REVISED SITE MANAGEMENT PLAN
for AREA I (Former Republic (LTV) Steel Parcel)

Steelfields (aka RiverBend, LLC) Site

Site No. V00619

Prepared for

Fort Schuyler Management Corporation

257 Fuller Road
Albany, New York

September 2021

Barton&Loguidice

This SMP was revised in 2021 by Barton & Loguidice D.P.C. to reflect operation and maintenance procedures updated based on field experience and site development since the publication of the initial SMP and its revision in 2016. Updates were made directly to the existing SMP produced by Turnkey LLC and include both revisions to existing text and replacement of certain sections, pages, tables, and figures.

I, Scott D. Nostrand, certify that I am currently a NYS registered professional engineer as defined in 6 NYSRR Part 375, and that the revisions made by Barton & Loguidice D.P.C. comply with the requirements of the DER Technical Guidance for Site Investigation and Remediation (DER-10).

Date: September 10, 2021

Voluntary Cleanup Program

SITE MANAGEMENT PLAN

for

AREA I

(Former Republic (LTV) Steel Parcel)

STEELFIELDS SITE
BUFFALO, NY
(NYSDEC SITE #V00619-9)

Revised August 2016 0062-010-100

Revised by Barton & Loguidice D.P.C. March 2021

Prepared for:

STEELFIELDS LTD

Prepared by:

TurnKey Environmental Restoration, LLC

In Association with:

Benchmark Environmental Engineering & Science, PLLC

Revisions to Final Approved Site Management Plan:

Revision #	Submitted Date	Summary of Revision	DEC Approval Date
1	08/10/2016	Addition of Addenda covering TENORM in Area I	09/20/2016
2	10/20/2020	Redline Revisions	
3	03/25/2021	Updates to current conditions/procedures	

I *Thomas Forbes* certify that I am currently a NYS registered professional engineer as in defined in 6 NYCRR Part 375 and that this Site Management Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

_______________________ P.E.

8-10-16 Date

TABLE OF CONTENTS

ADDENDUM I

Appendix A to this Site Management Plan for Area I has been added effective August 10, 2016 covering the handling of technologically enhanced naturally occurring radioactive material (TENORM).

PART I

OPERATION, MONITORING, & MAINTENANCE PLAN

OPERATION, MONITORING, & MAINTENANCE PLAN
for
STEELFIELDS SITE - AREA I

FORMER STEEL MANUFACTURING SITE
BUFFALO, NY

APRIL 2007 0062-001-100

Revised by Barton & Loguidice D.P.C. March 2021

Prepared for:

Steelfields, LTD.
Buffalo, NY

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF ATTACHMENTS

1.0 INTRODUCTION

1.1 Background

In October, 2002 Steelfields Ltd. purchased several vacant industrial properties in South Buffalo, New York (See Figure 1-1 and Figure 1-2) out of bankruptcy from the LTV Steel Company and Hanna Furnace Corporation (a wholly owned subsidiary of the National Steel Corporation). At the same time, Steelfields entered into a Voluntary Cleanup Agreement (VCA) with the New York State Department of Environmental Conservation (NYSDEC). A Work Plan for Voluntary Cleanup Program Remedial Design /Remedial Action for the Former Steel and Coke Manufacturing Site (by TurnKey Environmental Restoration, LLC, September 2002) was approved by the NYSDEC on December 27, 2002. This OM&M Plan pertains to the subdivided parcel known as Area I (former Republic Steel Plant Parcel). RiverBend, LLC purchased the Site from Steelfields in May 2008. In 2014, Fort Schuyler Management Corporation (FMSC) acquired the Site from RiverBend, LLC and is the current owner.

1.2 Purpose and Scope

This Operation, Monitoring, & Maintenance Plan (OM&M Plan) has been prepared for inclusion in the Site Management Plan. The sole purpose of this plan and that of the Soil/Fill Management Plan is to ensure protection of both the environment and human health during redevelopment and use of the Site, subsequent to completion of Voluntary Cleanup activities.

The RD/RA Work Plan addresses remediation activities to be performed as part of the Voluntary cleanup of the site. Following completion of the Voluntary Cleanup activities, post remediation requirements will need to be implemented by subsequent owners or developers of the site to comply with the Voluntary Cleanup Agreement terms and conditions. This Plan summarizes the tasks and obligations required by those parties.

1.3 Operation, Monitoring, and Maintenance Program Responsibility

The property owner will be responsible for all monitoring, implementation, and reporting as required by the OM&M Plan. The NYSDEC will be informed of any change in ownership, redevelopment, site configuration, or subdivision of the property and the "Responsible Party" information below will be revised and resubmitted. The implementation of this plan will continue until such time as the NYSDEC determines the long-term obligations and implementation of this OM&M Plan, including that described in detail in Appendix B of this Document entitled the "Long-Term Groundwater Monitoring Plan" have been fulfilled.

Upon initiation of the OM&M Plan, the developer and/or property owner will be required to submit the following documents to the NYSDEC for review and approval:

- An appropriate Health and Safety Plan
- A Schedule for Required Inspections & Reporting
- Contact information for party responsible for implementation of the OM&M Program

Currently on file, the responsible party for the Area I Property is:

Fort Schuyler Management Corporation
257 Fuller Road
Albany, NY 12203

A soil vapor intrusion evaluation study or the installation of a vapor mitigation system is required before any buildouts are performed onsite.

1.4 2021 Revisions

This SMP was revised in 2021 by Barton & Loguidice D.P.C. to reflect operation and maintenance procedures updated based on field experience and site development since the publication of the initial SMP and its revision in 2016. Updates were made directly to the existing SMP produced by Turnkey LLC and include both revisions to existing text and replacement of certain sections, pages, tables, and figures.

2.0 OM&M PLAN COMPONENTS

The Operation, Maintenance, & Monitoring (OM&M) Plan for Area I consists of three major components:

- A1-MW-6 Operation, Maintenance, & Monitoring Program
- Long-Term Groundwater Monitoring (LTGWM) Plan
- Annual Inspection & Certification Program

Each of these components is described within this section in detail.

2.1 A1-MW-6 Operation, Maintenance & Monitoring Program

The presence of an immiscible layer detected within monitoring well A1-MW-6 has resulted in the development of an Area-specific OM&M Plan to address that issue. Although the history of the immiscible layer within monitoring well A1-MW-6 has already been submitted in the LTGWM 2004 Annual Report for Area I (revised January 2005), it has been repeated within this document for completeness. The subsequent long-term OM&M of the immiscible layer in monitoring well A1-MW-6 and the LTGWM Plan for Area I are discussed below.

2.1.1 Immiscible Layer Background

During well development and initial sampling activities of the September 2004 Area I LTGWM Event, field personnel performed visual immiscible layer surveillance of each well and observed no non-aqueous phase liquid (NAPL) in any of the on-site monitoring wells, except monitoring well A1-MW-6. Monitoring well A1-MW-6 is located approximately 45-feet from the Buffalo River adjacent to Subarea A (approximately 60 feet) as shown on Figure 1-3. A discussion pertaining to the immiscible layer detected in monitoring well A1-MW-6 follows. During well development and sampling, an immiscible layer, measuring approximately 0.3 feet thick, was observed floating within monitoring well A1-MW-6 (approximately 16.5 fbgs). The LNAPL was described as black and oily with a "weathered" petroleum odor.

2.1.2 Immiscible Layer OM&M

Since installation of the PetroTrap™ free product passive skimmer in February 2005, a significant decline in volume of recoverable product has been observed. As such, in February 2017, the skimmer was replaced with an absorbent sock. The absorbent sock has been and will continue to be removed and evaluated for replacement monthly.

Following sufficient operational experience and subject to NYSDEC approval, the frequency of monitoring may be reduced. The removed absorbent socks will be properly containerized in a standard waste container and disposed as non-hazardous solid waste.

2.2 Long-Term Groundwater Monitoring (LTGWM) Plan

Appendix 4 of this document includes the LTGWM Plan that is required at the Site to monitor the effectiveness of the source area removals, treatment, and controls implemented in accordance with the Voluntary Cleanup Agreement. Groundwater quality trends shall continue to be monitored along the perimeters of the Site in accordance with the schedule presented in Appendix IV Table 1.

2.3 Annual Inspection & Certification Program

The Area I property including wells and other physical components of the site shall be inspected annually by a qualified person representing the Owner or Property Manager/Representative. This qualified person shall at a minimum hold a four-year college degree in environmental sciences or engineering, and be supervised by a New York State Licensed Professional Engineer.

Annual Certification shall be stamped and signed by a New York State Licensed Professional Engineer and must certify and attest that:

- The institutional controls and/or engineering controls employed at such site are unchanged from the previous certification and are:
- In place and effective;
- Performing as designed; and
- Nothing has occurred that would impair the ability of the controls to protect the public health and environment
- Nothing has occurred that would constitute a violation or failure to comply with any operation and maintenance plan for such controls; and
- Access is available to the site to evaluate continued maintenance of such controls.

The Property Owner/ Owner's Representative shall also certify on a yearly basis that no new information has come to the site owner's attention, including groundwater monitoring data from wells located at the site boundary, to indicate that the assumptions made in the qualitative exposure assessment of offsite contamination are no longer valid.

This information can be included in either the Annual Certification documentation, or the Long Term Groundwater Monitoring Annual Report.

