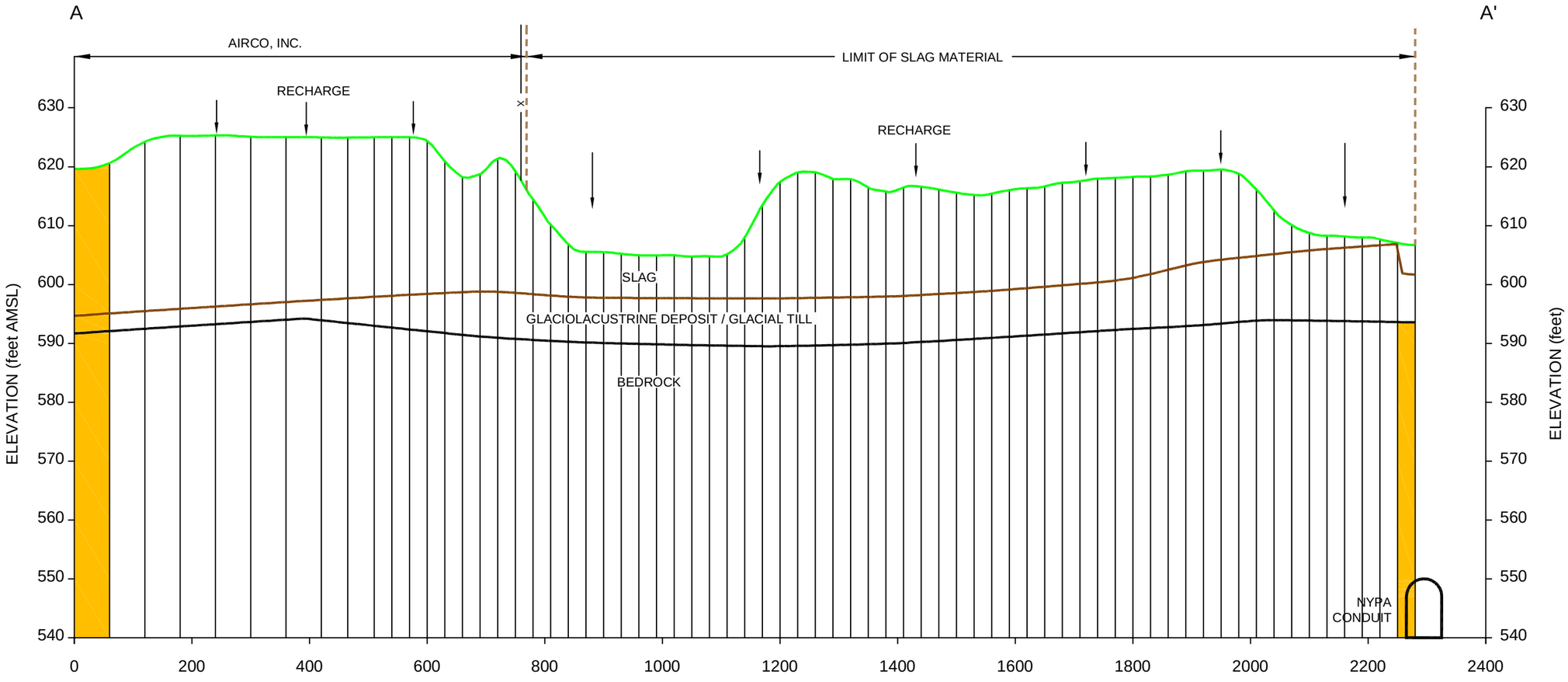
NIAGARA MOHAWK POWER CORPORATION, VANADIUM CORPORATION OF AMERICA SITE, NIAGARA FALLS, NY. FIGURES 1, 2 AND 3, BBL ENGINEERS & SCIENTISTS. 12/8/2000

NOTES:

1. BASE MAP DIGITIZED FROM 'VANADIUM SITE NO. 932001' PROVIDED BY LU ENGINEERS, 2230 PENFIELD RD., PENFIELD, NY, (716) 377-1450. MAP DATA DIGITIZED FROM 'SITE PLAN AND SAMPLING LOCATION' PREPARED BY ABB ENVIRONMENTAL.
2. SITE FEATURES AND SAMPLE LOCATIONS ARE APPROXIMATE.

figure F.1

LOCATION OF 2D CROSS-SECTION MODEL
VANADIUM CORPORATION OF AMERICA SITE
Niagara Falls, NY



HORIZONTAL SCALE 1" = 200'
VERTICAL SCALE 1" = 20'
VERTICAL EXAGGERATION 10x

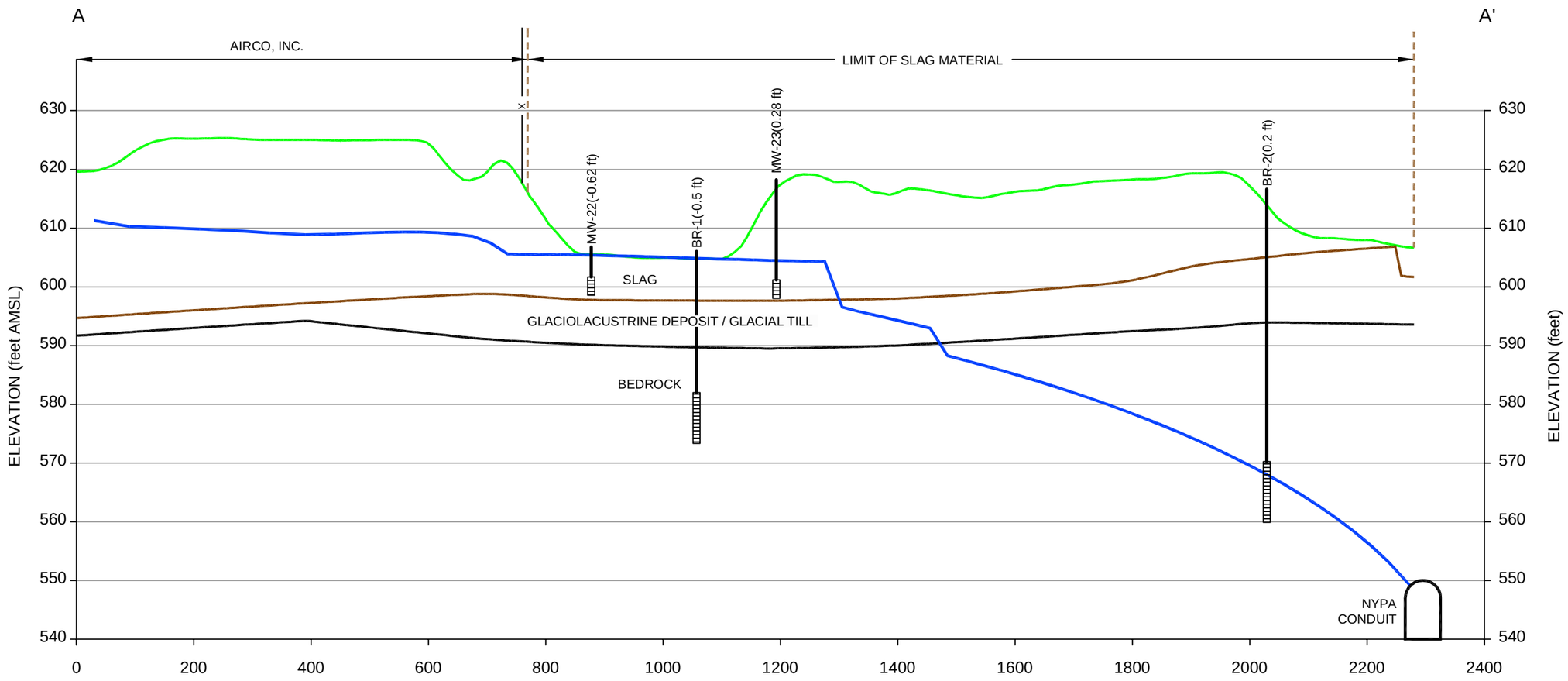
LEGEND

CONSTANT HEAD

figure F.2

MODEL DOMAIN AND BOUNDARY CONDITIONS
VANADIUM CORPORATION OF AMERICA SITE
Niagara Falls, NY

19867-00(008)GN-WA009 MAY 30/2005



HORIZONTAL SCALE 1" = 200'
VERTICAL SCALE 1" = 20'
VERTICAL EXAGGERATION 10x

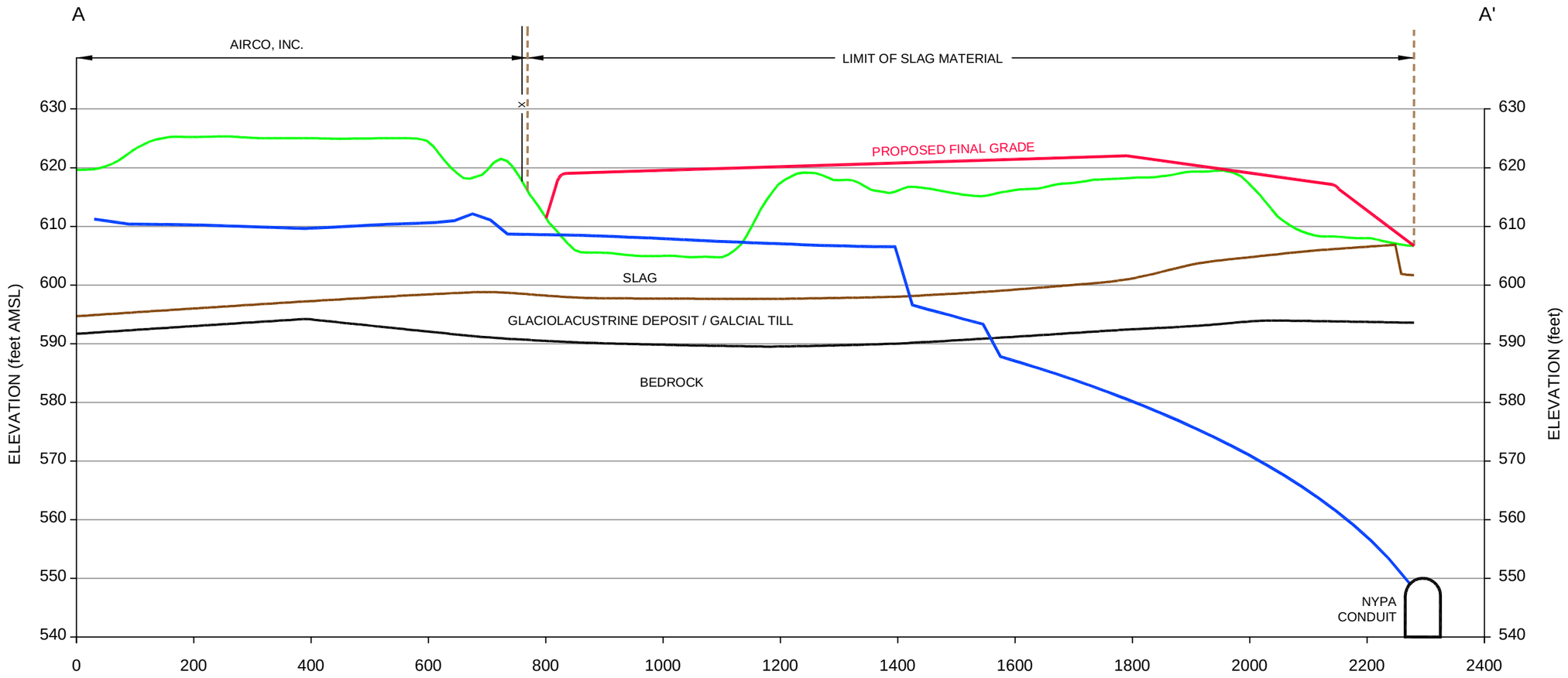
LEGEND

	CALIBRATED GROUNDWATER TABLE
MW-22	MODEL CALIBRATION TARGET
(-0.62 ft)	CALIBRATION RESIDUAL NEGATIVE - OVER PREDICTED POSITIVE - UNDER PREDICTED

