2021 Hazardous Waste Scanning Project

File Form Naming Convention.

(*File_Type*).(*Program*).(*Site_Number*).(*YYYY-MM-DD*).(*File_Name*).pdf

Note 1: Each category is separated by a period "."
Note 2: Each word within category is separated by an underscore "_"

Specific File Naming Convention Label:

Report.HW.932026.1987-09-01.Roadway_Embankment_Sampling.pdf

SUMMARY OF SAMPLING AND ANALYSIS OF ROADWAY EMBANKMENT ALONG CHEW ROAD, NIAGARA COUNTY, NEW YORK

September 1987

Introduction

At the request of the New York State Department of Transportation (NYSDOT) Region 5 Office, Ecology and Environment, Inc., (E & E) performed sampling and analysis of soil and sediment along and in the vicinity of Chew Road on the Tuscarora Indian Reservation in the Town of Lewiston, Niagara County, New York. The purpose of the sampling program was to determine whether the embankment material which was used in the 1950s for construction of Chew Road contains any contaminants of concern, and whether there had been any migration of contaminants from the embankment through leaching. Concern for potential contamination is based on the fact that the embankment material was derived from open hearth slag residue from steel manufacturing operations.

To determine whether there was any contamination of the embankment material and areas adjacent to the roadway, soil samples were collected from the roadway embankment, roadside drainage ditches, and from two small creeks which cross Chew Road. These samples, which were collected between August 4 and August 6, 1987, were analyzed at E & E's Analytical Services Center (ASC) for potential contaminants of concern. This letter report describes the sampling program and presents the results of the laboratory analyses. The report is divided into four sections: methods, field monitoring, sample analysis, and laboratory results.

Methods

Embankment material was collected at 35 locations along Chew Road. The samples were located approximately every 200 feet on alternate sides of the road (i.e., at 200, 600, 1000 feet, etc., from NY Route 31 on the east side of the road, and at 400, 800, 1200 feet, etc., from NY Route 31 on the west side of the road).

Samples of stream sediments were collected from two creeks which are crossed by Chew Road. Two upstream and two downstream sediment samples were collected from each creek. At the southern creek, downstream sediment samples were collected 40 feet and 70 feet west of the road. Upstream sediment samples were collected 1/4 mile east of Chew Road at a location approximately 200 feet east of a Town of Lewiston Flood Control Pump Station.

At the northern creek, downstream sediment samples were collected at locations 50 feet and 100 feet west of Chew Road. Upstream sediment samples were collected 50 feet and 100 feet east of Chew Road.

Ten samples were also collected from roadside drainage ditches. The ten samples consisted of pairs of samples collected at five locations in the drainage ditches from opposite sides of Chew Road. These samples were collected from areas which were likely to have received leachate from the roadway. In particular, one sample was collected near the southern end of Chew Road where a material apparently derived from the embankment was observed on the east side of the road.

Background samples also were collected from two locations off the road. One sample was collected approximately 75 feet from Chew Road in a recently tilled field located on the west side of Chew Road near NY Route 31. The other background sample was collected approximately 100 feet east of Chew Road near survey station number 38+00.

Samples of embankment material underlying Chew Road were collected using a backhoe. The depth at which slag residue was encountered beneath the road ranged from 1 to 6 feet. Samples were excavated in the side slope area in the embankment immediately adjacent to the road surface. A sample of material was collected using a stainless steel spoon and placed into an 8-ounce glass jar. A minimum of one 8-ounce sample was collected at each sampling location for metals analysis.

Additional 8-ounce samples were collected at two locations along Chew Road (sampling stations 20 and 26) for laboratory QA/QC procedures. At these locations, samples also were collected for priority pollutant analysis. These samples consisted of an additional 8-ounce glass container and a 40-milliliter (ml) teflon sealed glass vial.

Stream sediment samples were collected from exposed stream bed areas using stainless steel spoons, and placed into 8-ounce glass jars. To the extent possible, care was taken to avoid the collection of water or vegetation occuring in the sample area.

Samples of drainage ditch sediment were collected from both sides of the road at the toe of the embankment using stainless steel spoons. The collected soil was placed into 8-ounce glass jars. As described for the stream sediment samples, care was taken to avoid the collection of water or vegetation present in the sampling areas.

The background soil samples also were collected using stainless steel spoons and placed into 8-ounce glass jars.

All samples were maintained under strict chain-of-custody procedures from the time of collection through delivery to E & E's ASC in Cheektowaga, New York.

Prior to any sample collection, the excavated areas were screened for organic vapors, combustible gas, and radiation. An HNu Model PI 101 photoionizer was used to survey each excavation for organic vapor emissions prior to collection of any embankment or soil/sediment material throughout the sampling program. The HNu was calibrated daily.

In addition, an MSA Model 260 O_2/combustible gas detector was used to detect the presence of any explosive gas emissions from the excavations. The unit was calibrated on a daily basis prior to use in the field.

Prior to collection of any embankment material, a radiation detector (Solar Electronics International Monitor 4) was used to survey all excavations for radioactive emissions throughout the sampling event. Additional measurements of radiation levels were obtained along Chew Road on August 4, 1987. Each of 19 excavations completed that day was checked for radiation with a Ludlum Model 19 Micro-R meter and a Ludlum Model 3 survey meter with external Geiger-Mueller pancake probe. Material placed into each sample container was also surveyed prior to capping. The Model 19 was also used to perform a complete walkover along both sides of the portion of Chew Road which was to be sampled on subsequent days. For comparison, background radiation readings were taken approximately 1 mile from Chew Road, and at the NYSDOT field office.

Field Monitoring

None of the areas surveyed showed any evidence of organic vapor emissions, and there were no indications of any explosive gas emission at any excavation.