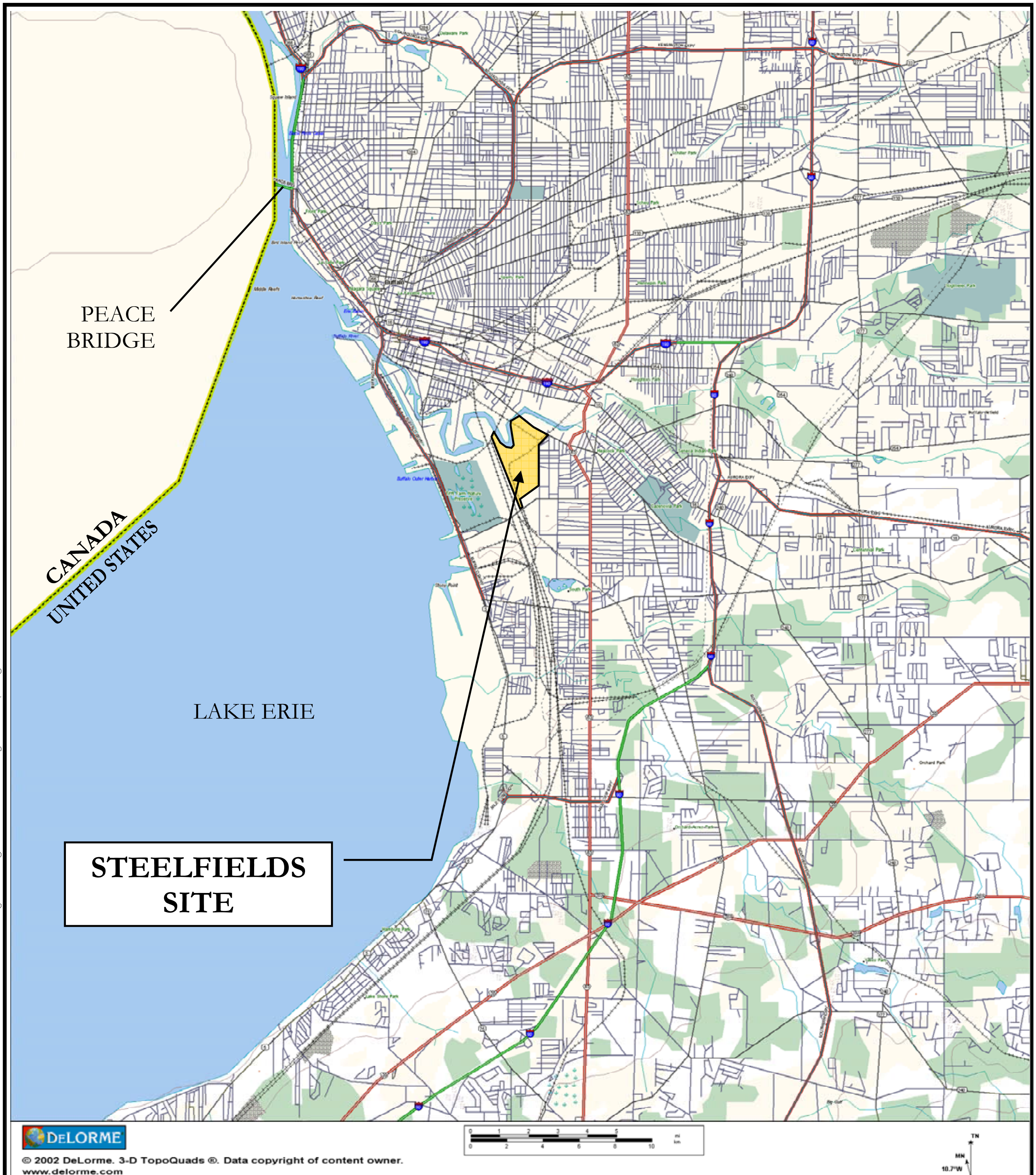
In addition to the above certification requirements, the annual inspection will require the completion of the Environmental Inspection Form (attachment A1). The Corrective Actions Certification (Attachment A2) may be required if something is noted for attention during the initial inspection. If maintenance is required, the owner shall notify the NYSDEC and schedule repairs. The NYSDEC shall be informed by the Property Owner/Manager when repairs have been completed. The Inspection forms shall be submitted to the NYSDEC within 60 days of completion, with a letter signed by a New York State Licensed Professional Engineer verifying that all institutional and engineering controls are in place and operating correctly and/or pending repair and maintenance.
Every five years, the Property Owner/ Owner's Representative shall document and certify that the assumptions made in the qualitative exposure assessment remain valid.

Between 2014 and 2017, a factory was constructed on Area I. This construction included placement of a cover system throughout Area I as shown on Figure 1-3. The annual inspection will evaluate the integrity of this cover system.

The factory construction included a Passive Gas Venting System (PGVS) installed in the northwestern corner of the building. The PGVS is passive and there are no active components requiring inspection. However, the annual inspection will evaluate whether the vents from the passive system remain unobstructed.

FIGURES

FIGURE 1-1



FILEPATH:g:\cad\turnkey\steelfields\2003 cmr\area 1 construction closeout\figures\figure 1-1; site regional map.dwg

TURNKEY ENVIRONMENTAL RESTORATION, LLC
726 EXCHANGE STREET
SUITE 624
BUFFALO, NEW YORK 14210
(716) 856-0635

PROJECT NO.: 0062-008-400

DATE: SEPTEMBER 2004

DRAFTED BY: BCH

SITE REGIONAL MAP

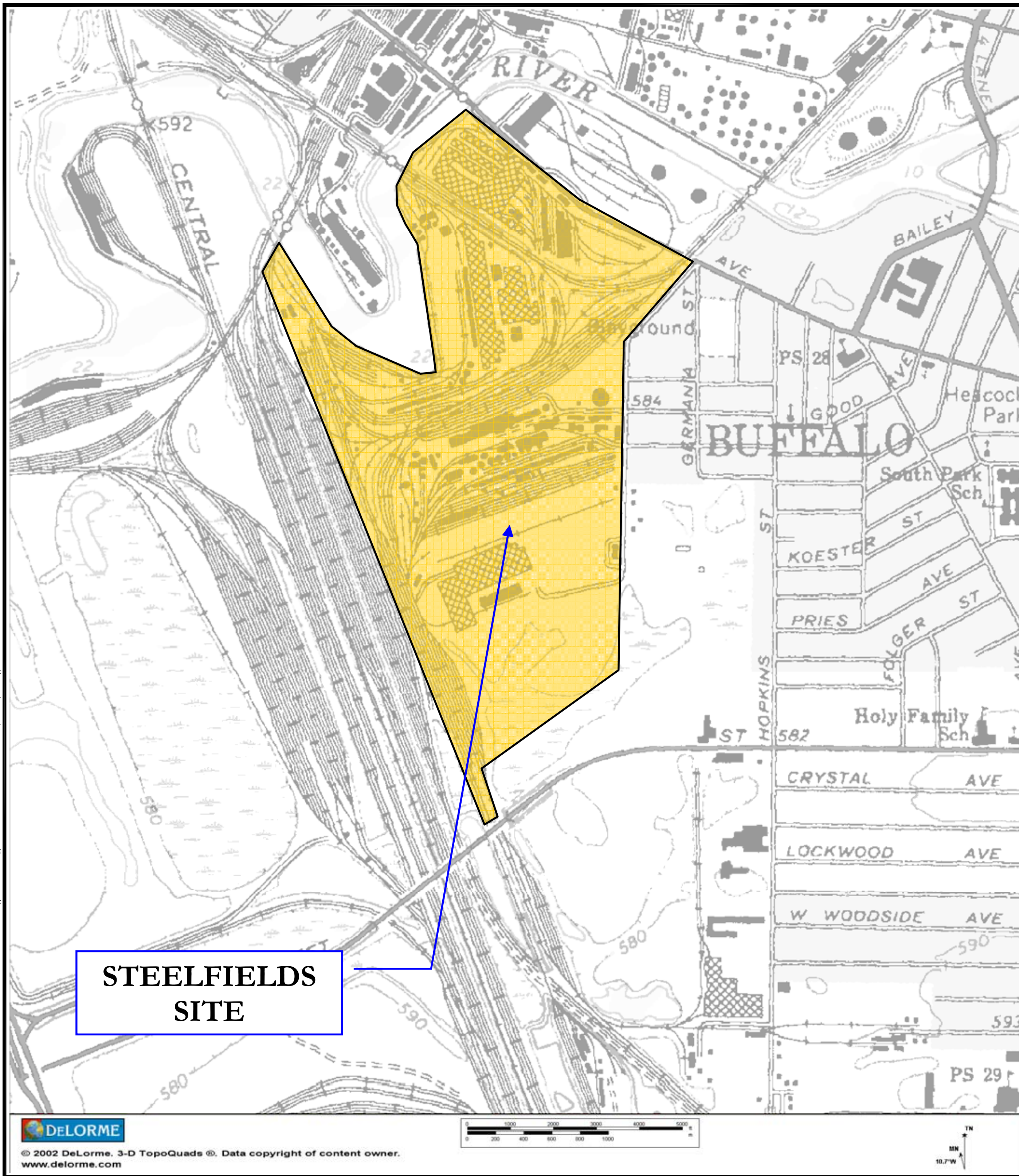
O.M. & M PLAN

AREA I - FORMER REPUBLIC (LTV) STEEL PARCEL
BUFFALO, NEW YORK

PREPARED FOR

STEELFIELDS, LTD.