figure F.3

CALIBRATED GROUNDWATER TABLE
VANADIUM CORPORATION OF AMERICA SITE
Niagara Falls, NY

19867-00(008)GN-WA002 MAY 30/2005



HORIZONTAL SCALE 1" = 200'
VERTICAL SCALE 1" = 20'
VERTICAL EXAGGERATION 10x

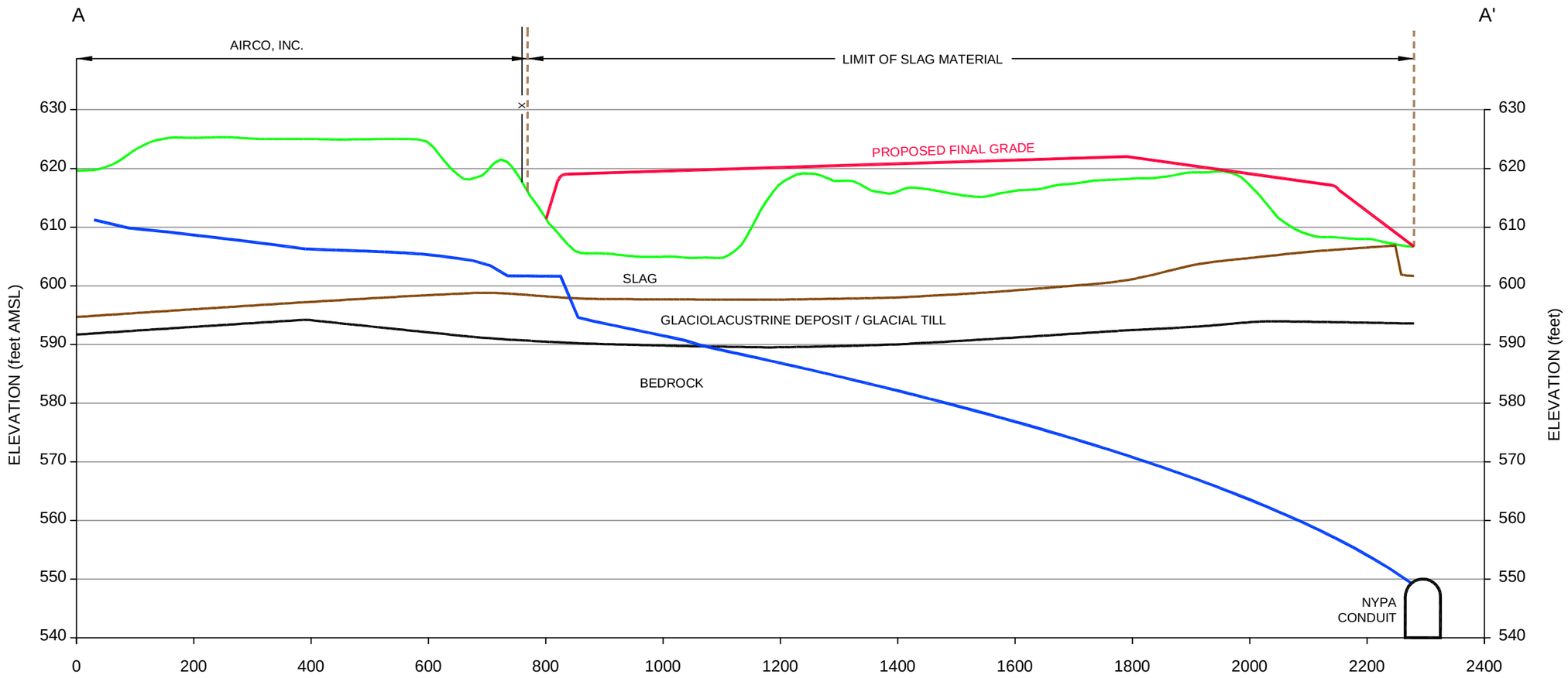
LEGEND

SIMULATED GROUNDWATER TABLE

figure F.4

SIMULATED GROUNDWATER TABLE - SOIL COVER
VANADIUM CORPORATION OF AMERICA SITE
Niagara Falls, NY

19867-00(008)GN-WA003 MAY 30/2005



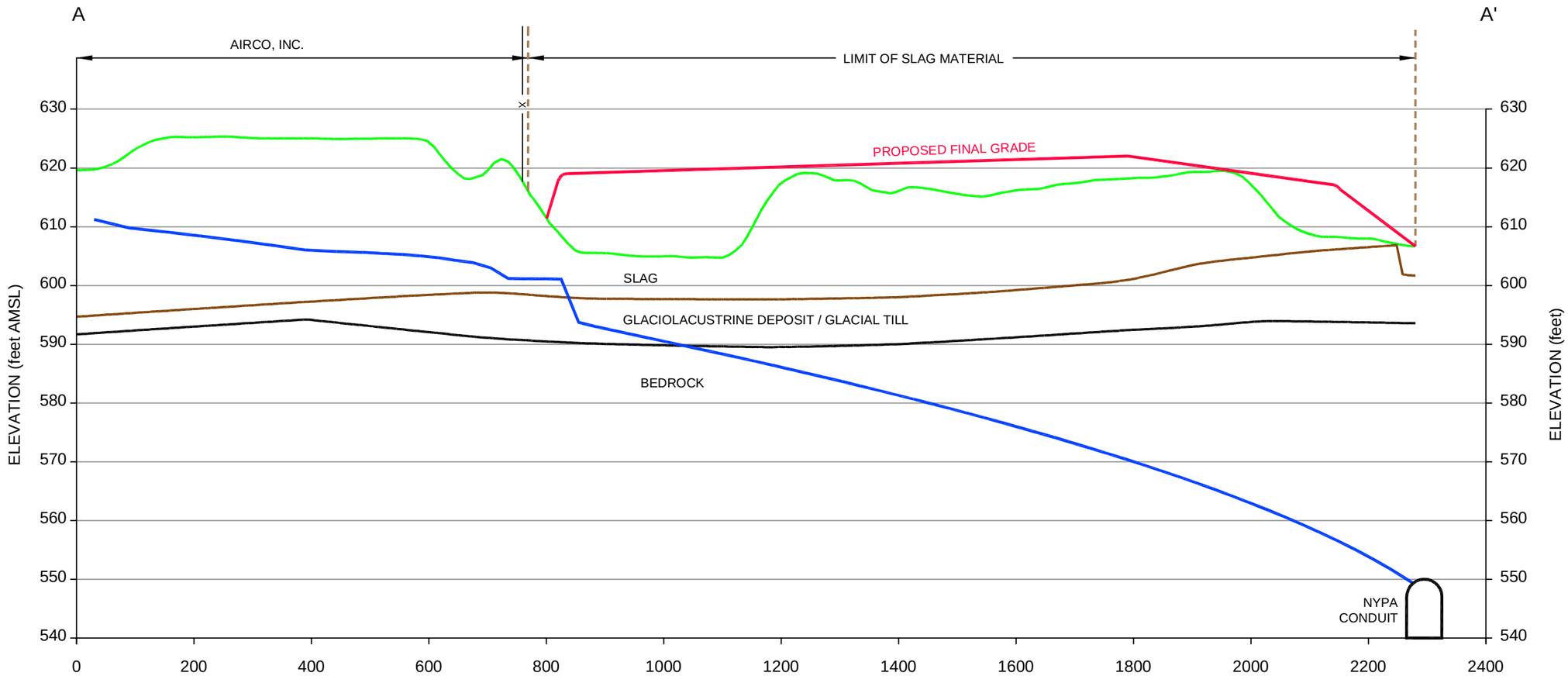
HORIZONTAL SCALE 1" = 200'
VERTICAL SCALE 1" = 20'
VERTICAL EXAGGERATION 10x

LEGEND

SIMULATED GROUNDWATER TABLE

figure F.5

SIMULATED GROUNDWATER TABLE - CLAY COVER
VANADIUM CORPORATION OF AMERICA SITE
Niagara Falls, NY



HORIZONTAL SCALE 1" = 200'
VERTICAL SCALE 1" = 20'
VERTICAL EXAGGERATION 10x

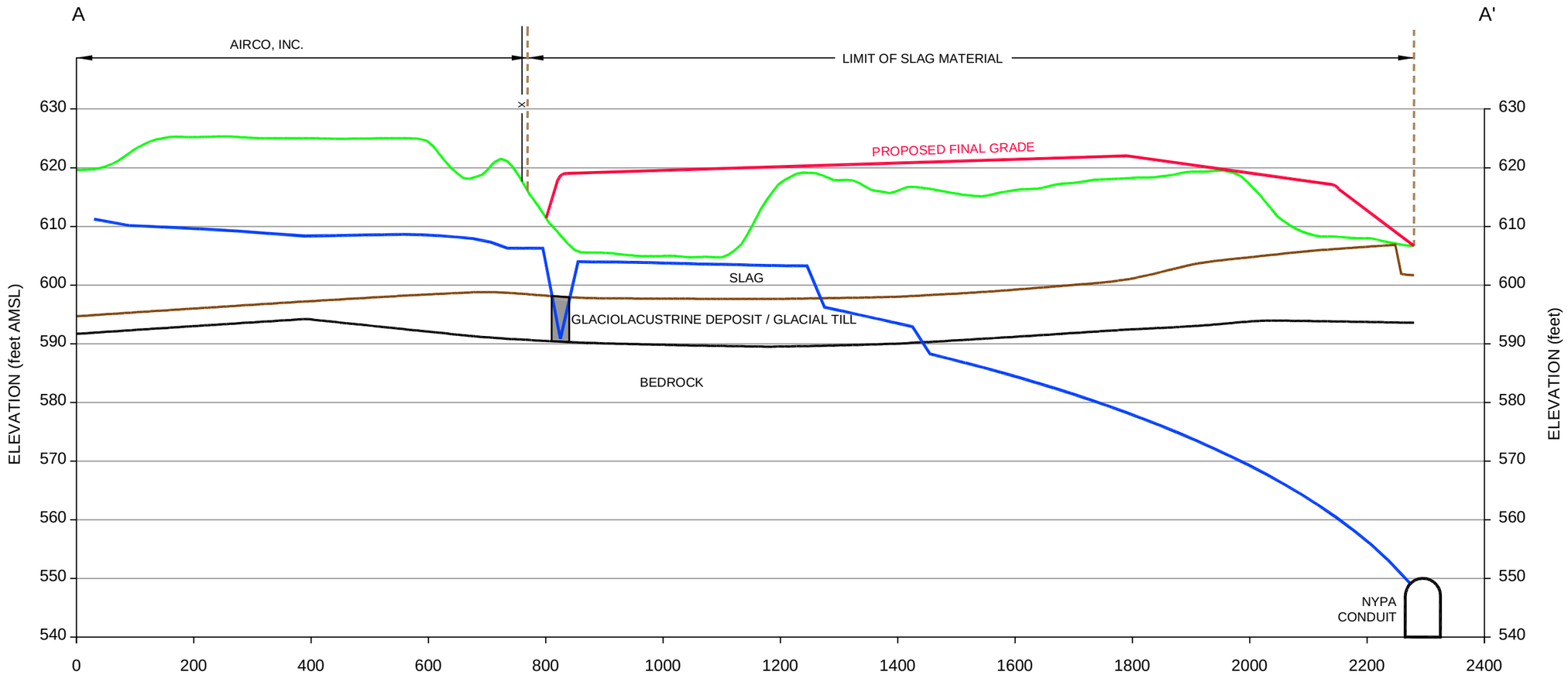
LEGEND

SIMULATED GROUNDWATER TABLE

figure F.6

SIMULATED GROUNDWATER TABLE - GCL/CLAY COVER
VANADIUM CORPORATION OF AMERICA SITE
Niagara Falls, NY

19867-00(008)GN-WA005 MAY 30/2005

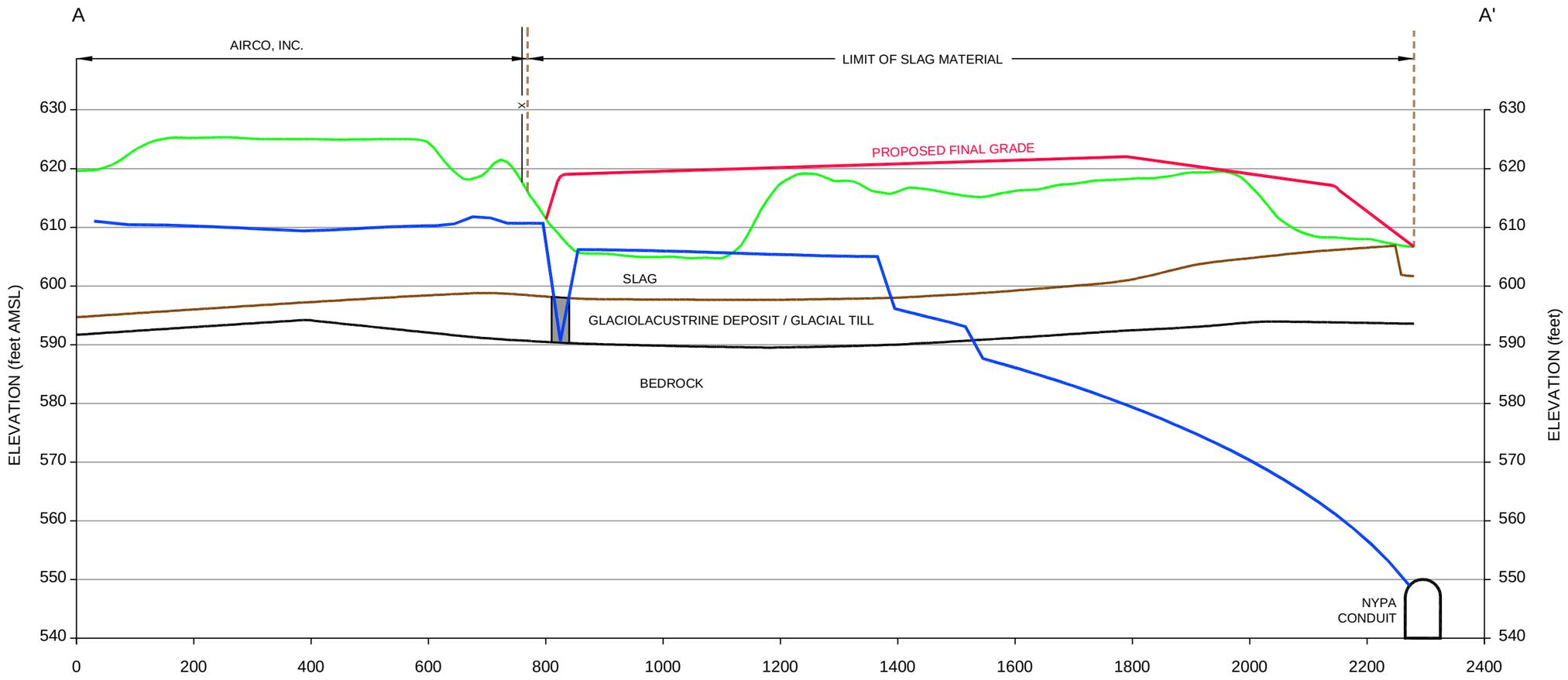


HORIZONTAL SCALE 1" = 200'
VERTICAL SCALE 1" = 20'
VERTICAL EXAGGERATION 10x

LEGEND
SIMULATED GROUNDWATER TABLE
UPGRADIENT DRAIN

figure F.7

SIMULATED GROUNDWATER TABLE - UPGRADIENT DRAIN
VANADIUM CORPORATION OF AMERICA SITE
Niagara Falls, NY

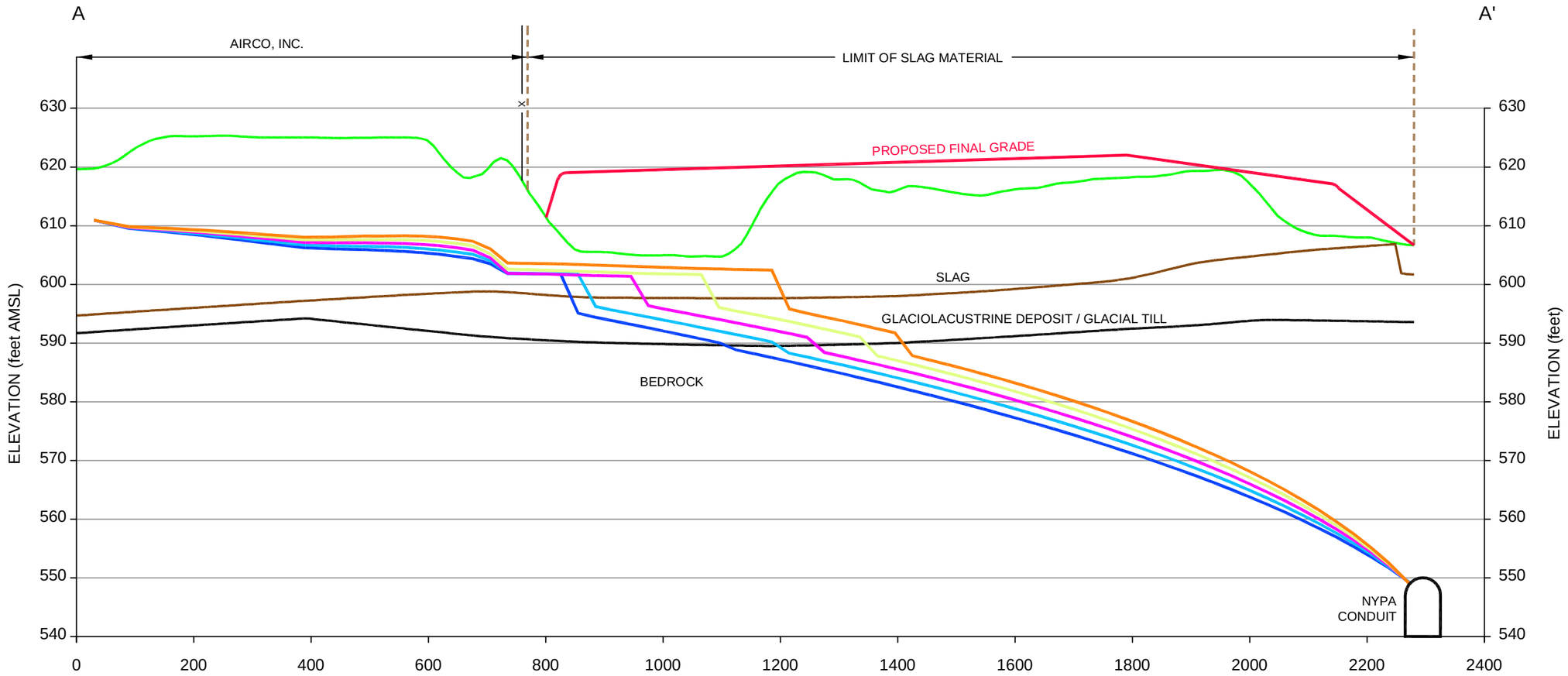


HORIZONTAL SCALE 1" = 200'
VERTICAL SCALE 1" = 20'
VERTICAL EXAGGERATION 10x

LEGEND
SIMULATED GROUNDWATER TABLE
UPGRADIENT DRAIN

figure F.8

SIMULATED GROUNDWATER TABLE - SOIL COVER WITH UPGRADIENT DRAIN
VANADIUM CORPORATION OF AMERICA SITE
Niagara Falls, NY



HORIZONTAL SCALE 1" = 200'
VERTICAL SCALE 1" = 20'
VERTICAL EXAGGERATION 10x

LEGEND

- SIMULATED GROUNDWATER TABLE - RECHARGE RATE 1" PER YEAR
- SIMULATED GROUNDWATER TABLE - RECHARGE RATE 2" PER YEAR
- SIMULATED GROUNDWATER TABLE - RECHARGE RATE 3" PER YEAR
- SIMULATED GROUNDWATER TABLE - RECHARGE RATE 4" PER YEAR
- SIMULATED GROUNDWATER TABLE - RECHARGE RATE 5" PER YEAR

figure F.9

SIMULATED GROUNDWATER TABLE - INCREMENTAL RECHARGE RATES
VANADIUM CORPORATION OF AMERICA SITE
Niagara Falls, NY

APPENDIX F

GROUNDWATER MODELING