All of the areas (materials and samples) surveyed along Chew Road were within the background radiation levels of 8 to 10 micro roentgens per hour (ur/hr) measured with the Model 19, and 20 to 30 counts per minute (CPM) measured with the Model 3. The walkover of Chew Road with the Model 19 failed to indicate any areas of above background radioactivity. The Solar Electronics Monitor 4 radiation detector, used to monitor each excavation, also showed no radioactivity above background levels.

Sample Analysis

Samples delivered to the ASC were composited according to the scheme outlined in Table 1. Only a portion of each sample was required for compositing purposes; the remainder of each sample was stored for further analysis if required.

After compositing, 14 samples, plus two background samples were analyzed for the 23 metals identified as part of the U. S. Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP). The CLP series of metals were chosen for anlaysis because they provide the most complete series of metals, and include analysis of several metals not included in either the Priority Pollutant Metal Series or the New York State Drinking Water Series. Table 2 lists the 23 metals for which the soil samples were analyzed. Two additional samples were analyzed for total priority pollutants.

Results

This section summarizes the results of the laboratory analyses for total priority pollutants and CLP metals. The resultsfor metals are presented in Table 3, and the complete laboratory reports are presented in Appendix A.

Total Priority Pollutants Analyses. Two embankment samples, CR20 and CR26, were analyzed for total priority pollutants. No purgeable organic, base/neutral extractable, acid extractable, or cyanide constituents were identified at concentrations which exceeded measurable detection limits. (See Appendix A).

CLP Metals Analyses. Results of the laboratory analyses for the CLP metals, as shown in Table 3, indicate that for 16 of the 23 metals, concentrations in the embankment, drainage ditches, and stream sediments were similar to or less than concentrations found in background samples collected approximately 75 to 100 feet from the road. In addition, the concentrations of these metals are within the range which is typical of uncontaminated conditions.

Seven metals were found to be present in the embankment, drainage ditches and/or stream sediments at levels higher than those in the background samples. These metals include antimony, calcium, chromium, iron, magnesium, sodium and vanadium. This is not unexpected as these constituents are normal by-products of the vanadium, chrome or stainless steel production operations from which the embankment material was derived. In addition, some constituents (ie. calcium and sodium) could be the result of normal roadway maintenance (ie. salt application). The occurrence of these seven constituents are discussed below.

Antimony was present in the embankment at levels ranging from 15.3 to 36.3 mg/kg [1] (mean = 25 mg/kg). Antimony was not present at levels above detection (< 12 mg/kg) in either the background samples or the drainage ditches, and was only recorded in one of the four stream sediment samples (15.7 mg/kg in the downstream sample from south creek). The other three stream sediment samples were below detection limits.

Calcium was present in the embankment material at levels ranging from 89,300 to 139,000 mg/kg (mean = 123,21 mg/kg), and in the drainage ditches at 10,900 and 38,070 mg/kg. For comparison, background samples had 1,840 and 1,850 mg/kg calcium.

Calcium also was present in the two streams at levels above background, and although the downstream sediments had higher calcium levels than the upstream samples, both of the upstream samples also had higher levels than background. In the south creek, upstream samples had 36,800 mg/kg calcium and the downstream samples had 133,000 mg/kg. In the north creek, upstream samples had 6,260 mg/kg and the downstream samples 9,760 mg/kg.

1 mg/kg = parts per million dry weight

Chromium was present in the embankment samples at levels ranging from 539 mg/kg to 1660 mg/kg (mean = 1122 mg/kg), and in the drainage ditches at 31 and 58 mg/kg. For comparison the background samples had 15 and 19 mg/kg chromium. Three of the four stream sediment samples had levels similar to or less than background (9 to 17 mg/kg), whereas the downstream sample in the south creek was above background (147 mg/kg).

Iron was present in the embankment sample at levels ranging from 218 mg/kg to 5,000 mg/kg (mean = 2,274 mg/kg), and although several of the embankment samples were higher than background, the average level for all samples of 2,274 mg/kg was not substantially higher than the two background samples (1,170 and 1,950 mg/kg).

The drainage ditches had iron levels higher than both background and embankment (17,400 and 20,800 mg/kg), as did three of the four stream samples (6,880 to 13,800 mg/kg); the fourth stream sample was similar to background (1920 mg/kg). It should be noted that the upstream sample from the north creek had an iron concentration nearly five times higher than the average level in the embankment (10,500 vs 2,174 mg/kg) and over twice that in the highest embankment sample (5,000 mg/kg).

Magnesium levels in the embankment ranged from 27,600 to 71,000 mg/kg (mean= 52,989 mg/kg), compared with the background samples which contained 2,940 and 2,550 mg/kg magnesium. Samples from both drainage ditches (5,980 and 7,740 mg/kg) as well as both upstream (4,010 and 8,510 mg/kg) and downstream (6,040 and 6,130 mg/kg) sediment samples from the creeks also contained more magnesium than background, but less than the embankment. In the case of the south creek, the upstream sediment sample actually had higher magnesium concentrations than the downstream sample (8,510 vs 6,130 mg/kg).

Sodium levels in the embankment ranged from 326 to 1,960 mg/kg (mean = 895 mg/kg) compared with the background samples which were 50.6 and 77.8 mg/kg. Levels of sodium in the drainage ditches and stream sediments were also above background, but generally below the levels in the embankment. One exception to this was the downstream sample in the south creek (1,060 mg/kg) which was higher than most embankment samples. Also of interest

was the result that downstream sodium concentrations in the north creek were lower (slightly) than upstream samples (228 vs 276 mg/kg).

The average concentration of vanadium in the embankment was 30.6 mg/kg (range 20.3 to 43.4 mg/kg); this was only slightly higher than the background samples (23 and 27 mg/kg). Samples from the drainage ditch were also similar to background and embankment samples (25.2 and 30.9 mg/kg), and stream sediment samples were generally less than background (7.5 to 23.3 mg/kg).