FIGURE 1-2



726 EXCHANGE STREET
SUITE 624
BUFFALO, NEW YORK 14210
(716) 856-0635

PROJECT NO.: 0062-008-400

DATE: SEPTEMBER 2004

DRAFTED BY: BCH

SITE VICINITY MAP

O. M. & M PLAN

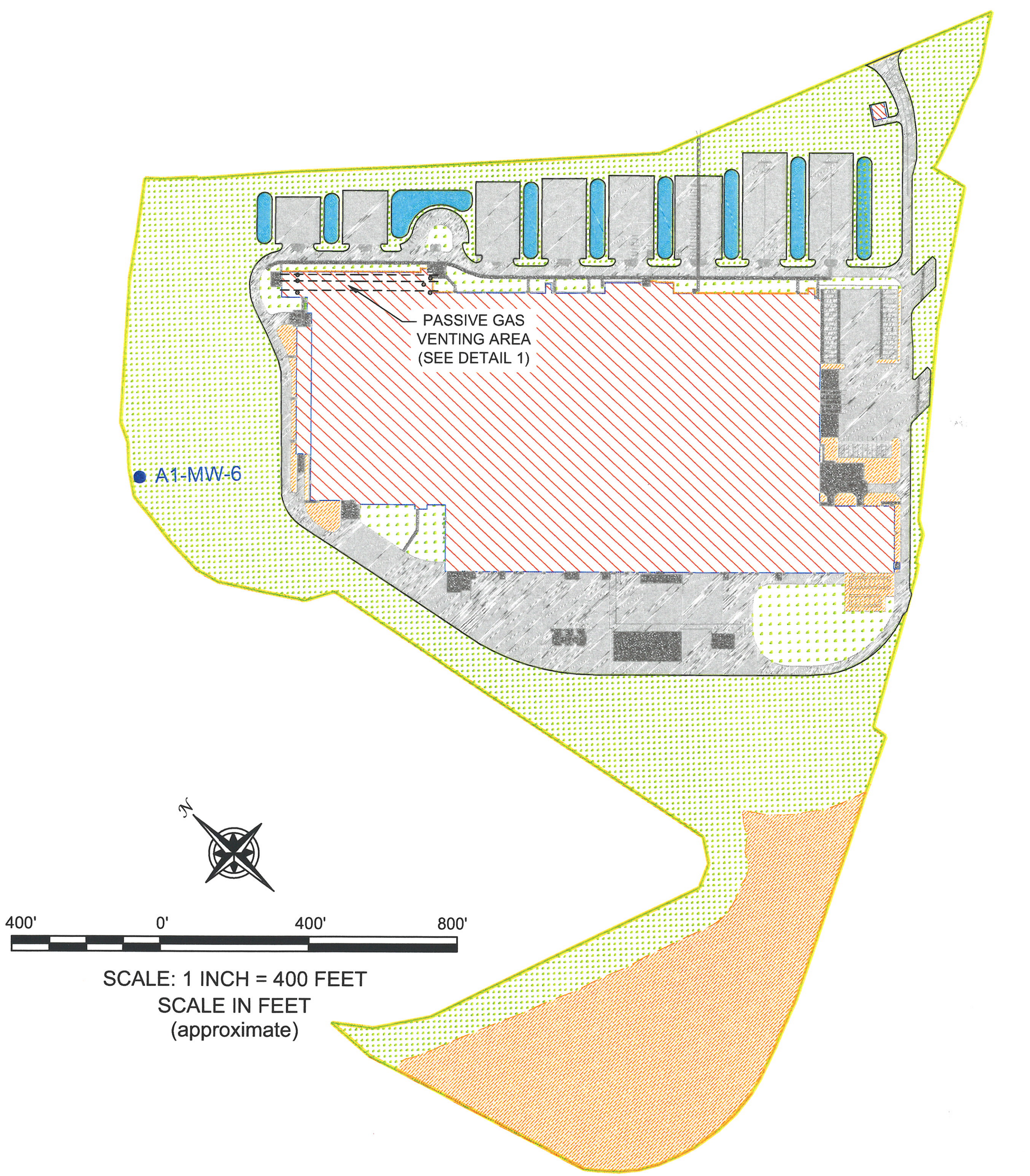
AREA I - FORMER REPUBLIC (LTV) STEEL PARCEL
BUFFALO, NEW YORK

PREPARED FOR

STEELFIELDS, LTD.

FILEPATH:g:\cad\turnkey\steelfields\2003 cmr\area 1 construction closeout\figures\figure 1-2; site vicinity map.dwg

F:\CAD\TurnKey\LPCiminelli Construction\Construction Completion Report\Figure 5; Site Cover Plan11X17.dwg

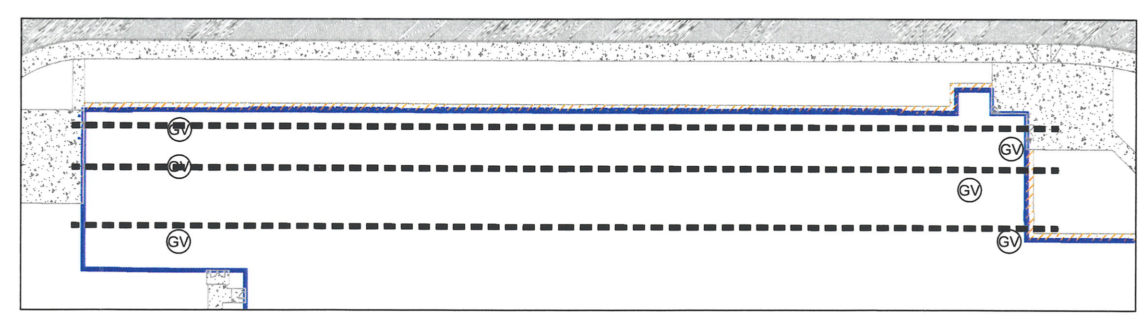


LEGEND:

- PROPERTY BOUNDARY (APPROXIMATE)
- A: GREEN SPACE COVER
- B: ASPHALT COVER
- C: CONCRETE SLAB ON-GRADE BUILDING COVER
- D: EXTERIOR CONCRETE COVER
- E: DRIP STONE, NO. 1 STONE, AND NO. 2 CRUSHER RUN STONE COVER
- F: BIORETENTION COVER
- GV PASSIVE GAS VENT (ABOVE ROOF LINE)
- SUBSLAB PERFORATED PVC PIPING
- A1-MW-6 ● MONITORING WELL WITH PETROTRAP FOR LNAPL COLLECTION

NOTES:

1. LNAPL MEANS LIGHT NON-AQUEOUS PHASE LIQUID.



DETAIL 1: PASSIVE GAS VENTING AREA
APPROXIMATE SCALE 1" = 80'

I, Gerard J Sentz, PE, CERTIFY THAT I AM CURRENTLY A NYS REGISTERED PROFESSIONAL ENGINEER AND THAT THE SOIL/FILL PORTION OF THE COVER SYSTEM WHICH HAS BEEN INSTALLED IN THE NON-HARDSCAPE PORTIONS OF THE SITE MEETS THE MINIMUM 1 FOOT THICKNESS REQUIREMENT IN ACCORDANCE WITH NYSDEC DER-10 SECTION 4.1(f)2ii.

11/3/17

STATE OF NEW YORK
GERARD J. SENTZ
No 062576-1
LICENSED PROFESSIONAL ENGINEER

DATE: JUNE 2017
DRAFTED BY: RFL

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC
TURNKEY ENVIRONMENTAL RESTORATION, LLC
2558 HAMBURG TURNPIKE, SUITE 300, BUFFALO, NY 14218, (716) 856-0599

JOB NO.: 0330-015-001

ENGINEERING CONTROLS
VOLUNTARY CLEANUP PROGRAM

CONSTRUCTION COMPLETION REPORT

RIVERBEND AREA I VCP SITE NO. V00619-9
1339 SOUTH PARK AVENUE, BUFFALO, NEW YORK 14220

PREPARED FOR
FORT SCHUYLER MANAGEMENT CORPORATION

FIGURE 1-3

APPENDIX I

ENVIRONMENTAL INSPECTION FORM

Environmental Inspection Form
Operation, Monitoring, & Maintenance Work Plan

Property Name:	Project No.:	
Client:		
Property Address:	City, State:	Zip Code:
Property ID: (Tax Assessment Map) Section:	Block:	Lot(s):
Preparer's Name:	Date/Time:	

CERTIFICATION

The results of this inspection were discussed with the owner and/or owner's representative. Any corrective actions required have been identified and noted in this report, and a supplemental Corrective Actions Form has been completed. Proper implementation of these corrective actions have been discussed with the owner, agreed upon, and scheduled.

Preparer / Inspector: **Date:**

Signature: ____________________

Next Scheduled Inspection (date): [ ]

Final Surface Cover / Vegatation

In accordance with the Soil/Fill Management Plan, vegetative or other (eg. Asphalt, buildings, concrete) surface coverage over the entire redeveloped parcel is required by the developer or owner as a pre-condition of occupancy. The following documents the condition of the above.

1. Final Cover is in Place and in good condition? ☐ yes ☐ no ☐ N/A
   Cover consists of (mainly): ____________________
2. Evidence of erosion? ☐ yes ☐ no ☐ N/A
3. Cracks visible in pavement? ☐ yes ☐ no ☐ N/A
4. Evidence of distressed vegetation/turf? ☐ yes ☐ no ☐ N/A
5. Evidence of unintended traffic and/or rutting? ☐ yes ☐ no ☐ N/A
6. Evidence of uneven settlement and/or ponding? ☐ yes ☐ no ☐ N/A
7. Damage to any surface coverage? ☐ yes ☐ no ☐ N/A

If yes to any question above, please provide more information below.