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FIGURE F.2 MODEL DOMAIN AND BOUNDARY CONDITIONS

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FIGURE F.4 SIMULATED GROUNDWATER TABLE – SOIL COVER

FIGURE F.5 SIMULATED GROUNDWATER TABLE – CLAY COVER

FIGURE F.6 SIMULATED GROUNDWATER TABLE – GCL/CLAY COVER

FIGURE F.7 SIMULATED GROUNDWATER TABLE – UPGRADIENT DRAIN

FIGURE F.8 SIMULATED GROUNDWATER TABLE – SOIL COVER WITH UPGRADIENT DRAIN

FIGURE F.9 SIMULATED GROUNDWATER TABLES – INCREMENTAL RECHARGE RATES

LIST OF TABLES
(Following Text)

TABLE F.1 SUMMARY OF SIMULATION RESULTS

1.0 PURPOSE AND METHODOLOGY

- Purpose was to assess what infiltration rate could be maintained without a build-up of water in the slag.
- Simplified hydrogeological representation of slag, overburden, and bedrock units with a reasonable extent and regional flow condition in a 2-dimensional (2D) cross-sectional manner.
- Modeling intended to comparatively evaluate the influence of various capping options on local groundwater flow and water levels within the slag.
- Conservatively assumed that groundwater is always available from the west (upgradient of the landfill area).
- Model can't simulate perched groundwater conditions close to the New York Power Authority (NYPA) conduit.

2.0 MODEL TYPE AND SIMULATION PROGRAM

- Steady-state two-dimensional finite-difference groundwater flow model as constructed.
- Used United States Geological Survey (USGS) program MODFLOW-96 (McDonald and Harbaugh, 1988[1]; Harbaugh and McDonald, 1996[2]).
- Groundwater Vistas (Environmental Simulations, Inc., 2004[3]) was used as a graphical user interface (GUI) to develop the groundwater flow model.

---

1 McDonald, M.G. and A.W. Harbaugh, 1988, A Modular Three-Dimensional Finite-Difference Ground-Water Flow Model, United States Geological Survey Techniques of Water-Resources Investigations, Book 6, Chapter A1.

2 Harbaugh, A.W., and McDonald, M.G., 1996, User's documentation for MODFLOW-96, an update to the U.S. Geological Survey modular finite-difference ground-water flow model: U.S. Geological Survey Open-File Report 96-485, 56 p.