EP Toxicity. In addition to the analysis for total metal content, the three embarkment samples with the highest reported concentrations of chromium and vanadium were analyzed to determine whether these metals were subject to leaching out of the embankment, and thus could be considered hazardous materials.

The test performed was the EP Toxicity test in which the material to be tested is subject to a moderately acidic solution which will serve to dissolve those metals which are not tightly bound to the sediment.

The results of the EP Toxicity analysis, which are shown in Table 4, indicate that neither the chromium nor vanadium in the embankment material is subject to any substantial leaching and subsequent release into surface or groundwaters.

Discussion

The results of the laboratory analyses indicate that with the exception of some metals, there are no priority pollutants present in the embankment material. Of the 23 metals for which analyses were performed, 16 were present at limits similar to or less than background samples. The remaining seven metals which are present at levels above background are normal by-products of the steel manufacturing operations from which the embankment material was derived. Of these seven metals, four were present at levels considerably higher than background: calcium, chromium, magnesium and sodium. Of these, sodium, calcium and magnesium are not hazardous, and are, actually essential elements for human health. Chromium can be considered hazardous under some circumstances, but the chromium, bound to the slag, does not present a human health threat. The remaining three metals (antimony, iron and vanadium) were present at levels only slightly above background, and were not present at levels which are of any concern to public health.

In addition, the results of EP Toxicity tests indicate that the two metals tested (chromium and vanadium) are not readily soluble or subject to leaching from the embankment. Because of the nature of the embankment material, the other metals are likely to behave in a similar fashion, and thus not be subject to leaching either.

In summary, the constituents present in the roadway embankment are not hazardous, and the metals appear to be tightly bound to the slag and thus not subject to leaching and migration from the site. The completion of the resurfacing operation of Chew Road will not result in any adverse health effects if standard dust suppression methods are employed during construction.

TABLE 1

SUMMARY OF SAMPLE
COMPOSITING FOR ANALYSIS

Sample Area	Samples Collected	Composites	Sample Numbers Composited	Laboratory Analyses Performed
Chew Road Embankment	35	7	1 - 5	CLP Metals
			6 - 10	CLP Metals
			11 - 15	CLP Metals
			16 - 20	CLP Metals
			21 - 25	CLP Metals
			26 - 30	CLP Metals
			31 - 35	CLP Metals
	1	-	20	Total Priority Pollutant Sample and Duplicate Analyses for CLP Metals
	1	-	26	Total Priority Pollutant Sample and Duplicate Analyses for CLP Metals
Drainage Ditches				
East Ditch	5	1	1 - 5	CLP Metals
West Ditch	5	1	1 - 5	CLP Metals
Stream Samples				
North Creek downstream	2	1	1 - 2	CLP Metals
North Creek upstream	2	1	1 - 2	CLP Metals
South Creek downstream	2	1	1 - 2	CLP Metals
South Creek upstream	2	1	1 - 2	CLP Metals
Background Samples				
Background 1	1	-	-	CLP Metals
Background 2	1	-	-	CLP Metals

Source: Ecology & Environment, Inc., 1987

TABLE 2

METALS FOR WHICH SOIL SAMPLES
WERE ANALYZED

Aluminum	Al
Antimony	Sb
Arsenic	As
Barium	Ba
Beryllium	Be
Cadmium	Cd
Chromium	Cr
Calcium	Ca
Cobalt	Co
Copper	Cu
Iron	Fe
Lead	Pb
Magnesium	Mg
Manganese	Mn
Mercury	Hg
Nickel	Ni
Potassium	D
Selenium	Se
Silver	Ag
Sodium	Na
Thallium	Th
Vanadium	V
Zinc	Zn

Source: Ecology and Environment, Inc., 1987

TABLE 3

SUMMARY OF ANALYTICAL RESULTS FOR
CLP METALS
(ALL RESULTS IN MG/KG)

METAL	OFF-ROAD BACKGROUND B-1	OFF-ROAD BACKGROUND B-2	EMBANKMENT SAMPLES Comp * 1 (Stn. 1-5)	Comp 2 (Stn. 6-10)	Comp 3 (Stn. 11-15)	Comp 4 (Stn. 16-20)	CR #20 Duplicate	Comp 5 (Stn. 21-25)	CR #26 Duplicate	Comp 6 (Stn. 26-30)	Comp 7 (Stn. 31-35)	DRAINAGE DITCHES Comp 8 East Ditch	Comp 8 West Ditch	SOUTH CREEK Comp 9 Down-Stream	Comp 10 Up-Stream	NORTH CREEK Comp 11 Down Stream	Comp 12 Up-Stream
Al	14800	11400	11100	1004	686	11300	12300	10100	869	9660	5810	1530	16010	5200	12200	9570	7503
Sb	<12.0	<12.0	33.6	36.3	22.0	36.3	18.3	18.7	28.8	15.7	15.3	<12.0	<12.0	15.7	<12.0	<12.0	<12.0
As	2.43	1.84	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	1.16	3.05	<1.65	1.77	2.31	1.44
Ba	63.8	53.9	35.2	15.2	17.5	36.6	16.1	23.8	17.2	22.0	14.4	100	113	126	90.6	68.2	58.7
Be	<1.0	<1.0	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Cd	<1.0	<1.0	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	1.09	<1.00	<1.00	<1.00	<1.00
Ca	1850	1840	118000	13900	89300	12300	17100	119000	128000	122000	99600	38070	10900	133000	36800	9760	6260
Cr	18.8	14.8	1590	1660	979	1650	539	892	1180	948	657	57.9	31.1	147	16.5	14.2	8.75
Co	7.02	9.96	2.04	2.21	<2.00	2.22	<2.00	<2.00	2.19	<2.00	<2.00	6.49	8.49	<2.00	7.73	5.70	5.52
Cu	8.80	11.5	8.59	6.60	4.34	10.7	3.03	7.22	6.13	7.71	3.40	16.3	23.9	3.36	15.6	14.9	11.1
Fe	1950	1170	5000	218	1370	3810	757	3003	3180	1780	1350	17400	20800	6880	1920	13800	10500
Pb	15.0	22.5	2.12	1.85	2.49	7.35	2.00	5.88	7.24	10.4	6.63	22.5	34.1	13.6	5.95	18.5	9.04
Mg	2940	2550	59500	67800	43800	54200	55400	49800	71400	47400	27600	5980	7440	6130	8510	6040	4010
Mn	323	832	398	217	220	284	151	231	327	235	135	350	490	273	459	209	344
Hg	<0.1	<0.221	<0.10	<0.10	<0.10	<0.10	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Ni	13.5	13.3	11.8	8.37	5.24	9.31	3.80	7.03	7.02	3.98	3.42	16.8	20.7	4.48	18.1	13.1	9.06
K	1060	1540	307	59.5	95.2	366	68.0	235	246	121	92.2	1800	2190	726	2450	1560	1240
Se	-	-	<5.00	<5.00	<5.00	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<2.0	<2.0
Ag	<2.0	<2.0	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Na	77.8	50.6	947	363	362	1047	1960	999	440	1055	914	598	328	1060	250	228	276
Ti	-	-	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
V	26.5	22.5	43.4	34.9	28.1	35.6	25.3	29.8	27.1	30.9	20.3	25.2	30.9	7.50	23.3	18.4	13.1
Zn	51.4	67.2	50.6	18.4	14.7	41.4	8.90	26.2	79.1	15.4	11.7	687	431	45.9	63.4	167	137
Cn	-	-	-	-	-	-	<1	-	<1	-	-	-	-	-	-	-	-