Environmental Inspection Form
Operation, Monitoring, & Maintenance Work Plan

Property Security & Access

In accordance with the Soil/Fill Management Plan, fencing is required to restrict access in all undeveloped areas and as necessary in redeveloped areas. In addition, all fencing around undeveloped areas will be posted with "No Trespassing" signs.

1. Is access controlled by perimeter fencing? ☐ yes ☐ no ☐ N/A
   If not, please note: ____________________
2. Is fencing in need of repair? ☐ yes ☐ no ☐ N/A
3. Area access gates in working order? ☐ yes ☐ no ☐ N/A
4. Suffecient signage posted (No Trespassing)? ☐ yes ☐ no ☐ N/A
5. Has there been any noted or reported trespassing? ☐ yes ☐ no ☐ N/A

Please note any irregularities/ changes in site access and security: ____________________

Property Use Changes / Site Development

Has the property usage changed, or site been redeveloped since the last inspection?
☐ yes ☐ no ☐ N/A

If so, please list with date: ____________________

This space for Notes and Comments

Please include the following Attachments:

1. Site Sketch
2. Photographs

APPENDIX II

CORRECTIVE ACTION CERTIFICATION

Corrective Action Certification
Operation, Monitoring, & Maintenance Work Plan

Property Name:	Project No.:	
Client:		
Property Address:	City, State:	Zip Code:
Property ID: (Tax Assessment Map) Section:	Block:	Lot(s):
Preparer's Name:	Date/Time:	

Issue Addressed

The environmental Inspection of the above property determined the need for corrective action. This form has been completed to document the required corrective action and it's implementation.

Description of site Issue identified during Environmental Inspection (include sketch & photographs):

Corrective Action Taken

Date Completed:

Describe Action Taken (include sketch & photographs):

Certification of Implementation

The signatory hereby certifies that the corrective action as described in this form has been completed in accordance with all relevant requirements of the Soil/Fill Management Plan and other applicable documents.

Preparer / Inspector: **Date:**

Signature:

Please verify inclusion of the following Attachments:

1. Site Sketch
2. Photographs

APPENDIX III

NYSDEC INSTITUTIONAL AND ENGINEERING CONTROLS CERTIFICATION FORM

Enclosure 1
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Site Management Periodic Review Report Notice
Insitutional and Engineering Controls Certification Form

Site Details **Box 1**

Site No. **V00619-9**

Site Name **Steelfields Site (AREA I)**

Site Address: Zip Code: 14210

City/Town: Buffalo

County: Erie, County

Current Use: Storage / Vacant

Intended Use: Commercial / Industrial Redevelopment

Box 2

Verification of Site Details

		YES	NO
1.	Are the Site Details above, correct?	☐	☐
	If NO, are changes handwritten above or included on a separate sheet?	☐	
2.	Has some or all of the site property been sold, subdivided, merged, or undergone a tax map amendment since the initial/last certification?	☐	☐
	If YES, is documentation or evidence that documentation has been previously submitted included with this certification?	☐	☐
3.	Have any federal, state, and/or local permits (e.g., building, discharge) been issued for or at the property since the initial/last certification?	☐	☐
	If YES, is documentation or evidence that documentation has been previously submitted included with this certification?	☐	☐
4.	Has a change-of-use occurred since the initial/last certification?	☐	
	If YES, is documentation or evidence that documentation has been previously submitted included with this certification?	☐	
5.	For non-significant-threat Brownfield Cleanup Program Sites subject to ECL 27-1415.7(c), has any new information revealed that assumptions made in the Qualitative Exposure Assessment for offsite contamination are no longer valid?	☐	☐
	If YES, is the new information or evidence that new information has been previously submitted included with this Certification?	☐	
6.	For non-significant-threat Brownfield Cleanup Program Sites subject to ECL 27-1415.7(c), are the assumptions in the Qualitative Exposure Assessment still valid (must be certified every five years) ?	☐	☐

SITE NO. V00619-9 **Box 3**

Description of Institutional/Engineering Control

	YES	NO
Environmental Easements & Restrictions	□	□
Site Management Plan Adherence	□	□

Control Certification Statement

For each Institutional or Engineering control listed above, I certify by checking "Yes" that all of the following statements are true:

(a) the Institutional Control and/or Engineering Control employed at this site is unchanged since the date that the Control was put in-place, or was last approved by the Department;

(b) nothing has occurred that would impair the ability of such Control, to protect public health and the environment;

(c) nothing has occurred that would constitute a violation or failure to comply with the Site Management Plan for this Control; and

(d) access to the site will continue to be provided to the Department, to evaluate the remedy, including access to evaluate the continued maintenance of this Control.

(e) if a financial assurance mechanism is required by the oversight document for the site, the mechanism remains valid and sufficient for its intended purpose established in the document.

IC/EC CERTIFICATIONS
SITE NO.

Box 5

SITE OWNER OR DESIGNATED REPRESENTATIVE SIGNATURE

I certify that all information and statements in Boxes 2 & 3 are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law.

I ________________________________ at ____,
print name print business address

am certifying as ____(Owner or Remedial Party)

for the Site named in the SIte Details Section of this form.

____ __________________
Signature of Owner or Remedial Party Rendering Certification Date

Box 6

QUALIFIED ENVIRONMENTAL PROFESSIONAL (QEP) SIGNATURE

I certify that all information and statements in Box 4 are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law.

I ________________________________ at ____,
print name print business address

am certifying as a Qualified Environmental Professional for the ________________________________

(Owner or Remedial Party) for the Site named in the SIte Details Section of this form.

____ _________________ __________
Signature of Qualified Environmental Professional, for the Owner or Remedial Party, Rendering Certification Stamp (if Required) Date

Enclosure 2

Certification of Institutional Controls/ Engineering Controls (ICs/ECs)
Step-by-Step Instructions, Certification Requirements and Definitions

The Owner, or Remedial Party, and when necessary, a Professional Engineer (P.E.), or the Qualified Environmental Professional (QEP), must review and complete the IC/EC Certification Form, sign the IC/EC Certifications Signature Page, and return it, along with the Periodic Review Report (PRR), within 45 days of the date of this notice.

Please use the following instructions to complete the IC/EC Certification.

I. Verification of Site Details (Box 1 and Box 2):

Answer the six questions in the Verification of Site Details Section. Questions 5 and 6 refer to only sites in the Brownfield Cleanup Program. ECL Section 27-1415-7(c) is included in
IV. IC/EC Certification Requirements. The Owner and/or your P.E. or QEP may include handwritten changes and/or other supporting documentation, as necessary.

II. Verification of Institutional / Engineering Controls (Box 3 and Box 4)

Review the listed Institutional / Engineering Controls, confirming that all existing controls are listed, and that all existing controls are still applicable. If there is a control that is no longer applicable the Owner / Remedial Party is to petition the Department requesting approval to remove the control.

2. Select "YES" or "NO" for **Control Certification** for each IC/EC, based on Sections (a)-(e) of the **Control Certification Statement**.

   If the Department concurs with the explanation, the corrective measures, and the proposed schedule, a letter authorizing the implementation of those corrective measures will be issued by the Project Manager. If the Department has any questions or concerns regarding the completion of the certification, the Project Manager will contact you.

3. If you cannot certify "Yes" for each Control, please continue to complete the remainder of this **Control Certification** form. Attach supporting documentation that explains why the **Control Certification** cannot be rendered, as well as a statement of proposed corrective measures, and an associated schedule for completing the corrective measures. Note that this **Control Certification** form must be submitted even if an IC or EC cannot be certified; however, the certification process will not be considered complete until corrective action is conducted.

   If the Department concurs with the explanation, the corrective measures, and the proposed schedule, a letter authorizing the implementation of those corrective measures will be issued by the Project Manager. Once the corrective measures are complete a new Periodic Review Report (with IC/EC Certification) is to be submitted within 45 days to the Department. If the Department has any questions or concerns regarding the PRR and/or completion of the IC/EC Certification, the Project Manager will contact you.

III. IC/EC Certification by Signature (Box 5 and Box 6):

1. If you certified "Yes" for each Control, please complete and sign the IC/EC Certifications page. To determine WHO signs the **IC/EC Certification,** please use Table 1. Signature Requirements for the IC/EC Certification, which follows.

Table 1. Signature Requirements for Control Certification Page

Type of Control	Example of IC/EC	Required Signatures
IC only	Environmental Easement Deed Restriction.	A site or property owner or remedial party.
IC with an EC which does not include a treatment system or engineered caps.	Fence, Clean Soil Cover, Individual House Water Treatment System, Vapor Mitigation System	A site or property owner or remedial party, and a QEP. (P.E. license not required)
IC with an EC that includes treatment system or an engineered cap.	Pump & Treat System providing hydraulic control of a plume, Part 360 Cap.	A site or property owner or remedial party, and a QEP with a P.E. license.

IV. IC/EC Certification Requirements:

Division of Environmental Remediation Program Policy requires periodic certification of IC(s) and EC(s) as follows:

<u>For Environmental Restoration Projects</u>: N.Y. Envtl Conserv.Law Section 56-0503 (Environmental restoration projects; state assistance)

<u>For State Superfund Projects</u>: Envtl Conserv.Law Section 27-1318. (Institutional and engineering controls)

<u>For Brownfields Cleanup Program Projects</u>: Envtl Conserv.Law Section 27-1415. (Remedial program requirements)

Envtl Conserv.Law Section 27-1415-7(c) states:

(c) At non-significant threat sites where contaminants in groundwater at the site boundary contravene drinking water standards, such certification shall also certify that no new information has come to the owner's attention, including groundwater monitoring data from wells located at the site boundary, if any, to indicate that the assumptions made in the qualitative exposure assessment of offsite contamination are no longer valid. Every five years the owner at such sites shall certify that the assumptions made in the qualitative exposure assessment remain valid. The requirement to provide such certifications may be terminated by a written determination by the Commissioner in consultation with the Commissioner of Health, after notice to the parties on the brownfield site contact list and a public comment period of thirty days.