3 Environmental Simulations, Inc., 2004. *Guide to Using Groundwater Vistas*, Version 4, Reinholds, Pennsylvania.

3.0 MODEL DOMAIN

- Cross-section runs approximately along the observed groundwater flow directions in overburden and bedrock (Figure F.1), starting from the area of groundwater divide within AIRCO property to the NYPA conduits in the east.
- Overall dimensions are 2,280 feet in length and vertically from ground surface to 530 feet above mean sea level (AMSL) in bedrock with refined discretization zone of 30 feet in the area of interest (Figure F.2).
- In total there are 68 model cells ranging in length from 30 to 60 feet with grid cell expansion following a maximum factor of 1.5.

4.0 STRATIGRAPHIC REPRESENTATION

- Model simulates the slag material, glaciolacustrine deposits with glacial till, and limestone/dolostone bedrock.
- A three-layer model was used to represent the vertical stratigraphy within the model domain. Model Layer 1 represents primarily the slag (within the landfill area) and unknown materials within the neighboring AIRCO property; model Layer 2 represents glaciolacustrine and glacial till deposits; and model Layer 3 represents the underlying bedrock.

5.0 HYDRAULIC PROPERTIES

- Based on the laboratory test results (NYSDEC, 1997[4]), the saturated vertical hydraulic conductivities for the shallow and intermediate zones (silty clay) were from 1.0×10^{-9} cm/s to 3.5×10^{-6} cm/s with an arithmetic mean of 6.03×10^{-7} cm/s and a geometric mean of 1.96×10^{-8} cm/s for the shallow zone, and an arithmetic mean of 3.67×10^{-7} cm/s and a geometric mean of 1.96×10^{-8} cm/s for the intermediate zone, respectively.
- No tested hydraulic conductivities were available for the slag materials and the bedrock at the Vanadium Site.
- Estimated recharge was from 2 to 6 inches per year (in/year) (SSPA, etc., 2003[5]).
- Though groundwater divides were observed in the upgradient area (the model west extent), constant head was employed at the west to make the predictions conservative (Figure F.2).
- A constant head of 550 feet AMSL was used at the east in the bedrock layer to represent the NYPA conduit (Figure F.2).

---

4 New York State Department of Environmental Conservation (NYSDEC), 1997, Immediate Investigative Work Assignment (IIWA). Vanadium Corporation of America Site #932001. Operable Unit No. 3, prepared August 1997.

5 S.S. Papadopulos & Associates, Inc., Services Environmental, Inc., Conestoga-Rovers & Associates, May 31, 2005, Site Characterization Report - Groundwater Flow Model, Hyde Park Landfill Site, Town of Niagara, New York.

6.0 BASE CASE CALIBRATION

- Monitoring wells MW-22, MW-23 along the cross-section were selected for model calibration targets in the slag materials. Since no bedrock monitoring wells along the cross-section were available, two projected points (Figure F.1), one (BR-1) in-between MW-103B and MW-104B and the other (BR-2) in the vicinity of MW-102B along the cross-section, were selected as targets for bedrock. December 19, 2003 water levels were used to calibrate the model.
- The model calibrated parameters are listed as follows:
  - Hydraulic conductivity for the slag material is 1.23×10^{-3} cm/s (Kx) and the ratio of Kz/Kx is 1.
  - Hydraulic conductivity for Glaciolacustrine deposits/glacial till is 5.47×10^{-7} cm/s (Kx) and the ratio of Kz/Kx is 1.
  - Hydraulic conductivity for bedrock is 4.59×10^{-4} cm/s (Kx) and the ratio of Kz/Kx is 0.1.
  - Hydraulic conductivity for materials (above overburden) within the AIRCO property is 4.59×10^{-4} cm/s (Kx) and the ratio of Kz/Kx is 1.
  - The recharge rates are 6.13 in/year over the landfill and 4.82 in/year over the materials above the overburden within the AIRCO property, respectively.
- Figure F.3 shows the model calibrated groundwater tables. As shown on this figure, the simulated groundwater elevations match the observed elevations reasonably well.

7.0 PREDICTIVE SIMULATION RESULTS -- IMPACT OF CAPPING ON GROUNDWATER FLOW

The results are summarized in Table F.1. The details of each scenario are described in the following sections.

7.1 SOIL COVER

- The simulated soil cover was estimated to have a net recharge rate of 7.3 in/year.
- The simulated water table after the construction of a soil cover over the landfill is shown on Figure F.4.
- This type of cover will result in groundwater mounding in the slag with a mounding height of 14.65 feet (above the bottom of the slag) in the west portion of the slag.

7.2 CLAY COVER

- The simulated clay cover was estimated to have a net recharge rate of 0.53 in/year.
- The simulated water table after the construction of a clay cover over the landfill is shown on Figure F.5.
- This type of cover will not likely result in groundwater mounding in the slag, rather, the slag will remain unsaturated.

7.3 GCL/CLAY COVER

- The simulated GCL/clay cover was estimated to have a net recharge rate of 0.01 in/year.
- The simulated water table after the construction of a GCL/clay cover over the landfill is shown on Figure F.6.
- Like the clay cover scenario, the model demonstrates that the slag will remain unsaturated under this cover.

7.4 BASE CASE WITH AN UPGRADIENT DRAIN

- This scenario investigates the case when only a drain is installed in the upgradient area under the current (base case) condition and it was assumed that the drain bottom was on top of bedrock. The location of the drain is shown on Figure F.7.
- The simulated water table after the installation of a drain is shown on Figure F.7.
- By installing a drain only would result in a groundwater mounding height of 5.74 feet.

7.5 SOIL COVER WITH AN UPGRADIENT DRAIN

- This scenario investigates the case of a soil cover with a drain stalled in the upgradient area as shown on Figure F.8.
- The simulated water table after construction is shown on Figure F.8.
- This option would result in a groundwater mounding height of 8.02 feet within the west portion of the slag.

7.6 MAXIMUM RECHARGE ALLOWED THROUGH A COVER

- A series of incremental recharge rates through a cover were investigated to find a maximum recharge rate below which the slag would remain unsaturated. Starting from a recharge rate of 1 in/year to 5 in/year with an incremental rate of 1 in/year, so that five individual simulations were carried out.
- The simulated water tables are shown on Figure F.9.
- The model demonstrates that as long as a cover can maintain a net recharge rate below 2 in/year, the slag would remain unsaturated. When the recharge rate increased to 3 in/year, groundwater is predicted to start mounding below the existing pond area, and the saturated condition can spread up to the west portion of the slag when the recharge rate increased to 5 in/year.

TABLE F.1

SUMMARY OF SIMULATION RESULTS

Scenario	*Recharge Rate (Slag) (in/year)*	*Recharge Rate (AIRCO) (in/year)*	*Slag Condition*	*Approximate Maximum Water Table Elevation in Slag (ft AMSL)*	*Approximate Mound Height (ft)*
Base Case	6.13	4.82	western portion saturated	604.63	7.03
Soil Cover	7.30	4.82	western portion saturated	612.25	14.65
Clay Cover	0.53	4.82	unsaturated	-	-
GCL Cover	0.01	4.82	unsaturated	-	-
Upgradient Drain	6.13	4.82	west portion saturated	603.34	5.74
Soil Cover + Upgradient Drain	7.30	4.82	western portion saturated	605.62	8.02
Recharge Rate over a Cover	1.00	4.82	unsaturated	-	-
Recharge Rate over a Cover	2.00	4.82	unsaturated	-	-
Recharge Rate over a Cover	3.00	4.82	saturated (underneath the pond)	601.67	4.07
Recharge Rate over a Cover	4.00	4.82	saturated (underneath the pond)	601.98	4.38
Recharge Rate over a Cover	5.00	4.82	western portion saturated	602.78	5.18

APPENDIX E

HELP MODEL RESULTS FOR VARIOUS CAPPING OPTIONS

```
**********************************************************************
**********************************************************************
**                                                                  **
**                                                                  **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE        **
**                 HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)       **
**                   DEVELOPED BY ENVIRONMENTAL LABORATORY          **
**                    USAE WATERWAYS EXPERIMENT STATION             **
**              FOR USEPA RISK REDUCTION ENGINEERING LABORATORY      **
**                                                                  **
**                                                                  **
**********************************************************************
**********************************************************************

PRECIPITATION DATA FILE:     J:\SOFTWARE\HELP3\19867E.D4
TEMPERATURE DATA FILE:       J:\SOFTWARE\HELP3\19867.D7
SOLAR RADIATION DATA FILE:   J:\SOFTWARE\HELP3\19867.D13
EVAPOTRANSPIRATION DATA:     J:\SOFTWARE\HELP3\19867F.D11
SOIL AND DESIGN DATA FILE:   J:\SOFTWARE\HELP3\19867F1R.D10
OUTPUT DATA FILE:            J:\SOFTWARE\HELP3\19867F1R.OUT

TIME:   9:51     DATE:   3/ 2/2005

K = 1x10-4 cm/s for common fill

**********************************************************************

     TITLE:  Vanadium Corp Site - Slag Mound Final (Soil Cap)

**********************************************************************

     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
            COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                                LAYER  1
                                --------

                  TYPE 1 - VERTICAL PERCOLATION LAYER
                      MATERIAL TEXTURE NUMBER   8
          THICKNESS                     =      6.00   INCHES
          POROSITY                      =      0.4630 VOL/VOL
          FIELD CAPACITY                =      0.2320 VOL/VOL
          WILTING POINT                 =      0.1160 VOL/VOL
          INITIAL SOIL WATER CONTENT    =      0.4490 VOL/VOL
          EFFECTIVE SAT. HYD. COND.     =  0.369999994000E-03 CM/SEC
        NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  4.63
               FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.
```

LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 10

THICKNESS	=	18.00	INCHES
POROSITY	=	0.3980	VOL/VOL
FIELD CAPACITY	=	0.2440	VOL/VOL
WILTING POINT	=	0.1360	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3210	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.119999997000E-03	CM/SEC

LAYER 3

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 33

THICKNESS	=	200.00	INCHES
POROSITY	=	0.3750	VOL/VOL
FIELD CAPACITY	=	0.0550	VOL/VOL
WILTING POINT	=	0.0200	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1013	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.410000011000E-01	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE # 8 WITH A GOOD STAND OF GRASS, A SURFACE SLOPE OF 3.% AND A SLOPE LENGTH OF 500. FEET.