Source: Ecology and Environment, Inc., 1987

* Comp # = Composite sample number
** Stn. # = Embankment sample station
*** CR #20 or CR #26 = Individual sampling stations

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TABLE 4

SUMMARY OF EP TOXICITY TESTS

FOR CHROMIUM AND VANADIUM

	SAMPLE NUMBER		
Metal	Comp CR #1-5	Comp. CR #6-10	Comp. CR #11-15
Chromium	1.16	1.11	0.836
Vanadium	0.5	0.5	0.5

Source: Ecology & Environment, Inc.

APPENDIX A

LABORATORY RESULTS

M E M O R A N D U M

TO: Craig Ferris

FROM: Gary Hahn G. Hahn ITD

DATE: August 26, 1987

SUBJECT: New York State Department of Transportation - TUSCARORA Report

REF: U-6087

CC: Lab File, QA/QC File

Attached is the laboratory report of the analysis conducted on three samples received at the Analytical Services Center on August 4, 1987. Analysis was performed according to the procedures set forth in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

All samples on which this report is based will be retained by E & E for a period of 30 days from the date of this report, unless otherwise instructed by the client. If additional storage of samples is requested by the client, a storage fee of $1.00 per sample container per month will be charged for each sample, with such charges accruing until destruction of the samples is authorized by the client.

GH/mgs
Enclosure

ecology and environment, inc.
International Specialists in the Environment

LABORATORY REPORT

FOR
NEW YORK STATE DEPARTMENT OF TRANSPORTATION
TUSCARORA

U-6087

Job No.: U-6087			RE:			
Sample Date: 8/4/87			P.O. No.:			
Date Received: 8/4/87			Sampled By: E & E, Inc.			
Sample Type: Soil			Delivered By: E & E, Inc.			
E & E Lab. No. 87-	8073	8074	8075			
Customer No.						
Sample Identity	Comp. CR 1-5	Comp. CR 6-10	Comp. CR 11-15			
	Results In: mg/kg as received unless noted					
Aluminum	11,100	1,004	686			
Antimony	33.6	36.3	22.0			
Arsenic	<1.00	<1.00	<1.00			
Barium	35.2	15.2	17.5			
Beryllium	<1.00	<1.00	<1.00			
Cadmium	<1.00	<1.00	<1.00			
Calcium	118,000	139,000	89,300			
Chromium	1,590	1,660	979			
Cobalt	2.04	2.21	<2.00			
Copper	8.59	6.60	4.34			

Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

Supervising Analyst: Gary Hahn III

Date: 8/26/87

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LABORATORY REPORT

FOR
NEW YORK STATE DEPARTMENT OF TRANSPORTATION
TUSCARORA

U-6087.1

Job No.: U-6087			RE:			
Sample Date: 8/4/87			P.O. No.:			
Date Received: 8/4/87			Sampled By: E & E, Inc.			
Sample Type: Soil			Delivered By: E & E, Inc.			
E & E Lab. No. 87-	8073	8074	8075			
Customer No.						
Sample Identity	Comp. CR 1-5	Comp. CR 6-10	Comp. CR 11-15			
	Results in: mg/kg as received unless noted					
Iron	5,000	218	1,370			
Lead	2.12	1.85	2.49			
Magnesium	59,500	67,800	43,800			
Manganese	398	217	220			
Mercury	<0.10	<0.10	<0.10			
Nickel	11.8	8.37	5.24			
Potassium	307	59.5	95.2			
Selenium	<10.0	<5.00	<5.00			
Silver	<2.00	<2.00	<2.00			
Sodium	947	363	326			

Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

Supervising Analyst: Gary Lehmann

Date: 8/26/87

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LABORATORY REPORT

FOR
NEW YORK STATE DEPARTMENT OF TRANSPORTATION
TUSCARORA

U-6087.2

Job No.: U-6087			RE:			
Sample Date: 8/4/87			P.O. No.:			
Date Received: 8/4/87			Sampled By: E & E, Inc.			
Sample Type: Soil			Delivered By: E & E, Inc.			
E & E Lab. No. 87-	8073	8074	8075			
Customer No.						
Sample Identity	Comp. CR 1-5	Comp. CR 6-10	Comp. CR 11-15			
	Results in: mg/kg as received unless noted					
Thallium	<1.00	<1.00	<1.00			
Vanadium	43.4	34.9	28.1			
Zinc	50.6	18.4	14.7			

Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

Supervising Analyst: Gary Hahn IV

Date: 8/26/87

M E M O R A N D U M

TO: Craig Ferris

FROM: Gary Hahn

DATE: August 23, 1987

SUBJECT: NYS DOT - Tuscarora Report

REF: U-6105

CC: Lab File, QA/QC File

Attached is the laboratory report of the analysis conducted on six samples received at the Analytical Services Center on August 5, 1987. Analysis was performed according to the procedures set forth in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

All samples on which this report is based will be retained by E & E for a period of 30 days from the date of this report, unless otherwise instructed by the client. If additional storage of samples is requested by the client, a storage fee of $1.00 per sample container per month will be charged for each sample, with such charges accruing until destruction of the samples is authorized by the client.

GH/nc-M2G
Enclosure

RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT
PURGEABLE ORGANIC COMPOUNDS BY GC/MS

(all results in ug/kg, as received)

U-6105

Compound	E & E Lab. No. 87-	8225	8226			
	Sample Identity	CR#20	CR#26			
chloromethane		<10	<10			
bromomethane		<10	<10			
vinyl chloride		<10	<10			
chloroethane		<10	<10			
methylene chloride		<5	<5			
1,1-dichloroethene		<5	<5			
1,1-dichloroethane		<5	<5			
trans-1,2-dichloroethene		<5	<5			
chloroform		<5	<5			
1,2-dichloroethane		<5	<5			
1,1,1-trichloroethane		<5	<5			
carbon tetrachloride		<5	<5			
bromodichloromethane		<5	<5			
1,2-dichloropropane		<5	<5			
trans-1,3-dichloropropene		<5	<5			
trichloroethene		<5	<5			
chlorodibromomethane		<5	<5			
1,1,2-trichloroethane		<5	<5			
benzene		<5	<5			
cis-1,3-dichloropropene		<5	<5			
2-chloroethylvinyl ether		<10	<10			
bromoform		<5	<5			
tetrachloroethene		<5	<5			
1,1,2,2-tetrachloroethane		<5	<5			
toluene		<5	<5			
chlorobenzene		<5	<5			
ethylbenzene		<5	<5			

QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY OF SURROGATE SPIKES

U-6105.1

Compound	E & E Laboratory No. 86-	Amount Added (ng)	Amount Determined (ng)	Percent Recovery
1,2-dichloroethane-D4	8225	250	277	111
	8226	250	278	111
toluene-D8	8225	250	287	115
	8226	250	296	118
4-bromofluorobenzene	8225	250	300	120
	8226	250	270	108

ECOLOGY AND ENVIRONMENT'S, INC.
A N A L Y T I C A L S E R V I C E S C E N T E R

RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT
BASE/NEUTRAL EXTRACTABLE COMPOUNDS BY GC/MS

(all results in ug/kg, as received)

U-6105.2

Compound	E & E Lab. No. 87-	8225	8226			
	Sample Identity	CR#20	CR#26			
bis(2-chloroethyl)ether		<330	<330			
1,3-dichlorobenzene		<330	<330			
1,4-dichlorobenzene		<330	<330			
1,2-dichlorobenzene		<330	<330			
bis(2-chloroisopropyl)ether		<330	<330			
N-nitrosodipropylamine		<330	<330			
hexachloroethane		<330	<330			
nitrobenzene		<330	<330			
isophorone		<330	<330			
bis(2-chloroethoxy)methane		<330	<330			
1,2,4-trichlorobenzene		<330	<330			
naphthalene		<330	<330			
hexachlorobutadiene		<330	<330			
hexachlorocyclopentadiene		<330	<330			
2-chloronaphthalene		<330	<330			
dimethyl phthalate		<330	<330			
acenaphthylene		<330	<330			
fluorene		<330	<330			
acenaphthene		<330	<330			
2,4-dinitrotoluene		<330	<330			
2,6-dinitrotoluene		<330	<330			
diethylphthalate		<330	<330			
4-chlorophenyl phenyl ether		<330	<330			
N-nitrosodiphenylamine		<330	<330			
4-bromophenyl phenyl ether		<330	<330			
hexachlorobenzene		<330	<330			
phenanthrene		<330	<330			
anthracene		<330	<330			
di-n-butyl phthalate		<330	<330			
fluoranthene		<330	<330			
benzidine		<1,600	<1,600			
pyrene		<330	<330			
butyl benzyl phthalate		<330	<330			
3,3'-dichlorobenzidine		<660	<660			
benzo(a)anthracene		<330	<330			
bis(2-ethylhexyl)phthalate		<330*	<330			
chrysene		<330	<330			
di-n-octyl phthalate		<330	<330			
benzo(b)fluoranthene		<330	<330			
benzo(k)fluoranthene		<330	<330			
benzo(a)pyrene		<330	<330			
indeno(1,2,3-cd)pyrene		<330	<330			
dibenzo(a,h)anthracene		<330	<330			
benzo(ghi)perylene		<330	<330			

*Compound present below measurable detection limit.