<u>Voluntary Cleanup Program</u>: Applicable program guidance.

<u>Petroleum Remediation Program</u>: Applicable program guidance.

<u>Federal Brownfields</u>: Applicable program guidance.

Manufactured Gas Plant Projects: Applicable program guidance (including non-registry listed MGPs).

WHERE to mail the signed Certification Form by Thursday, May 24, 2007 (45 days of the date of the notice):

New York State Department of Environmental Conservation
Division of Environmental Remediation

Attn: , Project Manager

Please note that extra postage may be required.

V. Definitions

“Engineering Control” (EC), means any physical barrier or method employed to actively or passively contain, stabilize, or monitor contamination, restrict the movement of contamination to ensure the long-term effectiveness of a remedial program, or eliminate potential exposure pathways to contamination. Engineering controls include, but are not limited to, pavement, caps, covers, subsurface barriers, vapor barriers, slurry walls, building ventilation systems, fences, access controls, provision of alternative water supplies via connection to an existing public water supply, adding treatment technologies to such water supplies, and installing filtration devices on private water supplies.

“Institutional Control” (IC), means any non-physical means of enforcing a restriction on the use of real property that limits human and environmental exposure, restricts the use of groundwater, provides notice to potential owners, operators, or members of the public, or prevents actions that would interfere with the effectiveness of a remedial program or with the effectiveness and/or integrity of operation, maintenance, or monitoring activities at or pertaining to a remedial site.

“Professional Engineer” (P.E.) means an individual or firm licensed or otherwise authorized under article 145 of the Education Law of the State of New York to practice engineering.

“Property Owner” means, for purposes of an IC/EC certification, the actual owner of a property. If the site has multiple properties with different owners, the Department requires that the owners be represented by a single representative to sign the certification.

“Oversight Document” means any document the Department issues pursuant to each Remedial Program (see below) to define the role of a person participating in the investigation and/or remediation of a site or area(s) of concern. Examples for the various programs are as follows:

BCP (after approval of the BCP application by DEC) - Brownfield Site Cleanup Agreement.
ERP (after approval of the ERP application by DEC) - State Assistance Contract.
Federal Superfund Sites - Federal Consent Decrees, Administrative Orders on Consent or Unilateral Orders issued pursuant to CERCLA.
Oil Spill Program - Order on Consent, or Stipulation pursuant to Article 12 of the Navigation Law (and the New York Environmental Conservation Law).
State Superfund Program - Administrative Consent Order, Record of Decision.
VCP (after approval of the VCP application by DEC) - Voluntary Cleanup Agreement.
RCRA Corrective Action Sites- Federal Consent Decrees, Administrative Orders on Consent or permit conditions issued pursuant to RCRA.

“Qualified Environmental Professional” (QEP), means a person who possesses sufficient specific education, training, and experience necessary to exercise professional judgment to develop opinions and conclusions regarding the presence of releases or threatened releases to the surface or subsurface of a property or off-site areas, sufficient to meet the objectives and performance factors for the areas of practice identified by this Part. Such a person must:

(1) hold a current professional engineer’s or a professional geologist’s license or registration issued by the State or another state, and have the equivalent of three years of full-time relevant experience in site investigation and remediation of the type detailed in this Part; or

(2) be a site remediation professional licensed or certified by the federal government, a state or a recognized accrediting agency, to perform investigation or remediation tasks consistent with Department guidance, and have the equivalent of three years of full-time relevant experience.

“Qualitative Exposure Assessment” means a qualitative assessment to determine the route, intensity, frequency, and duration of actual or potential exposures of humans and/or fish and wildlife to contaminants.

“Remedial Party” means a person implementing a remedial program at a remedial site pursuant to an order, agreement or State assistance contract with the Department.

“Site Management” (SM) means the activities undertaken as the last phase of the remedial program at a site, which continue after a Certificate of Completion is issued. Site management is conducted in accordance with a site management plan, which identifies and implements the institutional and engineering controls required for a site, as well as any necessary monitoring and/or operation and maintenance of the remedy.

“Site Management Plan” (SMP) means a document which details the steps necessary to assure that the institutional and engineering controls required for a site are in-place, and any physical components of the remedy are operated, maintained and monitored to assure their continued effectiveness, developed pursuant to Section 6 (DER10 Technical Guide).

“Site Owner” means the actual owner of a site. If the site has multiple owners of multiple properties with ICs and/or ECs, the Department requires that the owners designate a single representative for IC/EC Certification activities.

APPENDIX IV

LONG-TERM GROUNDWATER MONITORING WORK PLAN

WORK PLAN
for
LONG-TERM GROUNDWATER MONITORING

FORMER STEEL MANUFACTURING SITE
BUFFALO, NY

March 2000 0062-011-100
Revised June 2005
Revised April 2007

Revised by Barton & Loguidice D.P.C. December 2020

Prepared for:

Prepared by:

LIST OF TABLES

LIST OF FIGURES

ATTACHMENTS

1.0 INTRODUCTION

This groundwater monitoring program has been designed to monitor the effectiveness of the source area removal, treatment, and controls to be implemented at the Former Steel Manufacturing Site in accordance with the Voluntary Cleanup Agreement. Groundwater quality trends will be monitored along the perimeter of the Site and along the Buffalo River. Groundwater elevation and/or quality trends will be monitored inside and adjacent to the Area II containment cell to assess its effectiveness in collecting, containing and controlling groundwater flows.

2.0 GROUNDWATER MONITORING PROGRAM

2.1 Monitoring Network

The long-term groundwater monitoring network and monitoring frequency for this program is presented in Table C1. Figure C1 presents the monitoring well locations.

If any existing wells identified to be in the Groundwater Monitoring Program become damaged or unusable during remedial construction, those wells will be replaced within 30 days of completion of remedial construction. The potential need to install additional wells or adjust the location of new wells will be determined during the remedial activities as additional field information is gathered. New well installations will be surveyed to accurately determine their location and elevation.

2.2 Groundwater Flow and Hydrodynamics

For the first year of monitoring (began 2004) following construction of the Area II groundwater collection and containment system, a complete round of water table elevation data will be collected quarterly from the new wells and all other functional wells that remain on the Site and groundwater isopotential maps prepared. Thereafter, groundwater elevation data will be collected and an isopotential map prepared annually. Slug testing will be performed for any new monitoring wells installed adjacent to the Buffalo River (i.e. A1-MW-6) and used for calculating average annual groundwater constituent loadings to the River.

2.3 Groundwater Sampling

2.3.1 Sampling Frequency

Area I has a network of historic monitoring wells that have been in place since 2017 and at this point no future wells have been planned for the site unless existing wells become damaged or they are requested by regulatory agencies. All monitoring wells within Area I are currently sampled on an annual bases. Table C1 outlines the specific analytical monitoring requirements for all Area I monitoring locations starting in 2021 thorough 2030. The requirements for the Area I monitoring wells do change from even to odd years. Should any new wells be required to be installed they will be sampled semi-annually for two years after completion and then annually thereafter to establish a historical baseline for the well (see section 2.1).

2.3.2 Sampling Method

The monitoring wells in the program will be sampled using USEPA Region II Low Stress (i.e. low-flow) Purging and Sampling technique. The low flow method produces samples with lower turbidity and smaller volumes of purge water than using conventional bailer techniques. Low-flow sampling also produces less agitation of the groundwater. As a result, the low-flow method provides a more representative sample, in relation to actual groundwater conditions, by not drastically altering the chemistry of the groundwater while withdrawing the sample. Barton and Loguidice – Monitoring Well Sampling SOP #10 for the low-flow technique is provided as Attachment C1.

2.3.3 Analyses

Refer to Table C1 which outlines the specific analytical monitoring requirements for all Area I monitoring locations starting in 2021 thorough 2030.

2.4 Statistical Evaluations

2.4.1 Parameters of Interest

Based upon the groundwater test results to date, the following parameters of interest will be statistically evaluated for all water quality monitoring wells in Area I:

- Benzene, lead, cyanide and TPH (for those wells that TPH and cyanide are analyzed), and
- Any parameters exceeding the groundwater quality standard for two (2) consecutive events.

For each "parameter of interest", statistical tables in spreadsheet form will be generated that include parameter concentration for each sampling event number, laboratory detection limit, moving average, standard deviation, and mean. The moving average will involve averaging four sequential concentrations in succession for analytical data.

2.4.2 Data Evaluation

For each monitoring location, a graph will then be generated which has the individual sample results and moving average concentration versus sampling event (i.e. time). A trend line will be plotted of the moving average, and evaluated to assess an increasing, decreasing, or neutral trend (neutral is having no significant increasing or decreasing trend).

The results will be interpreted in the following manner:

- If an increasing trend occurs for two consecutive monitoring events and the concentrations of each of the monitoring events are above New York State Groundwater Quality Standards/Guidance Values (GWQS/GV), an evaluation will be made to determine the potential cause. The type of evaluation will depend on which parameter(s) has the increasing trend.
- If there is a neutral or decreasing trend in a monitoring well for four consecutive monitoring events (after source removal or implementation of remedial measure), the parameter list and/or frequency of sampling may be reduced subject to NYSDEC approval.
- If there is a neutral or decreasing long-term trend in a monitoring well for all parameters for eight consecutive monitoring events, that location will be considered for elimination from further monitoring subject to NYSDEC approval.
- If an increasing trend occurs along the Buffalo River, the loadings calculation will be performed for the segment belonging to that well. The methodology described in Attachment C2 will be used to calculate loadings, if needed.