SCS RUNOFF CURVE NUMBER	=	71.80	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	32.000	ACRES
EVAPORATIVE ZONE DEPTH	=	24.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	8.472	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	9.942	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	3.144	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	28.732	INCHES
TOTAL INITIAL WATER	=	28.732	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
BUFFALO NEW YORK

STATION LATITUDE	=	42.93 DEGREES
MAXIMUM LEAF AREA INDEX	=	3.50
START OF GROWING SEASON (JULIAN DATE)	=	126
END OF GROWING SEASON (JULIAN DATE)	=	285
EVAPORATIVE ZONE DEPTH	=	24.0 INCHES
AVERAGE ANNUAL WIND SPEED	=	12.10 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	76.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	68.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	72.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR BUFFALO NEW YORK

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
3.02	2.40	2.97	3.06	2.89	2.72
2.96	4.16	3.37	2.93	3.62	3.42

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR BUFFALO NEW YORK

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
23.50	24.50	33.00	45.40	56.10	66.00
70.70	68.90	62.10	51.50	40.30	28.80

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR BUFFALO NEW YORK
AND STATION LATITUDE = 42.93 DEGREES

****

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 25

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	2.98	2.39	2.99	2.91	2.65	2.64
	2.98	3.89	3.20	2.98	3.74	3.10
STD. DEVIATIONS	0.89	0.94	0.95	1.28	1.11	1.09

	1.64	2.01	1.37	1.39	1.61	0.71
RUNOFF						
TOTALS	0.644	0.763	3.933	1.579	0.030	0.000
	0.012	0.003	0.000	0.000	0.003	0.099
STD. DEVIATIONS	0.864	0.757	2.200	1.676	0.152	0.000
	0.058	0.010	0.001	0.001	0.015	0.192
EVAPOTRANSPIRATION						
TOTALS	0.458	0.419	0.447	2.103	3.289	3.616
	2.823	3.570	2.433	1.416	1.018	0.602
STD. DEVIATIONS	0.083	0.093	0.126	0.862	1.007	1.207
	1.400	1.376	0.845	0.234	0.165	0.110
PERCOLATION/LEAKAGE THROUGH LAYER 3						
TOTALS	0.9452	0.6366	0.5176	0.5061	1.1285	0.8958
	0.6520	0.4873	0.3675	0.3203	0.2522	0.5873
STD. DEVIATIONS	0.6928	0.2826	0.1860	0.2728	0.3940	0.1730
	0.0840	0.0694	0.0698	0.0782	0.0789	0.6633

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 25

	INCHES		CU. FEET	PERCENT
PRECIPITATION	36.43	(3.788)	4231430.5	100.00
RUNOFF	7.068	(2.1246)	820991.44	19.402
EVAPOTRANSPIRATION	22.196	(2.4320)	2578229.75	60.930
PERCOLATION/LEAKAGE THROUGH LAYER 3	7.29627	(1.90933)	847534.250	20.02950
CHANGE IN WATER STORAGE	-0.132	(3.0389)	-15324.95	-0.362

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 25

	(INCHES)	(CU. FT.)
PRECIPITATION	4.00	464640.000
RUNOFF	3.946	458387.3750
PERCOLATION/LEAKAGE THROUGH LAYER 3	0.138828	16126.21480
SNOW WATER	7.84	910849.3120

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.4026
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.1310

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FINAL WATER STORAGE AT END OF YEAR 25

LAYER	(INCHES)	(VOL/VOL)
1	1.5103	0.2517
2	5.0261	0.2792
3	16.7125	0.0836
SNOW WATER	2.184	

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**                                                                  **
**                                                                  **
**                HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE     **
**                  HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)      **
**                   DEVELOPED BY ENVIRONMENTAL LABORATORY          **
**                    USAE WATERWAYS EXPERIMENT STATION             **
**                FOR USEPA RISK REDUCTION ENGINEERING LABORATORY   **
**                                                                  **
**                                                                  **
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PRECIPITATION DATA FILE:     J:\SOFTWARE\HELP3\19867E.D4
TEMPERATURE DATA FILE:       J:\SOFTWARE\HELP3\19867.D7
SOLAR RADIATION DATA FILE:   J:\SOFTWARE\HELP3\19867.D13
EVAPOTRANSPIRATION DATA:     J:\SOFTWARE\HELP3\19867F.D11
SOIL AND DESIGN DATA FILE:   J:\SOFTWARE\HELP3\19867F3.D10
OUTPUT DATA FILE:            J:\SOFTWARE\HELP3\19867F3.OUT

TIME:  11:10     DATE:   3/ 2/2005

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     TITLE:  Vanadium Corp Site - Slag Mound Final Conditions (Clay Cap)

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     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
            COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                                LAYER  1
                                --------

                  TYPE 1 - VERTICAL PERCOLATION LAYER
                       MATERIAL TEXTURE NUMBER   8
          THICKNESS                     =       6.00   INCHES
          POROSITY                      =       0.4630 VOL/VOL
          FIELD CAPACITY                =       0.2320 VOL/VOL
          WILTING POINT                 =       0.1160 VOL/VOL
          INITIAL SOIL WATER CONTENT    =       0.4491 VOL/VOL
          EFFECTIVE SAT. HYD. COND.     =  0.369999994000E-03 CM/SEC
       NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  4.63
              FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.
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LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 10

THICKNESS	=	36.00	INCHES
POROSITY	=	0.3980	VOL/VOL
FIELD CAPACITY	=	0.2440	VOL/VOL
WILTING POINT	=	0.1360	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2933	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.119999997000E-03	CM/SEC

LAYER 3

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 34

THICKNESS	=	0.24	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0153	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	33.0000000000	CM/SEC
SLOPE	=	3.00	PERCENT
DRAINAGE LENGTH	=	500.0	FEET

LAYER 4

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 16

THICKNESS	=	12.00	INCHES
POROSITY	=	0.4270	VOL/VOL
FIELD CAPACITY	=	0.4180	VOL/VOL
WILTING POINT	=	0.3670	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4270	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000001000E-06	CM/SEC

LAYER 5

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 33

THICKNESS	=	200.00	INCHES
POROSITY	=	0.3750	VOL/VOL
FIELD CAPACITY	=	0.0550	VOL/VOL
WILTING POINT	=	0.0200	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0572	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.410000011000E-01	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE # 8 WITH A GOOD STAND OF GRASS, A SURFACE SLOPE OF 3.% AND A SLOPE LENGTH OF 500. FEET.

SCS RUNOFF CURVE NUMBER	=	71.80	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	32.000	ACRES
EVAPORATIVE ZONE DEPTH	=	24.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	8.492	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	9.942	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	3.144	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	29.825	INCHES
TOTAL INITIAL WATER	=	29.825	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM BUFFALO NEW YORK

STATION LATITUDE	=	42.93	DEGREES
MAXIMUM LEAF AREA INDEX	=	3.50	
START OF GROWING SEASON (JULIAN DATE)	=	126	
END OF GROWING SEASON (JULIAN DATE)	=	285	
EVAPORATIVE ZONE DEPTH	=	24.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	12.10	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	76.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	68.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00	%

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING COEFFICIENTS FOR BUFFALO NEW YORK

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
3.02	2.40	2.97	3.06	2.89	2.72
2.96	4.16	3.37	2.93	3.62	3.42

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING COEFFICIENTS FOR BUFFALO NEW YORK

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
23.50	24.50	33.00	45.40	56.10	66.00
70.70	68.90	62.10	51.50	40.30	28.80

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR BUFFALO NEW YORK
AND STATION LATITUDE = 42.93 DEGREES

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 25

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	2.98	2.39	2.99	2.91	2.65	2.64
	2.98	3.89	3.20	2.98	3.74	3.10
STD. DEVIATIONS	0.89	0.94	0.95	1.28	1.11	1.09
	1.64	2.01	1.37	1.39	1.61	0.71
RUNOFF						
TOTALS	0.653	0.771	3.952	1.581	0.030	0.000
	0.012	0.004	0.002	0.001	0.007	0.103
STD. DEVIATIONS	0.874	0.763	2.211	1.678	0.152	0.000
	0.058	0.012	0.008	0.004	0.023	0.200
EVAPOTRANSPIRATION						
TOTALS	0.458	0.420	0.451	2.084	3.293	3.934
	2.823	3.579	2.413	1.377	1.001	0.600
STD. DEVIATIONS	0.083	0.092	0.127	0.841	0.992	1.161
	1.406	1.366	0.840	0.234	0.167	0.109
LATERAL DRAINAGE COLLECTED FROM LAYER 3						
TOTALS	0.3167	0.0243	0.1372	1.9795	0.9273	0.1303
	0.0084	0.0094	0.0713	0.2564	1.0222	1.4530
STD. DEVIATIONS	0.3277	0.0355	0.4142	0.8143	0.6553	0.0786
	0.0219	0.0362	0.1959	0.5027	1.2911	0.9050
PERCOLATION/LEAKAGE THROUGH LAYER 4						

TOTALS	0.0903	0.0222	0.0016	0.0501	0.1044	0.0810
	0.0082	0.0056	0.0110	0.0258	0.0470	0.0860
STD. DEVIATIONS	0.0333	0.0266	0.0051	0.0315	0.0039	0.0210
	0.0177	0.0183	0.0268	0.0374	0.0398	0.0247

PERCOLATION/LEAKAGE THROUGH LAYER 5

TOTALS	0.0597	0.0409	0.0180	0.0135	0.0462	0.0557
	0.0316	0.0106	0.0220	0.0385	0.0479	0.0598
STD. DEVIATIONS	0.0285	0.0260	0.0185	0.0180	0.0293	0.0238
	0.0189	0.0094	0.0173	0.0249	0.0279	0.0254

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 4

AVERAGES	0.0009	0.0001	0.0004	0.0059	0.0027	0.0004
	0.0000	0.0000	0.0002	0.0007	0.0030	0.0042
STD. DEVIATIONS	0.0009	0.0001	0.0012	0.0024	0.0019	0.0002
	0.0001	0.0001	0.0006	0.0014	0.0038	0.0026

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 25

	INCHES		CU. FEET	PERCENT
PRECIPITATION	36.43	(3.788)	4231430.5	100.00
RUNOFF	7.116	(2.1264)	826573.69	19.534
EVAPOTRANSPIRATION	22.434	(2.4718)	2605914.50	61.585
LATERAL DRAINAGE COLLECTED FROM LAYER 3	6.33592	(2.35886)	735980.062	17.39317
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.53329	(0.10223)	61947.121	1.46398
AVERAGE HEAD ON TOP OF LAYER 4	0.002	(0.001)		
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.44418	(0.18814)	51595.848	1.21935
CHANGE IN WATER STORAGE	0.098	(1.2977)	11365.79	0.269

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 25

	(INCHES)	(CU. FT.)
PRECIPITATION	4.00	464640.000
RUNOFF	3.960	459962.3750
DRAINAGE COLLECTED FROM LAYER 3	0.99355	115410.33600
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.003427	398.03763
AVERAGE HEAD ON TOP OF LAYER 4	0.089	
MAXIMUM HEAD ON TOP OF LAYER 4	0.177	
LOCATION OF MAXIMUM HEAD IN LAYER 3 (DISTANCE FROM DRAIN)	1.4 FEET	
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.005356	622.17426
SNOW WATER	7.84	910849.3120

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.4021
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.1310

*** Maximum heads are computed using McEnroe's equations. ***

Reference: Maximum Saturated Depth over Landfill Liner
by Bruce M. McEnroe, University of Kansas
ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

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FINAL WATER STORAGE AT END OF YEAR 25

LAYER	(INCHES)	(VOL/VOL)
1	1.5154	0.2526
2	9.7728	0.2715
3	0.0035	0.0146
4	5.1240	0.4270
5	13.6714	0.0684
SNOW WATER	2.184	

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**                                                                              **
**               HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE                  **
**                 HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)                   **
**                   DEVELOPED BY ENVIRONMENTAL LABORATORY                      **
**                     USAE WATERWAYS EXPERIMENT STATION                        **
**               FOR USEPA RISK REDUCTION ENGINEERING LABORATORY                **
**                                                                              **
**                                                                              **
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**********************************************************************************

PRECIPITATION DATA FILE:     J:\SOFTWARE\HELP3\19867E.D4
TEMPERATURE DATA FILE:       J:\SOFTWARE\HELP3\19867.D7
SOLAR RADIATION DATA FILE:   J:\SOFTWARE\HELP3\19867.D13
EVAPOTRANSPIRATION DATA:     J:\SOFTWARE\HELP3\19867F.D11
SOIL AND DESIGN DATA FILE:   J:\SOFTWARE\HELP3\19867F2B.D10
OUTPUT DATA FILE:            J:\SOFTWARE\HELP3\19867F2B.OUT