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A N A L Y T I C A L S E R V I C E S C E N T E R

RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT
ACID EXTRACTABLE COMPOUNDS BY GC/MS

(all results in ug/kg, as received)

U-6105.3

Compound	E & E Lab. No. 87-	8225	8226			
	Sample Identity	CR#20	CR#26			
phenol		<330	<330			
2-chlorophenol		<330	<330			
2-nitrophenol		<330	<330			
2,4-dimethylphenol		<330	<330			
2,4-dichlorophenol		<330	<330			
4-chloro-3-methylphenol		<330	<330			
2,4,6-trichlorophenol		<330	<330			
2,4-dinitrophenol		<1,600	<1,600			
4-nitrophenol		<1,600	<1,600			
4,6-dinitro-2-methylphenol		<1,600	<1,600			
pentachlorophenol		<1,600	<1,600			

Note: Sample 8225 contained a high concentration of an unknown methyl ketone compound. Sample 8226 contained many aliphatic hydrocarbons similar to those observed in petroleum products.

QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY OF SURROGATE SPIKES

U-6105.4

Compound	E & E Laboratory No. 87-	Amount Added (ug/kg)	Amount Determined (ug/kg)	Percent Recovery
nitrobenzene-D5	8225	1,700	1,200	71
	8226	1,700	920	54
2-fluorobiphenyl	8225	1,700	1,400	82
	8226	1,700	1,400	82
terphenyl-D14	8225	1,700	2,000	118
	8226	1,700	1,100	65
phenol-D5	8225	3,300	2,300	70
	8226	3,300	850	26
2-fluorophenol	8225	3,300	1,500	45
	8226	3,300	520	16
2,4,6-tribromophenol	8225	3,300	1,000	30
	8226	3,300	xx	xx

xx - None recovered, possible matrix interference.

ECOLOGY AND ENVIRONMENT'S, INC.
A N A L Y T I C A L S E R V I C E S C E N T E R

RESULTS OF SOIL ANALYSIS FOR
PRIORITY POLLUTANT PESTICIDES AND PCBs BY GC

(all results in mg/kg as received)

U-6105.5

	E & E Lab. No. 87-	8225	8226					
Compound	Sample Identity	CR #20	CR #26					
Aldrin		<0.008	<0.008					
a-BHC		<0.008	<0.008					
b-BHC		<0.008	<0.008					
g-BHC		<0.008	<0.008					
d-BHC		<0.008	<0.008					
Chlordane		<0.08	<0.08					
4,4'-DDD		<0.016	<0.016					
4,4'-DDE		<0.016	<0.016					
4,4'-DDT		<0.016	<0.016					
Dieldrin		<0.016	<0.016					
Endosulfan I		<0.008	<0.008					
Endosulfan II		<0.016	<0.016					
Endosulfan sulfate		<0.016	<0.016					
Endrin		<0.016	<0.016					
Endrin aldehyde		<0.016	<0.016					
Heptachlor		<0.008	<0.008					
Heptachlor epoxide		<0.008	<0.008					
PCB - 1016		<0.08	<0.08					
PCB - 1221		<0.08	<0.08					
PCB - 1232		<0.08	<0.08					
PCB - 1242		<0.08	<0.08					
PCB - 1248		<0.08	<0.08					
PCB - 1254		<0.16	<0.16					
PCB - 1260		<0.16	<0.16					
Toxaphene		<0.16	<0.16					

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LABORATORY REPORT

FOR

NEW YORK STATE DEPARTMENT OF TRANSPORTATION
TUSCARORA

U-6105.6

Job No.: U-6105			RE:			
Sample Date: 8/5/87			P.O. No.:			
Date Received: 8/5/87			Sampled By: E & E, Inc.			
Sample Type: Soil			Delivered By: E & E, Inc.			
E & E Lab. No. 87-	8225	8226	8227	8228	8229	8230
Customer No.						
Sample Identity	CR#20	CR#26	Comp #4	Comp #5	Comp #6	Comp #7
	Results in: mg/kg as received unless noted					
Total Cyanide	<1	<1	NR	NR	NR	NR
Aluminum	12,300	869	11,300	10,100	9,660	5,810
Antimony	18.3	28.8	36.3	18.7	15.7	15.3
Arsenic	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Barium	16.1	17.2	36.6	23.8	22.0	14.4
Beryllium	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Cadmium	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Calcium	171,000	128,000	123,000	119,000	122,000	99,600
Chromium	539	1,180	1,650	892	948	657
Cobalt	<2.00	2.19	2.22	<2.00	<2.00	<2.00

NR: Analysis not requested.

Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

Supervising Analyst: Gary Haberl IV

Date: 8/25/87

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LABORATORY REPORT

FOR

NEW YORK STATE DEPARTMENT OF TRANSPORTATION
TUSCARORA

U-6105.7

Job No.: U-6105			RE:			
Sample Date: 8/5/87			P.O. No.:			
Date Received: 8/5/87			Sampled By: E & E, Inc.			
Sample Type: Soil			Delivered By: E & E, Inc.			
E & E Lab. No. 87-	8225	8226	8227	8228	8229	8230
Customer No.						
Sample Identity	CR#20	CR#26	Comp #4	Comp #5	Comp #6	Comp #7
	Results in: mg/kg as received unless noted					
Copper	3.03	6.13	10.7	7.22	7.71	3.40
Iron	757	3,180	3,810	3,003	1,780	1,350
Lead	2.00	7.24	7.35	5.88	10.4	6.63
Magnesium	55,400	71,400	54,200	49,800	47,400	27,600
Manganese	151	327	284	231	235	135
Mercury	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nickel	3.80	7.02	9.31	7.03	3.98	3.42
Potassium	68.0	246	366	235	121	92.2
Selenium	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Silver	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00

Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

Supervising Analyst: Gary Hahn

Date: 8/26/87

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LABORATORY REPORT

FOR

NEW YORK STATE DEPARTMENT OF TRANSPORTATION
TUSCARORA

U-6105.8

Job No.: U-6105			RE:			
Sample Date: 8/5/87			P.O. No.:			
Date Received: 8/5/87			Sampled By: E & E, Inc.			
Sample Type: Soil			Delivered By: E & E, Inc.			
E & E Lab. No. 87-	8225	8226	8227	8228	8229	8230
Customer No.						
Sample Identity	CR#20	CR#26	Comp #4	Comp #5	Comp #6	Comp #7
	Results in: mg/kg as received unless noted					
Sodium	1,960	440	1,047	999	1,055	914
Thallium	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Vanadium	25.3	27.1	35.6	29.8	30.9	20.3
Zinc	8.90	79.1	41.4	26.2	15.4	11.7

Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

Supervising Analyst: Gary Hahn III

Date: 8/25/87

QUALITY CONTROL FOR PRECISION
RESULTS OF ANALYSIS OF REPLICATE
ANALYSES OF SOIL SAMPLES

U-6105.9

Parameter	E & E Laboratory No. 87-	(mg/kg)		Relative Percent Difference (RPD)
		Original Analysis	Replicate Analysis	
Aluminum	8227	11,300	10,490	7
Antimony	8227	36.3	17.3	71
Arsenic	8227	<1.00	<1.00	—
Barium	8227	36.6	36.6	0
Beryllium	8227	<1.00	<1.00	—
Cadmium	8227	<1.00	<1.00	—
Calcium	8227	123,000	115,000	7
Chromium	8227	1,650	1,240	28
Cobalt	8227	2.22	<2.00	—
Copper	8227	10.7	9.80	9
Iron	8227	3,810	3,650	4
Lead	8227	7.35	5.41	30
Magnesium	8227	54,200	50,800	6
Manganese	8227	284	272	4
Nickel	8227	9.31	8.85	5
Potassium	8227	366	376	3
Selenium	8227	<10.0	<10.0	--
Silver	8227	<2.00	<2.00	—
Sodium	8227	1,047	992	5
Thallium	8227	<1.00	<1.00	—
Vanadium	8227	35.6	32.1	10
Zinc	8227	41.4	159	117

QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY
FOR SPIKED SOIL SAMPLES

U-6105.10

Parameter	E & E Laboratory No. 87-	Original Value	Amount Added	Amount Determined	Percent Recovery
		(mg/kg)			
Antimony	8227	17.3	100	46.9	30
Barium	8227	36.6	400	391	89
Beryllium	8227	<1.00	10.0	8.47	85
Cadmium	8227	<1.00	10.0	8.03	80
Cobalt	8227	<2.00	100	83.4	83
Copper	8227	9.80	50	51.3	83
Lead	8227	5.41	8.5	12.6	85
Nickel	8227	8.85	100	89.3	80
Selenium	8227	<10.0	1.7	<10	*
Silver	8227	<2.00	10	8.84	88
Thallium	8227	<1.00	4.2	4.8	114
Vanadium	8227	32.1	100	123	91

*Spike lost due to dilutions required to remove matrix interference.

M E M O R A N D U M

TO: Craig Ferris

FROM: Gary Hahn

DATE: August 24, 1987

SUBJECT: NYS DOT - Tuscarora Report

REF: U-6114

CC: Lab File, QA/QC File

Attached is the laboratory report of the analysis conducted on six samples received at the Analytical Services Center on August 6, 1987. Analysis was performed according to the procedures set forth in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

All samples on which this report is based will be retained by E & E for a period of 30 days from the date of this report, unless otherwise instructed by the client. If additional storage of samples is requested by the client, a storage fee of $1.00 per sample container per month will be charged for each sample, with such charges accruing until destruction of the samples is authorized by the client.

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LABORATORY REPORT

FOR

NEW YORK STATE DEPARTMENT OF TRANSPORTATION
TUSCARORA

U-6114

Job No.: U-6114			RE:			
Sample Date: 8/6/87			P.O. No.:			
Date Received: 8/6/87			Sampled By: E & E, Inc.			
Sample Type: Soil			Delivered By: E & E, Inc.			
E & E Lab. No. 87-	8277A	8277B	8278	8279	8280	8281
Customer No.						
Sample Identity	Comp 8 East Ditch	Comp 8 West Ditch	Comp 9	Comp 10	Comp 11	Comp 12
	Results in: mg/kg as received unless noted					
Aluminum	1,530	16,010	5,200	12,200	9,570	7,503
Antimony	<12.0	<12.0	15.7	<12.0	<12.0	<12.0
Arsenic	1.16	3.05	<1.65	1.77	2.31	1.44
Barium	100	113	126	90.6	68.2	58.7
Beryllium	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Cadmium	<1.0	1.09	<1.0	<1.0	<1.0	<1.0
Calcium	38,070	10,900	133,000	36,800	9,760	6,260
Chromium	57.9	31.1	147	16.5	14.2	8.75
Cobalt	6.49	8.49	<2.0	7.73	5.70	5.52

Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

Supervising Analyst: [signature]

Date: 8/24/87

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LABORATORY REPORT

FOR

NEW YORK STATE DEPARTMENT OF TRANSPORTATION
TUSCARORA

U-6114.1

Job No.: U-6114			RE:			
Sample Date: 8/6/87			P.O. No.:			
Date Received: 8/6/87			Sampled By: E & E, Inc.			
Sample Type: Soil			Delivered By: E & E, Inc.			
E & E Lab. No. 87-	8277A	8277B	8278	8279	8280	8281
Customer No.						
Sample Identity	Comp 8 East Ditch	Comp 8 West Ditch	Comp 9	Comp 10	Comp 11	Comp 12
	Results in: mg/kg as received unless noted					
Copper	16.3	23.9	3.63	15.6	14.9	11.1
Iron	17,400	20,800	6,880	1,920	13,800	10,500
Lead	22.5	34.1	13.6	5.95	18.5	9.04
Magnesium	5,980	7,440	6,130	8,510	6,040	4,010
Manganese	350	490	273	459	209	344
Mercury	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nickel	16.8	20.7	4.48	18.1	13.1	9.06
Potassium	1,800	2,190	726	2,450	1,560	1,240
Selenium	<10.0	<10.0	<10.0	<10.0	<2.0	<2.0
Silver	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0

Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

Supervising Analyst: Gary Hakes

Date: 8/14/87

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LABORATORY REPORT

FOR

NEW YORK STATE DEPARTMENT OF TRANSPORTATION
TUSCARORA

U-6114.2

Job No.: U-6114			RE:			
Sample Date: 8/6/87			P.O. No.:			
Date Received: 8/6/87			Sampled By: E & E, Inc.			
Sample Type: Soil			Delivered By: E & E, Inc.			
E & E Lab. No. 87-	8277A	8277B	8278	8279	8280	8281
Customer No.						
Sample Identity	Comp 8 East Ditch	Comp 8 West Ditch	Comp 9	Comp 10	Comp 11	Comp 12
	Results in: mg/kg as received unless noted					
Sodium	598	328	1,060	250	228	276
Thallium	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vanadium	25.2	30.9	7.50	23.3	18.4	13.1
Zinc	687	431	45.9	63.4	167	137

Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

Supervising Analyst: Gary Hahn IV

Date: 8/19/87

M E M O R A N D U M

TO: Craig Ferris

FROM: Gary Hahn G. Hahn III

DATE: September 2, 1987

SUBJECT: NYS DOT- Tuscarora Report

REF: U-6229

CC: Lab File, QA/QC File

Attached is the laboratory report of the analysis conducted on two samples received at the Analytical Services Center on August 6, 1987. Analysis was performed according to the procedures set forth in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

All samples on which this report is based will be retained by E & E for a period of 30 days from the date of this report, unless otherwise instructed by the client. If additional storage of samples is requested by the client, a storage fee of $1.00 per sample container per month will be charged for each sample, with such charges accruing until destruction of the samples is authorized by the client.

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LABORATORY REPORT

FOR

NEW YORK STATE DEPARTMENT OF TRANSPORTATION
TUSCARORA

U-6229

Job No.: U-6229			RE: NY-2030			
Sample Date: 8/6/87			P.O. No.:			
Date Received: 8/6/87			Sampled By: E & E, Inc.			
Sample Type: Soil			Delivered By: E & E, Inc.			
E & E Lab. No. 87-	8275	8276				
Customer No.						
Sample Identity	B1	B2				
	Results In: mg/kg as received unless noted					
Aluminum	14,800	11,400				
Antimony	<12.0	<12.0				
Arsenic	2.43	1.84				
Barium	63.8	53.9				
Beryllium	<1.0	<1.0				
Cadmium	<1.0	<1.0				
Chromium	18.8	14.8				
Calcium	1,850	1,840				
Cobalt	7.02	9.96				
Copper	8.80	11.5				
Iron	1,950	1,170				
Lead	15.0	22.5				

Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

Supervising Analyst: Gary Hahn

Date: 9/8/87

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LABORATORY REPORT

FOR

NEW YORK STATE DEPARTMENT OF TRANSPORTATION
TUSCARORA

U-6229.1

Job No.: U-6229			RE: NY-2030			
Sample Date: 8/6/87			P.O. No.:			
Date Received: 8/6/87			Sampled By: E & E, Inc.			
Sample Type: Soil			Delivered By: E & E, Inc.			
E & E Lab. No. 87-	8275	8276				
Customer No.						
Sample Identity	B1	B2				
	Results in: mg/kg as received unless noted					
Magnesium	2,940	2,550				
Manganese	323	832				
Mercury	<0.1	<0.22				
Nickel	13.5	13.3				
Potassium	1,060	1,540				
Selenium	<2.0	<2.0				
Silver	<2.0	<2.0				
Sodium	77.8	50.6				
Thallium	<1.0	<1.0				
Vanadium	26.5	22.5				
Zinc	51.4	67.2				

Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

Supervising Analyst: Gary Hahn IB

Date: 9/8/87

M E M O R A N D U M

TO: Craig Ferris

FROM: Gary Hahn

DATE: September 10, 1987

SUBJECT: NYS DOT-Tuscarora Report

REF: U-6248

CC: Lab File, QA/QC File

Attached is the laboratory report of the analysis conducted on two samples received at the Analytical Services Center on August 4 and 5, 1987. Analysis was performed according to the procedures set forth in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

All samples on which this report is based will be retained by E & E for a period of 30 days from the date of this report, unless otherwise instructed by the client. If additional storage of samples is requested by the client, a storage fee of $1.00 per sample container per month will be charged for each sample, with such charges accruing until destruction of the samples is authorized by the client.

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LABORATORY REPORT

FOR

NEW YORK STATE DEPARTMENT OF TRANSPORTATION - TUSCARORA

U-6248

Job No.: U-6248			RE: NY-2030			
Sample Date: 8/4-5/87			P.O. No.:			
Date Received: 8/4-5/87			Sampled By: E & E, Inc.			
Sample Type: Soil			Delivered By: Federal Express			
E & E Lab. No. 87-	8073	8074	8227			
Customer No.						
Sample Identity	Comp CR #1-5	Comp CR #6-10	Comp CR #11-15			
	Results in: mg/L unless noted					
Results of Chemical Analysis of Extracts From EP Toxicity Tests						
Chromium	1.16	1.11	0.836			
Vanadium	<0.5	<0.5	<0.5			

Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

Supervising Analyst: Gary Stehlik III
Date: 9/8/87

QUALITY CONTROL FOR PRECISION
RESULTS OF ANALYSIS OF REPLICATE
ANALYSES OF SOIL SAMPLES

U-6248.1

Parameter	E & E Laboratory No. 87-	(mg/L)		Relative Percent Difference (RPD)
		Original Analysis	Replicate Analysis	
Chromium	8073	1.16	1.20	3
Vanadium	8073	<0.5	<0.5	—