2.5 Immiscible Layer Surveillance

During well development and 2004 Long-Term Groundwater Monitoring sampling activities in Area I, field personnel performed visual immiscible layer surveillance of each well and observed no immiscible layer in any of the on-site monitoring wells, except monitoring well A1-MW-6. However, since installation of a PetroTrap™ free product passive skimmer in February 2005, a significant decline in volume of recoverable product has been observed. As such, in February 2017, the skimmer was replaced with an absorbent sock.

2.5.1 Monitoring Procedure

Upon arrival at monitoring well A1-MW-6, field personnel will adhere to the following procedure:

- Don appropriate personal protective equipment, such as poly-coated Tyvek and nitrile gloves, as necessary.

- Unlock well and remove J-plug.
  Carefully remove the absorbent sock by pulling on the safety rope and lay the absorbent sock in a plastic garbage bag for inspection.
- Slowly lower the interface probe down to the product surface (if present) and record the measurement depth.
- Continue lowering the probe through the immiscible layer (if present) to the water table and record the measurement depth.
- Remove probe taking care to wipe excess product (if present) from the tape of the probe.
- Inspect the existing absorbent sock for signs of wear and/or full capacity; replace the existing sock with a new one, as necessary.
- Slowly lower the current (or new) absorbent sock back into the well using the safety rope, ensuring it is placed at the previously measured product/groundwater depth.
- Replace the J-plug and lock the well.
- Gather up all disposables (i.e., tarp, gloves, Tyvek, paper towels etc.) and place in standard garbage bag for disposal.

2.5.2 Monitoring Schedule

Now that the immiscible layer thickness has been significantly decreased, the monitoring frequency will be conducted monthly. Based upon continued monthly monitoring progress of the adsorbent sock, the frequency of monitoring and product removal may be modified, subject to NYSDEC approval.

2.5.3 Petroleum Product Storage and Disposal

The removed absorbent socks will be properly containerized in a standard waste container and disposed as non-hazardous solid waste.

3.0 REPORTING

During the first two years of semi-annual monitoring described in Section 2.3.1, two reports per year will be provided to the NYSDEC. A semi-annual report summarizing the first semi-annual event that includes graphs with trend lines, sampling data, discussion of results, isopotential map, and analytical data presented as tables and maps and an annual report presenting a summary of all semi-annual analytical data collected during the calendar year as well as an engineering and geologic evaluation of all of the data. After the first two years of semi-annual monitoring described above, one annual report will be provided to the NYSDEC, Region 9 Office, by March 1 of each calendar year that includes the information listed above.

Any and all changes to the Monitoring Program will be approved by the NYSDEC prior to implementation.

TABLES

TABLE C1

ANALYTICAL PROGRAM SUMMARY

Riverbend Site (V00619-9)
Buffalo, New York

Well Designation	Monitoring Year															
	2021, 2023, 2025, 2027, 2029								2022, 2024, 2026, 2028, 2030							
	Field	CP-51 VOCs	8260 Benzene Only	As	Cr	Pb	CN	Alk.	Field	CP-51 VOCs	8260 Benzene Only	As	Cr	Pb	CN	Alk.
AREA I																
A1-MW-1	x	x		x					x			x				
A1-MW-2	x	x							x							
A1-MW-3	x	x							x							
A1-MW-4R[2]	x	x							x							
A1-MW-5	x	x							x	x						
A1-MW-6	x	x		x					x	x		x				
A1-MW-7[3]	x								x							
AI-MW-8R[4]	x	x		x					x			x				
A1-MW-9	x	x							x							
A1-MW-10[4]	x	x			x				x				x			
A1-MW-11[2]	x	x							x							
AREA II																
A2-MW-3	x	x							x							
A2-MW-4R	x	x							x							
A2-MW-5	x	x							x							
A2-MW-6	*water level only*								*water level only*							
A2-MW-7	*water level only*								*water level only*							
A2-MW-10R	x	x							x							
A2-MW-12	*water level only*								*water level only*							
A2-MW-13	x	x							x							
A2-MW-16	x	x		x	x	x			x	x		x	x	x		
A2-MW-17	x	x							x	x						
A2-MW-18	*water level only*								*water level only*							
A2-MW-19	*water level only*								*water level only*							
A2-MW-20	*water level only*								*water level only*							
AREA III																
A3-MW-3	x	x		x			x		x	x		x			x	
A3-MW-6	x	x		x			x		x	x		x			x	
A3-MW-7	x	x					x		x	x					x	
A3-MW-9	x	x				x			x	x				x		
A3-MW-10	x	x					x		x	x					x	
AREA III - ORC wells (every 6 months)																
A3-ORC-1	x		x					x	x		x					x
A3-ORC-2	x		x					x	x		x					x
A3-ORC-3	x		x					x	x		x					x
A3-ORC-4	x		x					x	x		x					x
A3-ORC-5	x		x					x	x		x					x
A3-ORC-6	x		x					x	x		x					x
A3-ORC-7	x		x					x	x		x					x
A3-ORC-8	x		x					x	x		x					x
A3-ORC-9	x		x					x	x		x					x
A3-ORC-10	x		x					x	x		x					x
A3-ORC-11	x		x					x	x		x					x
Totals:	**34**	**22**	**11**	**6**	**2**	**2**	**4**	**11**	**34**	**9**	**11**	**6**	**2**	**2**	**4**	**11**

Notes:
1. Modified analytical plan as per NYSDEC approval letter dated May 5, 2011.
2. Due to redevelopment activities in Area I, wells A1-MW-4 and A1-MW-M2 were replaced on July 11-12, 2017 with wells A1-MW-4R and A1-MW-11, respectively.
3. Per a NYSDEC request, A1-MW-7 was sampled for VOCs, arsenic, chromiuim, and lead in 2011; water level and field parameters annually thereafter.
4. Well A1-MW-8 and piezometer A1-P-4 were replaced June 6-7, 2016 with wells A1-MW-8R and A1-MW-10, respectively.
5. Metals Analysis - As (EPA 6010B), Cr (EPA 6020), Pb (EPA 6010B)
6. Cyanide (CN) Analysis - EPA 9012B
7. Alkalinity Analysis - EPA 310.2

TABLE C2

SUMMARY OF LNAPL THICKNESS / REMOVAL IN A1-MW-6

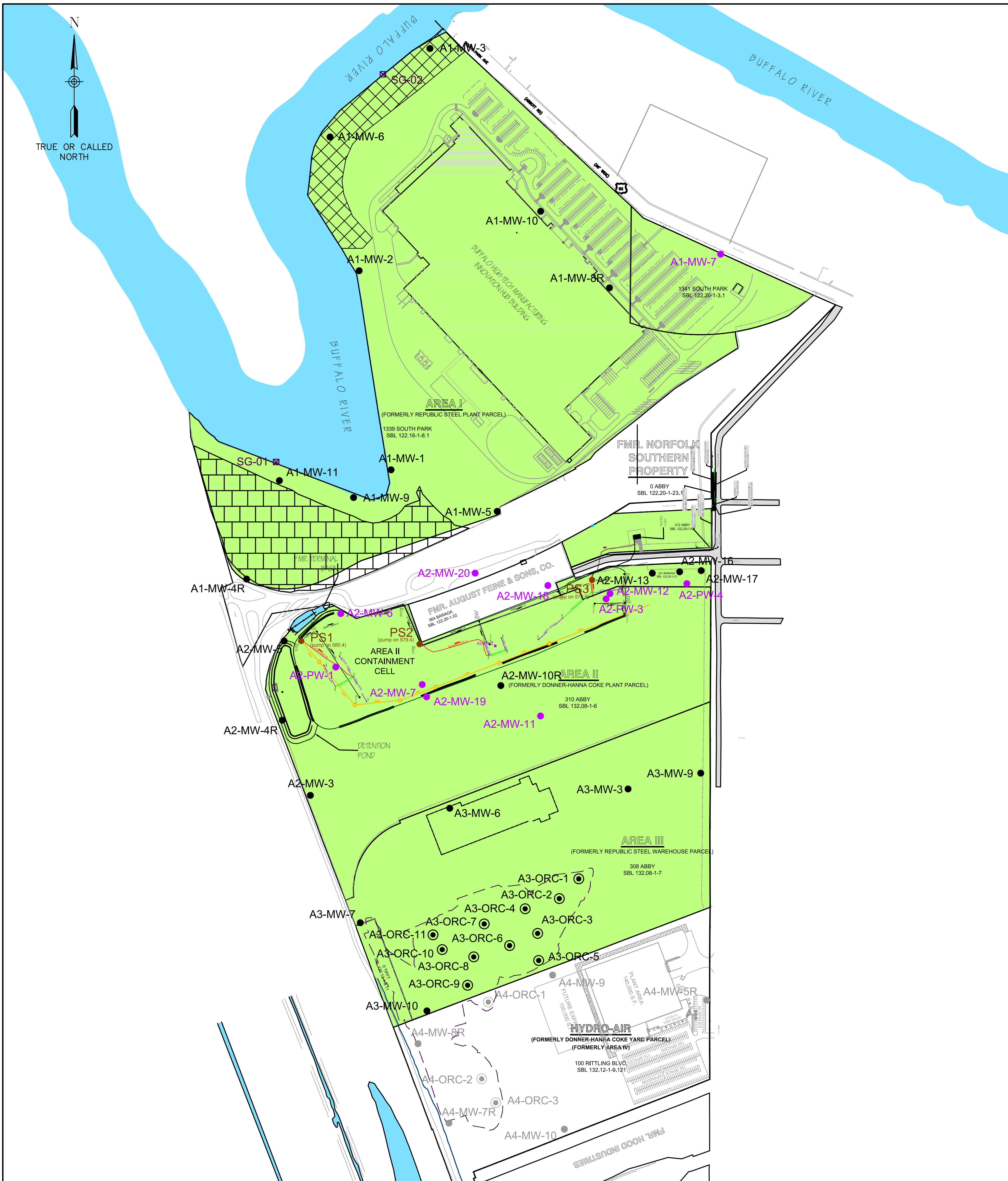
Steelfields, LTD.
Former Steel Manufacturing Site
Buffalo, New York