TIME:  10:49     DATE:   3/ 2/2005

**********************************************************************************

     TITLE:  Vanadium Corp Site - Slag Mound Final Conditions (GCL Cap)

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     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
              COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                                  LAYER  1
                                  --------

                  TYPE 1 - VERTICAL PERCOLATION LAYER
                      MATERIAL TEXTURE NUMBER   8
        THICKNESS                     =      6.00   INCHES
        POROSITY                      =      0.4630 VOL/VOL
        FIELD CAPACITY                =      0.2320 VOL/VOL
        WILTING POINT                 =      0.1160 VOL/VOL
        INITIAL SOIL WATER CONTENT    =      0.4491 VOL/VOL
        EFFECTIVE SAT. HYD. COND.     =  0.369999994000E-03 CM/SEC
     NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  4.63
              FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.
```

LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 10

THICKNESS	=	30.00	INCHES
POROSITY	=	0.3980	VOL/VOL
FIELD CAPACITY	=	0.2440	VOL/VOL
WILTING POINT	=	0.1360	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2966	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.119999997000E-03	CM/SEC

LAYER 3

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 34

THICKNESS	=	0.24	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0144	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	33.0000000000	CM/SEC
SLOPE	=	3.00	PERCENT
DRAINAGE LENGTH	=	500.0	FEET

LAYER 4

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.24	INCHES
POROSITY	=	0.7500	VOL/VOL
FIELD CAPACITY	=	0.7470	VOL/VOL
WILTING POINT	=	0.4000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08	CM/SEC

LAYER 5

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 33

THICKNESS	=	200.00	INCHES
POROSITY	=	0.3750	VOL/VOL
FIELD CAPACITY	=	0.0550	VOL/VOL
WILTING POINT	=	0.0200	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0550	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.410000011000E-01	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE # 8 WITH A GOOD STAND OF GRASS, A SURFACE SLOPE OF 3.% AND A SLOPE LENGTH OF 500. FEET.

SCS RUNOFF CURVE NUMBER	=	71.80	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	32.000	ACRES
EVAPORATIVE ZONE DEPTH	=	24.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	8.492	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	9.942	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	3.144	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	22.777	INCHES
TOTAL INITIAL WATER	=	22.777	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM BUFFALO NEW YORK

STATION LATITUDE	=	42.93	DEGREES
MAXIMUM LEAF AREA INDEX	=	3.50	
START OF GROWING SEASON (JULIAN DATE)	=	126	
END OF GROWING SEASON (JULIAN DATE)	=	285	
EVAPORATIVE ZONE DEPTH	=	24.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	12.10	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	76.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	68.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00	%

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING COEFFICIENTS FOR BUFFALO NEW YORK

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
3.02	2.40	2.97	3.06	2.89	2.72
2.96	4.16	3.37	2.93	3.62	3.42

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING COEFFICIENTS FOR BUFFALO NEW YORK

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
23.50	24.50	33.00	45.40	56.10	66.00
70.70	68.90	62.10	51.50	40.30	28.80

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR BUFFALO NEW YORK
AND STATION LATITUDE = 42.93 DEGREES

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 25

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	2.98	2.39	2.99	2.91	2.65	2.64
	2.98	3.89	3.20	2.98	3.74	3.10
STD. DEVIATIONS	0.89	0.94	0.95	1.28	1.11	1.09
	1.64	2.01	1.37	1.39	1.61	0.71
RUNOFF						
TOTALS	0.653	0.771	3.952	1.581	0.030	0.000
	0.012	0.004	0.002	0.001	0.007	0.103
STD. DEVIATIONS	0.874	0.763	2.211	1.678	0.152	0.000
	0.058	0.012	0.008	0.004	0.023	0.200
EVAPOTRANSPIRATION						
TOTALS	0.458	0.420	0.451	2.084	3.293	3.934
	2.823	3.579	2.413	1.377	1.001	0.600
STD. DEVIATIONS	0.083	0.092	0.127	0.841	0.992	1.161
	1.406	1.366	0.840	0.234	0.167	0.109
LATERAL DRAINAGE COLLECTED FROM LAYER 3						
TOTALS	0.2526	0.0048	0.1976	2.2593	0.8701	0.0891
	0.0055	0.0226	0.1023	0.3368	1.2018	1.5123
STD. DEVIATIONS	0.2893	0.0174	0.5672	0.8543	0.6854	0.0872
	0.0150	0.0698	0.2708	0.6091	1.3983	0.8702
PERCOLATION/LEAKAGE THROUGH LAYER 4						

TOTALS	0.0019	0.0001	0.0001	0.0018	0.0032	0.0011
	0.0001	0.0002	0.0004	0.0008	0.0016	0.0027
STD. DEVIATIONS	0.0010	0.0003	0.0002	0.0010	0.0002	0.0007
	0.0002	0.0006	0.0008	0.0011	0.0013	0.0008

PERCOLATION/LEAKAGE THROUGH LAYER 5

TOTALS	0.0019	0.0001	0.0001	0.0018	0.0032	0.0011
	0.0001	0.0002	0.0004	0.0008	0.0016	0.0027
STD. DEVIATIONS	0.0010	0.0003	0.0002	0.0010	0.0002	0.0007
	0.0002	0.0006	0.0008	0.0011	0.0013	0.0008

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 4

AVERAGES	0.0007	0.0000	0.0006	0.0261	0.0054	0.0003
	0.0000	0.0001	0.0003	0.0010	0.0036	0.0043
STD. DEVIATIONS	0.0008	0.0001	0.0016	0.0268	0.0160	0.0003
	0.0000	0.0002	0.0008	0.0018	0.0042	0.0025

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 25

	INCHES	CU. FEET	PERCENT
PRECIPITATION	36.43 (3.788)	4231430.5	100.00
RUNOFF	7.116 (2.1264)	826573.69	19.534
EVAPOTRANSPIRATION	22.434 (2.4718)	2605914.50	61.585
LATERAL DRAINAGE COLLECTED FROM LAYER 3	6.85480 (2.41683)	796253.812	18.81760
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.01394 (0.00302)	1618.757	0.03826
AVERAGE HEAD ON TOP OF LAYER 4	0.004 (0.002)		
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.01393 (0.00303)	1618.582	0.03825
CHANGE IN WATER STORAGE	0.009 (1.3009)	1069.29	0.025

PEAK DAILY VALUES FOR YEARS 1 THROUGH 25

	(INCHES)	(CU. FT.)
PRECIPITATION	4.00	464640.000
RUNOFF	3.960	459962.3750
DRAINAGE COLLECTED FROM LAYER 3	1.11219	129191.68700
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.001052	122.16064
AVERAGE HEAD ON TOP OF LAYER 4	2.353	
MAXIMUM HEAD ON TOP OF LAYER 4	1.870	
LOCATION OF MAXIMUM HEAD IN LAYER 3 (DISTANCE FROM DRAIN)	18.8 FEET	
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.000206	23.88526
SNOW WATER	7.84	910849.3120

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.4021
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.1310

*** Maximum heads are computed using McEnroe's equations. ***

Reference: Maximum Saturated Depth over Landfill Liner
by Bruce M. McEnroe, University of Kansas
ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

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FINAL WATER STORAGE AT END OF YEAR 25

LAYER	(INCHES)	(VOL/VOL)
1	1.5154	0.2526
2	8.1238	0.2708
3	0.0033	0.0139
4	0.1800	0.7500
5	11.0000	0.0550
SNOW WATER	2.184	

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**                                                                  **
**                                                                  **
**                HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE     **
**                  HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)      **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY           **
**                  USAE WATERWAYS EXPERIMENT STATION               **
**                FOR USEPA RISK REDUCTION ENGINEERING LABORATORY   **
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PRECIPITATION DATA FILE: J:\SOFTWARE\HELP3\19867E.D4
TEMPERATURE DATA FILE: J:\SOFTWARE\HELP3\19867.D7
SOLAR RADIATION DATA FILE: J:\SOFTWARE\HELP3\19867.D13
EVAPOTRANSPIRATION DATA: J:\SOFTWARE\HELP3\19867F.D11
SOIL AND DESIGN DATA FILE: J:\SOFTWARE\HELP3\19867F1R.D10
OUTPUT DATA FILE: J:\SOFTWARE\HELP3\19867F1R.OUT

TIME: 10:48 DATE: 3/ 9/2005

K = 1.9x10-6 cm/s for common fill

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TITLE: Vanadium Corp Site - Slag Mound Final (Soil Cap)

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NOTE: INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.

LAYER 1

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 8

THICKNESS	=	6.00 INCHES
POROSITY	=	0.4630 VOL/VOL
FIELD CAPACITY	=	0.2320 VOL/VOL
WILTING POINT	=	0.1160 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4439 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.369999994000E-03 CM/SEC

NOTE: SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY 4.63 FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.

1.9 X10^{-6}

LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 26

THICKNESS	=	18.00	INCHES
POROSITY	=	0.4450	VOL/VOL
FIELD CAPACITY	=	0.3930	VOL/VOL
WILTING POINT	=	0.2770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4380	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.190000003000E-05	CM/SEC

LAYER 3

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 33

THICKNESS	=	200.00	INCHES
POROSITY	=	0.3750	VOL/VOL
FIELD CAPACITY	=	0.0550	VOL/VOL
WILTING POINT	=	0.0200	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1008	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.410000011000E-01	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE # 8 WITH A GOOD STAND OF GRASS, A SURFACE SLOPE OF 3.% AND A SLOPE LENGTH OF 500. FEET.

SCS RUNOFF CURVE NUMBER	=	71.80	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	32.000	ACRES
EVAPORATIVE ZONE DEPTH	=	24.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	10.547	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	10.788	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	5.682	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	30.707	INCHES
TOTAL INITIAL WATER	=	30.707	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
BUFFALO NEW YORK

STATION LATITUDE	=	42.93 DEGREES
MAXIMUM LEAF AREA INDEX	=	3.50
START OF GROWING SEASON (JULIAN DATE)	=	126
END OF GROWING SEASON (JULIAN DATE)	=	285
EVAPORATIVE ZONE DEPTH	=	24.0 INCHES
AVERAGE ANNUAL WIND SPEED	=	12.10 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	76.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	68.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	72.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR BUFFALO NEW YORK

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
3.02	2.40	2.97	3.06	2.89	2.72
2.96	4.16	3.37	2.93	3.62	3.42

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR BUFFALO NEW YORK

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
23.50	24.50	33.00	45.40	56.10	66.00
70.70	68.90	62.10	51.50	40.30	28.80

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR BUFFALO NEW YORK
AND STATION LATITUDE = 42.93 DEGREES

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 25

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	2.98	2.39	2.99	2.91	2.65	2.64
	2.98	3.89	3.20	2.98	3.74	3.10
STD. DEVIATIONS	0.89	0.94	0.95	1.28	1.11	1.09

	1.64	2.01	1.37	1.39	1.61	0.71
RUNOFF						
TOTALS	0.776	0.945	4.544	1.768	0.032	0.000
	0.012	0.004	0.002	0.002	0.009	0.135
STD. DEVIATIONS	1.019	0.906	2.377	1.778	0.158	0.000
	0.058	0.013	0.009	0.005	0.028	0.264
EVAPOTRANSPIRATION						
TOTALS	0.458	0.420	0.448	1.959	3.059	3.993
	2.837	3.568	2.408	1.395	1.009	0.601
STD. DEVIATIONS	0.083	0.092	0.126	0.812	0.996	1.130
	1.426	1.366	0.824	0.233	0.162	0.110
PERCOLATION/LEAKAGE THROUGH LAYER 3						
TOTALS	0.9328	0.6352	0.5179	0.3478	0.5738	0.6908
	0.5564	0.4345	0.3372	0.3015	0.2354	0.5876
STD. DEVIATIONS	0.6882	0.2803	0.1844	0.1066	0.3174	0.1936
	0.0906	0.0753	0.0644	0.0880	0.0769	0.6724

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 25

	INCHES	CU. FEET	PERCENT
PRECIPITATION	36.43 (3.788)	4231430.5	100.00
RUNOFF	8.228 (2.2040)	955765.00	22.587
EVAPOTRANSPIRATION	22.156 (2.4337)	2573594.00	60.821
PERCOLATION/LEAKAGE THROUGH LAYER 3	6.15094 (1.83928)	714492.937	16.88538
CHANGE IN WATER STORAGE	-0.107 (2.9342)	-12421.81	-0.294

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 25

	(INCHES)	(CU. FT.)
PRECIPITATION	4.00	464640.000
RUNOFF	4.086	474645.2190
PERCOLATION/LEAKAGE THROUGH LAYER 3	0.144306	16762.59770
SNOW WATER	7.84	910849.3120

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.4491
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.2367

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FINAL WATER STORAGE AT END OF YEAR 25

LAYER	(INCHES)	(VOL/VOL)
1	1.5946	0.2658
2	7.4647	0.4147
3	16.7901	0.0840
SNOW WATER	2.184	

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(4)

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** **
** HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE **
** HELP MODEL VERSION 3.07 (1 NOVEMBER 1997) **
** DEVELOPED BY ENVIRONMENTAL LABORATORY **
** USAE WATERWAYS EXPERIMENT STATION **
** FOR USEPA RISK REDUCTION ENGINEERING LABORATORY **
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PRECIPITATION DATA FILE: J:\SOFTWARE\HELP3\19867E.D4
TEMPERATURE DATA FILE: J:\SOFTWARE\HELP3\19867.D7
SOLAR RADIATION DATA FILE: J:\SOFTWARE\HELP3\19867.D13
EVAPOTRANSPIRATION DATA: J:\SOFTWARE\HELP3\19867F.D11
SOIL AND DESIGN DATA FILE: J:\SOFTWARE\HELP3\19867F1R.D10
OUTPUT DATA FILE: J:\SOFTWARE\HELP3\19867F1R.OUT

TIME: 9:51 DATE: 3/ 2/2005

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TITLE: Vanadium Corp Site - Slag Mound Final (Soil Cap)

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NOTE: INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.

LAYER 1

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 8

THICKNESS	=	6.00	INCHES
POROSITY	=	0.4630	VOL/VOL
FIELD CAPACITY	=	0.2320	VOL/VOL
WILTING POINT	=	0.1160	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4490	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.369999994000E-03	CM/SEC

NOTE: SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY 4.63 FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.

LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 10

THICKNESS	=	18.00	INCHES
POROSITY	=	0.3980	VOL/VOL
FIELD CAPACITY	=	0.2440	VOL/VOL
WILTING POINT	=	0.1360	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3210	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.119999997000E-03	CM/SEC

LAYER 3

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 33

THICKNESS	=	200.00	INCHES
POROSITY	=	0.3750	VOL/VOL
FIELD CAPACITY	=	0.0550	VOL/VOL
WILTING POINT	=	0.0200	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1013	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.410000011000E-01	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE # 8 WITH A GOOD STAND OF GRASS, A SURFACE SLOPE OF 3.% AND A SLOPE LENGTH OF 500. FEET.

SCS RUNOFF CURVE NUMBER	=	71.80	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	32.000	ACRES
EVAPORATIVE ZONE DEPTH	=	24.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	8.472	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	9.942	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	3.144	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	28.732	INCHES
TOTAL INITIAL WATER	=	28.732	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
BUFFALO NEW YORK

STATION LATITUDE	=	42.93 DEGREES
MAXIMUM LEAF AREA INDEX	=	3.50
START OF GROWING SEASON (JULIAN DATE)	=	126
END OF GROWING SEASON (JULIAN DATE)	=	285
EVAPORATIVE ZONE DEPTH	=	24.0 INCHES
AVERAGE ANNUAL WIND SPEED	=	12.10 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	76.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	68.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	72.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR BUFFALO NEW YORK

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
3.02	2.40	2.97	3.06	2.89	2.72
2.96	4.16	3.37	2.93	3.62	3.42

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR BUFFALO NEW YORK

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
23.50	24.50	33.00	45.40	56.10	66.00
70.70	68.90	62.10	51.50	40.30	28.80

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR BUFFALO NEW YORK
AND STATION LATITUDE = 42.93 DEGREES

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 25

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	2.98	2.39	2.99	2.91	2.65	2.64
	2.98	3.89	3.20	2.98	3.74	3.10
STD. DEVIATIONS	0.89	0.94	0.95	1.28	1.11	1.09

	1.64	2.01	1.37	1.39	1.61	0.71
RUNOFF						
TOTALS	0.644	0.763	3.933	1.579	0.030	0.000
	0.012	0.003	0.000	0.000	0.003	0.099
STD. DEVIATIONS	0.864	0.757	2.200	1.676	0.152	0.000
	0.058	0.010	0.001	0.001	0.015	0.192
EVAPOTRANSPIRATION						
TOTALS	0.458	0.419	0.447	2.103	3.289	3.616
	2.823	3.570	2.433	1.416	1.018	0.602
STD. DEVIATIONS	0.083	0.093	0.126	0.862	1.007	1.207
	1.400	1.376	0.845	0.234	0.165	0.110
PERCOLATION/LEAKAGE THROUGH LAYER 3						
TOTALS	0.9452	0.6366	0.5176	0.5061	1.1285	0.8958
	0.6520	0.4873	0.3675	0.3203	0.2522	0.5873
STD. DEVIATIONS	0.6928	0.2826	0.1860	0.2728	0.3940	0.1730
	0.0840	0.0694	0.0698	0.0782	0.0789	0.6633

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 25

	INCHES		CU. FEET	PERCENT
PRECIPITATION	36.43	(3.788)	4231430.5	100.00
RUNOFF	7.068	(2.1246)	820991.44	19.402
EVAPOTRANSPIRATION	22.196	(2.4320)	2578229.75	60.930
PERCOLATION/LEAKAGE THROUGH LAYER 3	7.29627	(1.90933)	847534.250	20.02950
CHANGE IN WATER STORAGE	-0.132	(3.0389)	-15324.95	-0.362

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 25

	(INCHES)	(CU. FT.)
PRECIPITATION	4.00	464640.000
RUNOFF	3.946	458387.3750
PERCOLATION/LEAKAGE THROUGH LAYER 3	0.138828	16126.21480
SNOW WATER	7.84	910849.3120

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.4026
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.1310

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FINAL WATER STORAGE AT END OF YEAR 25

LAYER	(INCHES)	(VOL/VOL)
1	1.5103	0.2517
2	5.0261	0.2792
3	16.7125	0.0836
SNOW WATER	2.184	

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**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE        **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)        **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY           **
**                    USAE WATERWAYS EXPERIMENT STATION             **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY       **
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PRECIPITATION DATA FILE:    J:\SOFTWARE\HELP3\19867E.D4
TEMPERATURE DATA FILE:      J:\SOFTWARE\HELP3\19867.D7
SOLAR RADIATION DATA FILE:  J:\SOFTWARE\HELP3\19867.D13
EVAPOTRANSPIRATION DATA:    J:\SOFTWARE\HELP3\19867F.D11
SOIL AND DESIGN DATA FILE:  J:\SOFTWARE\HELP3\19867F3.D10
OUTPUT DATA FILE:           J:\SOFTWARE\HELP3\19867F3.OUT


TIME:  11:10     DATE:   3/ 2/2005


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     TITLE:  Vanadium Corp Site - Slag Mound Final Conditions (Clay Cap)

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     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
              COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                                LAYER  1
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                  TYPE 1 - VERTICAL PERCOLATION LAYER
                      MATERIAL TEXTURE NUMBER   8
          THICKNESS                    =      6.00   INCHES
          POROSITY                     =      0.4630 VOL/VOL
          FIELD CAPACITY               =      0.2320 VOL/VOL
          WILTING POINT                =      0.1160 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.4491 VOL/VOL
          EFFECTIVE SAT. HYD. COND.    =  0.369999994000E-03 CM/SEC
        NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  4.63
                 FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.
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LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 10

THICKNESS	=	36.00	INCHES
POROSITY	=	0.3980	VOL/VOL
FIELD CAPACITY	=	0.2440	VOL/VOL
WILTING POINT	=	0.1360	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2933	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.119999997000E-03	CM/SEC

LAYER 3

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 34

THICKNESS	=	0.24	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0153	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	33.0000000000	CM/SEC
SLOPE	=	3.00	PERCENT
DRAINAGE LENGTH	=	500.0	FEET

LAYER 4

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 16

THICKNESS	=	12.00	INCHES
POROSITY	=	0.4270	VOL/VOL
FIELD CAPACITY	=	0.4180	VOL/VOL
WILTING POINT	=	0.3670	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4270	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000001000E-06	CM/SEC

LAYER 5

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 33

THICKNESS	=	200.00	INCHES
POROSITY	=	0.3750	VOL/VOL
FIELD CAPACITY	=	0.0550	VOL/VOL
WILTING POINT	=	0.0200	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0572	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.410000011000E-01	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE # 8 WITH A GOOD STAND OF GRASS, A SURFACE SLOPE OF 3.% AND A SLOPE LENGTH OF 500. FEET.

SCS RUNOFF CURVE NUMBER	=	71.80	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	32.000	ACRES
EVAPORATIVE ZONE DEPTH	=	24.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	8.492	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	9.942	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	3.144	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	29.825	INCHES
TOTAL INITIAL WATER	=	29.825	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM BUFFALO NEW YORK

STATION LATITUDE	=	42.93	DEGREES
MAXIMUM LEAF AREA INDEX	=	3.50	
START OF GROWING SEASON (JULIAN DATE)	=	126	
END OF GROWING SEASON (JULIAN DATE)	=	285	
EVAPORATIVE ZONE DEPTH	=	24.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	12.10	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	76.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	68.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00	%

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING COEFFICIENTS FOR BUFFALO NEW YORK

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
3.02	2.40	2.97	3.06	2.89	2.72
2.96	4.16	3.37	2.93	3.62	3.42

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING COEFFICIENTS FOR BUFFALO NEW YORK

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
23.50	24.50	33.00	45.40	56.10	66.00
70.70	68.90	62.10	51.50	40.30	28.80

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR BUFFALO NEW YORK
AND STATION LATITUDE = 42.93 DEGREES

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 25