Date	Days Since Last Visit	LNAPL Measurement			Quantity Removed (oz.)	Progress Report #	Comments
		Top (fbTOR)	Bottom (fbTOR)	Thickness (feet)			
09/21/04	--	18.10	18.40	0.30	NA	1	well development
09/23/04	2	18.10	18.40	0.30	NA		Fall 2004 groundwater monitoring event
02/01/05	131	17.50	20.85	3.35	NA		installed Petro Trap passive skimmer @ 16.00 fbTOR
02/08/05	7	17.94	19.89	1.95	16		first LNAPL removal from Petro Trap
02/11/05	3	17.89	19.75	1.86	20		ok
02/15/05	4	18.10	18.52	0.42	20		ok
02/18/05	3	17.59	17.91	0.32	12		ok
02/25/05	7	18.02	18.51	0.49	2		Petro Trap tubing was tangled
03/04/05	7	18.13	18.63	0.50	6	2	Petro Trap tubing was tangled
03/18/05	14	18.00	18.74	0.74	3.5		checked Petro Trap for leaks, none located
04/08/05	21	17.37	18.20	0.83	24		ok; raised Petro Trap approximately 1-foot
04/14/05	27	17.65	17.81	0.16	22		ok
04/28/05	41	16.23	16.25	0.02	26	3 (to be submitted)	ok
05/17/05	39	17.62	17.80	0.18	14		~14 oz. of water in Petro Trap; raised approx. 1-foot

Total Quantity Removed To Date: 165.5 oz.

FIGURES

Plotted: Sep 16, 2021 – 1:11PM SYR By: bgh
Z:\BL-Vault\ID2\18217AD2-1C71-4823-8927-99D5C4054147\0\2278000-2278999\2278016\L\L\2210.001.001 C1 Riverbend Locations of Monitoring Wells (ID 2278016).dwg



LEGEND

A3-MW-7	NETWORK MONITORING WELL
A3-ORC-9	OXIDATION REDUCTION COMPOUND (ORC) SOCK WELL
PS2 (pump on 579.4)	GROUNDWATER COLLECTION PUMP STATION
SG-01	BUFFALO RIVER STAFF GAUGE
	OFF-SITE MONITORING WELL
	PROPERTY BOUNDARY OF AREAS I, II, & III
	APPROX. TAR & BLUE SOIL / FILL EXCAVATION LIMITS
	SLURRY (AS-BUILT)
	GROUNDWATER COLLECTION TRENCH
	GROUNDWATER TREATMENT FORCEMAIN (AS-BUILT)
	LIMITS OF CONTAINMENT CELL
	TENORM VARIANCE AREA
	BNR RESTORATION AREA
	SOIL FLUSHING SYSTEM: 4" PERF. HDPE PIPE (INVERT EL. SHOWN)
	SOIL FLUSHING SYSTEM: 4" SOLID HDPE PIPE
	SOIL FLUSHING SYSTEM: 2" SOLID HDPE PIPE
	FORCEMAIN & SOIL FLUSHING SYSTEM FLOW DIRECTION
	FENCE (ON-SITE)

443 Electronics Parkway
Liverpool, NY
13088

B &L

Barton & Loguidice, D.P.C.

Date	Scale
SEPTEMBER 2021	AS SHOWN

SURVEY NOTE

SURVEY PREPARED BY BENCHMARK/TURNKEY.

500' 0 500'

1"=500'

FORT SCHUYLER MANAGEMENT CORPORATION
SITE MANAGEMENT PLAN 2021 REVISION

LOCATIONS OF MONITORING WELLS

CITY OF BUFFALO ERIE COUNTY, NEW YORK

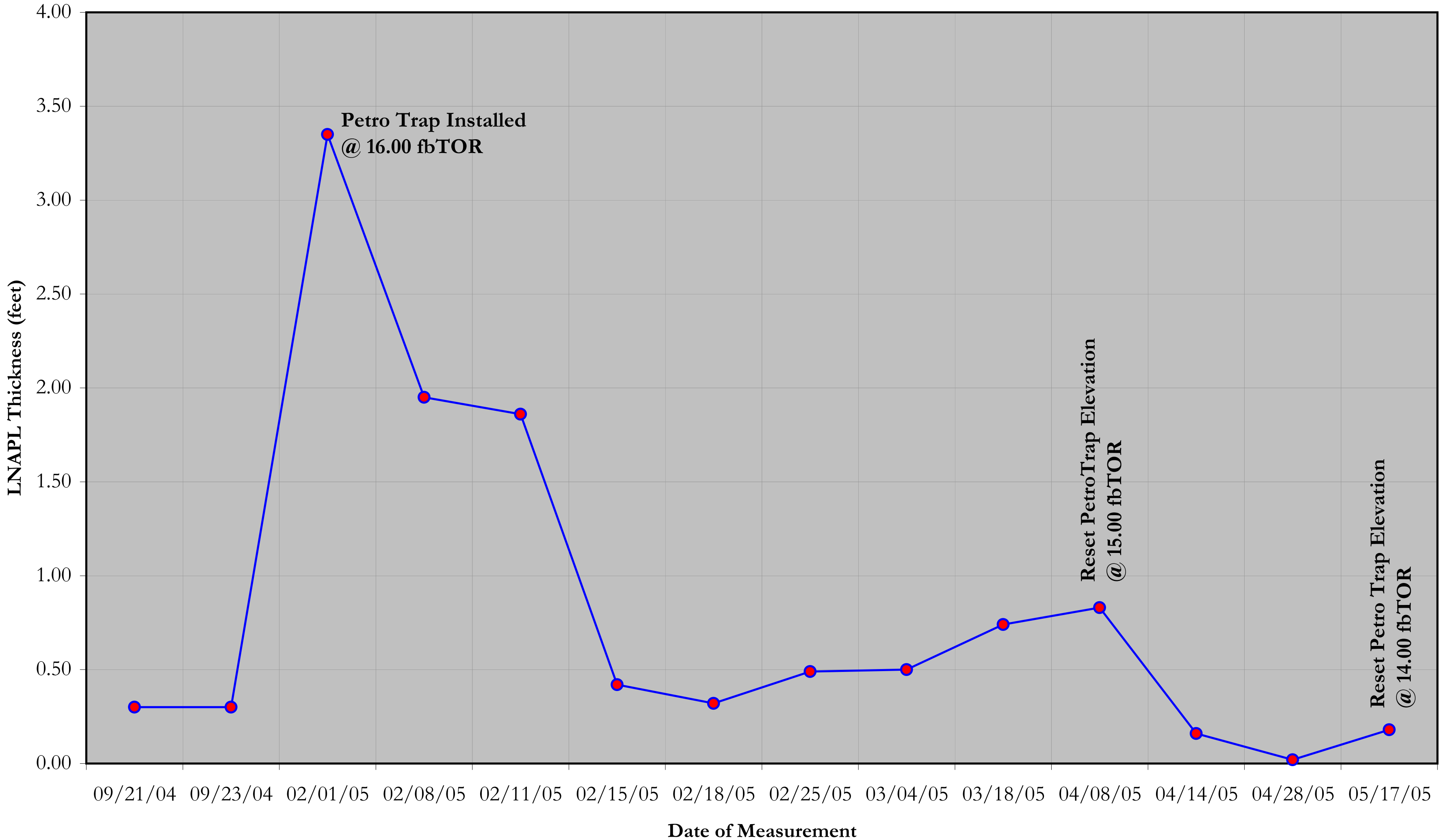
Figure Number
C1

Project Number
2210.001.001

FIGURE 2

LNAPL THICKNESS WITHIN A1-MW-6 VERSUS TIME

Steelfields, LTD.
Former Steel Manaufacturing Site
Buffalo, New York



ATTACHMENT C1

LOW-FLOW PURGING/SAMPLING STANDARD OPERATING PROCEDURE

BENCHMARK
ENVIRONMENTAL
ENGINEERING &
SCIENCE, PLLC

FIELD OPERATING PROCEDURES

Low-Flow (Minimal Drawdown) Groundwater Purging & Sampling Procedure

Revised by Barton & Loguidice D.P.C. March 2021

LOW FLOW (MINIMAL DRAWDOWN) GROUNDWATER PURGING & SAMPLING PROCEDURES

PURPOSE

This procedure describes the methods used for performing low flow (minimal drawdown) purging, also referred to as micro-purging, at a well prior to groundwater sampling to obtain a representative sample from the water-bearing zone. This method of purging is used to minimize the turbidity of the produced water. This may increase the representativeness of the groundwater samples by avoiding the necessity of filtering suspended solids in the field prior to preservation of the sample.