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	2.98	2.39	2.99	2.91	2.65	2.64
	2.98	3.89	3.20	2.98	3.74	3.10
STD. DEVIATIONS	0.89	0.94	0.95	1.28	1.11	1.09
	1.64	2.01	1.37	1.39	1.61	0.71
RUNOFF						
TOTALS	0.653	0.771	3.952	1.581	0.030	0.000
	0.012	0.004	0.002	0.001	0.007	0.103
STD. DEVIATIONS	0.874	0.763	2.211	1.678	0.152	0.000
	0.058	0.012	0.008	0.004	0.023	0.200
EVAPOTRANSPIRATION						
TOTALS	0.458	0.420	0.451	2.084	3.293	3.934
	2.823	3.579	2.413	1.377	1.001	0.600
STD. DEVIATIONS	0.083	0.092	0.127	0.841	0.992	1.161
	1.406	1.366	0.840	0.234	0.167	0.109
LATERAL DRAINAGE COLLECTED FROM LAYER 3						
TOTALS	0.3167	0.0243	0.1372	1.9795	0.9273	0.1303
	0.0084	0.0094	0.0713	0.2564	1.0222	1.4530
STD. DEVIATIONS	0.3277	0.0355	0.4142	0.8143	0.6553	0.0786
	0.0219	0.0362	0.1959	0.5027	1.2911	0.9050
PERCOLATION/LEAKAGE THROUGH LAYER 4						

TOTALS	0.0903	0.0222	0.0016	0.0501	0.1044	0.0810
	0.0082	0.0056	0.0110	0.0258	0.0470	0.0860
STD. DEVIATIONS	0.0333	0.0266	0.0051	0.0315	0.0039	0.0210
	0.0177	0.0183	0.0268	0.0374	0.0398	0.0247

PERCOLATION/LEAKAGE THROUGH LAYER 5

TOTALS	0.0597	0.0409	0.0180	0.0135	0.0462	0.0557
	0.0316	0.0106	0.0220	0.0385	0.0479	0.0598
STD. DEVIATIONS	0.0285	0.0260	0.0185	0.0180	0.0293	0.0238
	0.0189	0.0094	0.0173	0.0249	0.0279	0.0254

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 4

AVERAGES	0.0009	0.0001	0.0004	0.0059	0.0027	0.0004
	0.0000	0.0000	0.0002	0.0007	0.0030	0.0042
STD. DEVIATIONS	0.0009	0.0001	0.0012	0.0024	0.0019	0.0002
	0.0001	0.0001	0.0006	0.0014	0.0038	0.0026

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 25

	INCHES		CU. FEET	PERCENT
PRECIPITATION	36.43	(3.788)	4231430.5	100.00
RUNOFF	7.116	(2.1264)	826573.69	19.534
EVAPOTRANSPIRATION	22.434	(2.4718)	2605914.50	61.585
LATERAL DRAINAGE COLLECTED FROM LAYER 3	6.33592	(2.35886)	735980.062	17.39317
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.53329	(0.10223)	61947.121	1.46398
AVERAGE HEAD ON TOP OF LAYER 4	0.002	(0.001)		
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.44418	(0.18814)	51595.848	1.21935
CHANGE IN WATER STORAGE	0.098	(1.2977)	11365.79	0.269

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 25

	(INCHES)	(CU. FT.)
PRECIPITATION	4.00	464640.000
RUNOFF	3.960	459962.3750
DRAINAGE COLLECTED FROM LAYER 3	0.99355	115410.33600
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.003427	398.03763
AVERAGE HEAD ON TOP OF LAYER 4	0.089	
MAXIMUM HEAD ON TOP OF LAYER 4	0.177	
LOCATION OF MAXIMUM HEAD IN LAYER 3 (DISTANCE FROM DRAIN)	1.4 FEET	
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.005356	622.17426
SNOW WATER	7.84	910849.3120

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.4021
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.1310

*** Maximum heads are computed using McEnroe's equations. ***

Reference: Maximum Saturated Depth over Landfill Liner
by Bruce M. McEnroe, University of Kansas
ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

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FINAL WATER STORAGE AT END OF YEAR 25

LAYER	(INCHES)	(VOL/VOL)
1	1.5154	0.2526
2	9.7728	0.2715
3	0.0035	0.0146
4	5.1240	0.4270
5	13.6714	0.0684
SNOW WATER	2.184	

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**                                                                  **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE        **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)        **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY           **
**                    USAE WATERWAYS EXPERIMENT STATION             **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY       **
**                                                                  **
**                                                                  **
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PRECIPITATION DATA FILE:    J:\SOFTWARE\HELP3\19867E.D4
TEMPERATURE DATA FILE:      J:\SOFTWARE\HELP3\19867.D7
SOLAR RADIATION DATA FILE:  J:\SOFTWARE\HELP3\19867.D13
EVAPOTRANSPIRATION DATA:    J:\SOFTWARE\HELP3\19867F.D11
SOIL AND DESIGN DATA FILE:  J:\SOFTWARE\HELP3\19867F2.D10
OUTPUT DATA FILE:           J:\SOFTWARE\HELP3\19867F2.OUT

TIME:  12:51     DATE:   3/ 2/2005

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     TITLE:  Vanadium Corp Site - Slag Mound Final Conditions (GCL Cap)

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     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
              COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                                LAYER  1
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                  TYPE 1 - VERTICAL PERCOLATION LAYER
                      MATERIAL TEXTURE NUMBER   8
          THICKNESS                     =      6.00   INCHES
          POROSITY                      =      0.4630 VOL/VOL
          FIELD CAPACITY                =      0.2320 VOL/VOL
          WILTING POINT                 =      0.1160 VOL/VOL
          INITIAL SOIL WATER CONTENT    =      0.4491 VOL/VOL
          EFFECTIVE SAT. HYD. COND.     =  0.369999994000E-03 CM/SEC
        NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  4.63
                 FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.
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LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 10

THICKNESS	=	18.00	INCHES
POROSITY	=	0.3980	VOL/VOL
FIELD CAPACITY	=	0.2440	VOL/VOL
WILTING POINT	=	0.1360	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3221	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.119999997000E-03	CM/SEC

LAYER 3

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 34

THICKNESS	=	0.24	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0100	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	33.0000000000	CM/SEC
SLOPE	=	3.00	PERCENT
DRAINAGE LENGTH	=	500.0	FEET

LAYER 4

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.24	INCHES
POROSITY	=	0.7500	VOL/VOL
FIELD CAPACITY	=	0.7470	VOL/VOL
WILTING POINT	=	0.4000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08	CM/SEC

LAYER 5

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 33

THICKNESS	=	200.00	INCHES
POROSITY	=	0.3750	VOL/VOL
FIELD CAPACITY	=	0.0550	VOL/VOL
WILTING POINT	=	0.0200	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0550	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.410000011000E-01	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE # 8 WITH A GOOD STAND OF GRASS, A SURFACE SLOPE OF 3.% AND A SLOPE LENGTH OF 500. FEET.

SCS RUNOFF CURVE NUMBER	=	71.80	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	32.000	ACRES
EVAPORATIVE ZONE DEPTH	=	24.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	8.492	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	9.942	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	3.144	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	19.675	INCHES
TOTAL INITIAL WATER	=	19.675	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM BUFFALO NEW YORK

STATION LATITUDE	=	42.93	DEGREES
MAXIMUM LEAF AREA INDEX	=	3.50	
START OF GROWING SEASON (JULIAN DATE)	=	126	
END OF GROWING SEASON (JULIAN DATE)	=	285	
EVAPORATIVE ZONE DEPTH	=	24.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	12.10	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	76.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	68.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00	%

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING COEFFICIENTS FOR BUFFALO NEW YORK

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
3.02	2.40	2.97	3.06	2.89	2.72
2.96	4.16	3.37	2.93	3.62	3.42

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING COEFFICIENTS FOR BUFFALO NEW YORK

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
23.50	24.50	33.00	45.40	56.10	66.00
70.70	68.90	62.10	51.50	40.30	28.80

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR BUFFALO NEW YORK
AND STATION LATITUDE = 42.93 DEGREES

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 25

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	2.98	2.39	2.99	2.91	2.65	2.64
	2.98	3.89	3.20	2.98	3.74	3.10
STD. DEVIATIONS	0.89	0.94	0.95	1.28	1.11	1.09
	1.64	2.01	1.37	1.39	1.61	0.71
RUNOFF						
TOTALS	0.653	0.771	3.952	1.581	0.030	0.000
	0.012	0.004	0.002	0.001	0.007	0.103
STD. DEVIATIONS	0.874	0.763	2.211	1.678	0.152	0.000
	0.058	0.012	0.008	0.004	0.023	0.200
EVAPOTRANSPIRATION						
TOTALS	0.458	0.420	0.451	2.084	3.292	3.932
	2.822	3.579	2.414	1.377	1.001	0.600
STD. DEVIATIONS	0.083	0.092	0.128	0.841	0.992	1.162
	1.405	1.366	0.840	0.234	0.167	0.109
LATERAL DRAINAGE COLLECTED FROM LAYER 3						
TOTALS	0.0277	0.0000	0.3117	2.6757	0.4122	0.0236
	0.0074	0.0564	0.1189	0.4623	1.4753	1.2884
STD. DEVIATIONS	0.1050	0.0000	0.8710	0.9441	0.6987	0.0555
	0.0274	0.1707	0.3558	0.7990	1.5140	0.8123
PERCOLATION/LEAKAGE THROUGH LAYER 4						

TOTALS	0.0001	0.0000	0.0004	0.0039	0.0015	0.0001
	0.0001	0.0002	0.0002	0.0008	0.0017	0.0018
STD. DEVIATIONS	0.0002	0.0000	0.0010	0.0015	0.0013	0.0003
	0.0001	0.0003	0.0005	0.0010	0.0013	0.0009

PERCOLATION/LEAKAGE THROUGH LAYER 5

TOTALS	0.0001	0.0000	0.0001	0.0027	0.0027	0.0004
	0.0001	0.0002	0.0002	0.0007	0.0017	0.0018
STD. DEVIATIONS	0.0002	0.0000	0.0003	0.0017	0.0013	0.0007
	0.0001	0.0003	0.0005	0.0010	0.0013	0.0009

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 4

AVERAGES	0.0001	0.0000	0.0244	0.1857	0.0135	0.0001
	0.0000	0.0002	0.0004	0.0013	0.0047	0.0037
STD. DEVIATIONS	0.0003	0.0000	0.0678	0.1019	0.0634	0.0002
	0.0001	0.0005	0.0011	0.0023	0.0050	0.0023

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 25

	INCHES		CU. FEET	PERCENT
PRECIPITATION	36.43	(3.788)	4231430.5	100.00
RUNOFF	7.116	(2.1264)	826575.56	19.534
EVAPOTRANSPIRATION	22.431	(2.4718)	2605634.00	61.578
LATERAL DRAINAGE COLLECTED FROM LAYER 3	6.85961	(2.36359)	796811.937	18.83079
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.01066	(0.00281)	1238.324	0.02926
AVERAGE HEAD ON TOP OF LAYER 4	0.019	(0.005)		
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.01066	(0.00281)	1238.101	0.02926
CHANGE IN WATER STORAGE	0.010	(1.3237)	1170.03	0.028

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 25

	(INCHES)	(CU. FT.)
PRECIPITATION	4.00	464640.000
RUNOFF	3.960	459962.2500
DRAINAGE COLLECTED FROM LAYER 3	2.08977	242747.82800
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.004256	494.35526
AVERAGE HEAD ON TOP OF LAYER 4	9.786	
MAXIMUM HEAD ON TOP OF LAYER 4	12.923	
LOCATION OF MAXIMUM HEAD IN LAYER 3 (DISTANCE FROM DRAIN)	74.7 FEET	
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.000303	35.18422
SNOW WATER	7.84	910849.3120

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.4021
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.1310

*** Maximum heads are computed using McEnroe's equations. ***

Reference: Maximum Saturated Depth over Landfill Liner
by Bruce M. McEnroe, University of Kansas
ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

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FINAL WATER STORAGE AT END OF YEAR 25

LAYER	(INCHES)	(VOL/VOL)
1	1.5154	0.2526
2	5.0444	0.2802
3	0.0024	0.0100
4	0.1800	0.7500
5	11.0000	0.0550
SNOW WATER	2.184	

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