Well purging is typically performed immediately preceding groundwater sampling. The sample should be collected as soon as the parameters measured in the field (i.e., pH, specific conductance, dissolved oxygen, Eh, temperature, and turbidity) have stabilized as referenced in the Barton and Loguidice – Monitoring Well Sampling SOP #10.

PROCEDURE

1. Water samples should not be taken immediately following well development. Sufficient time should be allowed to stabilize the groundwater flow regime in the vicinity of the monitoring well. This lag time will depend on site conditions and methods of installation but may exceed one week.

2. Prepare the electronic static water level interface probe indicator (SWL probe) in accordance with the procedures referenced in the Barton and Loguidice's – Water Level Measurement SOP #9 and decontaminate the SWL probe and a lower portion of cable following the procedures referenced in the Barton and Loguidice's SOP #9. Store the SWL probe in a protected area until use.

3. Calibrate all sampling devices and monitoring equipment in accordance with manufacturer's recommendations, the site Quality Assurance Project Plan (QAPP) and/or Field Sampling Plan (FSP). Calibration of field instrumentation should be followed as specified in Barton and Loguidice's – Field Equipment and Calibration SOP #12 for each individual meter/s.

4. Inspect the well/piezometer for signs of vandalism or damage and record condition on the Barton and Loguidice site specific Field Sampling Data Sheet (sample attached). Specifically, inspect the integrity of the following: concrete surface seal, lock, protective casing and well cover, well casing and J-plug/cap. Report any irregular findings to the Project Manager.

5. Unlock and remove the well protective cap or cover and place on clean plastic to avoid introducing foreign material into the well.

6.

7. Lower the SWL meter slowly into the monitoring well and record the initial water level in accordance with the procedures referenced in Barton and Loguidice – Water Level Measurment SOP #9. Refer to the construction diagram for the well to identify the screened depth.

8. Decontaminate all non-dedicated pump and tubing equipment following the procedures referenced in the Barton and Loguidice – Water Level Measurement SOP #9. In addition to this SOP a degreaser may be used to decontaminate petroleum impacted non-dedicated equipment initially then an alconox/distilled water rinse as this SOP references.

9. Lower the purge pump or tubing (i.e., low-flow electrical submersible, peristaltic, etc.) <u>slowly</u> into the well until the pump/tubing intake is approximately in the middle of the screened interval. Rapid insertion of the pump will increase the turbidity of well water, and can increase the required purge time. This step can be eliminated if dedicated tubing is already within the well.

   Placement of the pump close to the bottom of the well will cause increased entrainment of solids, which may have settled in the well over time. Low-flow purging has the advantage of minimizing mixing between the overlying stagnant casing water and water within the screened interval. The objective of low-flow purging is to maintain a purging rate, which minimizes stress (drawdown) of the water level in the well. Low-flow refers to the velocity with which water enters the pump intake and that is imparted to the formation pore water in the immediate vicinity of the well screen.

10. Lower the SWL probe back down the well as water levels will be frequently monitored during purge and sample activities.

11. Begin pumping to purge the well. The pumping rate should be between 100 and 500 milliliters (ml) per minute (0.03 to 0.13 gallons per minute) depending on site hydrogeology. Periodically check the well water level with the SWL probe adjusting the flow rate as necessary to stabilize drawdown within the well. If possible, a steady flow rate should be maintained that results in a stabilized water level (drawdown of 0.3 feet or less). If the water level exceeds 2 feet below static and declining, slow the purge rate until the water level generally stabilizes. Record each pumping rate and water level during the event.

    The low flow rate determined during purging will be maintained during the collection of analytical samples. At some sites where geologic heterogeneities are sufficiently different within the screened interval, high conductivity zones may be preferentially sampled.

12. Measure and record field parameters (pH, specific conductance, Eh, dissolved oxygen (DO), temperature, and turbidity) during purging activities. In lieu of measuring all of the parameters, a minimum subset could be limited to pH, specific conductance, and turbidity or DO.

    Water quality indicator parameters should be used to determine purging needs prior to sample collection in each well. Stabilization of indicator parameters should be used to determine when formation water is first encountered during purging. In general, the order of stabilization is pH, temperature, and specific conductance, followed by Eh, DO and turbidity. Performance criteria for determination of stabilization should be based on water-level drawdown, pumping rate and equipment specifications for measuring indicator parameters. An in-line flow through cell to continuously measure the above parameters may be used. The in-line device should be disconnected or bypassed during sample collection.

13. Purging will continue until parameters of water quality have stabilized. Record measurements for field indicator parameters (including water levels) at regular intervals during purging. The stability of these parameters with time can be

used to guide the decision to discontinue purging. Proper adjustments must be made to stabilize the flow rate as soon as possible.

14. Record well purging and sampling data in the Project Field Book or on the attached Barton and Loguidice site specific Field Sampling Data Sheet (sample attached). Measurements should be taken approximately every three to five minutes, or as merited given the rapidity of change.

15. Purging is complete when field indicator parameters stabilize. Stabilization is achieved after all field parameters have stabilized for three successive readings. Three successive readings should be within ± 0.1 units for pH, ± 3% for specific conductance, ± 10 mV for Eh, and ± 10% for turbidity and dissolved oxygen. These stabilization guidelines are provided for rough estimates only, actual site-specific knowledge may be used to adjust these requirements higher or lower.

    An in-line water quality measurement device (e.g., flow-through cell) should be used to establish the stabilization time for several field parameters on a well-specific basis. Data on pumping rate, drawdown and volume required for parameter stabilization can be used as a guide for conducting subsequent sampling activities.

16. Collect all project-required samples from the discharge tubing at the flow rate established during purging in accordance with Barton and Loguidice – Monitoring Well Sampling SOP # 10. If a peristaltic pump and dedicated tubing is used, collect all project-required samples from the discharge tubing as stated before, however volatile organic compounds should be collected in accordance with the procedure presented in the next section. Continue to maintain a constant flow rate such that the water level is not drawn down as described above. Fill sample containers with minimal turbulence by allowing the ground water to flow from the tubing along the inside walls of the container.

17. If field filtration is recommended as a result of increased turbidity, an in-line filter equipped with a 0.45-micron filter should be utilized.

18. Replace the dedicated tubing down the well taking care to avoid contact with the ground surface.

19. Restore the well to its capped/covered and locked condition.

20. Upon purge and sample collection completion, slowly lower the SWL probe to the bottom of the well/piezometer. Record the total depth to the nearest 0.01- foot and compare to the previous total depth measurement. If a significant discrepancy exists, re-measure the total depth. Record observations of purge water to determine whether the well/piezometer had become silted due to inactivity or damaged (i.e., well sand within purge water). Upon confirmation of the new total depth and determination of the cause (i.e., siltation or damage), notify the Project Manager following project field activities.

PERISTALTIC PUMP VOC SAMPLE COLLECTION PROCEDURE

The collection of VOCs from a peristaltic pump and dedicated tubing assembly shall be collected using the following procedure.

1. Once all other required sample containers have been filled, turn off the peristaltic pump. The negative pressure effects of the pump head have not altered groundwater remaining within the dedicated tubing assembly and as such, this groundwater can be collected for VOC analysis.

2. While maintaining the pressure on the flexible tubing within the pump head assembly, carefully remove and coil the polyethylene tubing from the well; taking care to prevent the tubing from coming in contact with the ground surface and without allowing groundwater to escape or drain from the tubing intake.

3. Once the polyethylene tubing is removed, turn the variable speed control to zero and reverse the pump direction.

4. Slowly increase the pump rate allowing the groundwater within the polyethylene tubing to be “pushed” out of the intake end (i.e., positive displacement) making sure the groundwater within the tubing is not “pulled” through the original discharge end (i.e., negative displacement). Groundwater pulled through the pump head assembly CANNOT be collected for VOC

analysis.

5. Slowly fill each VOC vial by holding the vial at a 45-degree angle and allowing the flowing groundwater to cascade down the side until the vial is filled with as minimal disturbance as possible. As the vial fills, slowly rotate the vial to vertical. DO NOT OVERFILL THE VIAL, AS THE PRESERVATIVE WILL BE LOST. The vial should be filled only enough so that the water creates a slight meniscus at the vial mouth.

6. Cap the VOC vials leaving no visible headspace (i.e., air-bubbles). Gently tap each vial against your hand checking for air bubbles.

7. If an air bubble is observed, slowly remove the cap and repeat Steps 5 and 6.

ATTACHMENTS

Barton and Loguidice Site Specific Field Sampling Data Sheet (sample)

REFERENCES

United States Environmental Protection Agency, 540/S-95/504, 1995. Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures.

Barton and Loguidice SOP's:

009 Water Level Measurement
010 Monitroing Well Sampling
012 Field Equipment Maintenance and Calibration

Water Level Measurement	SOP #:	9
	Revision:	2
	Date:	June 2015

Prepared by:	Nathan J. Shaffer	QA Review:	Signature
Approved by:	Signature/Date 6/3/15		06/02/2015 Date

1.0 Objectives

The purpose of this Standard Operating Procedure (SOP) is to define the procedural requirements for water level measurement.

2.0 Scope and Applicability

The procedures of this SOP are applicable to personnel involved in the planning, coordination, preparation, conducting and reporting related to water level measurement.

3.0 Required Materials

- Project plans (work plan/health and safety plan)
- Personal protective equipment as specified in the site-specific health and safety plan
- Bound field log book
- Water level probe
- Measuring tape
- Decontamination supplies (5 gallon buckets, decontamination fluids, distilled (DI) water)
- Any additional equipment discussed in section 5.0

4.0 Responsibilities

The site manager is responsible for ensuring that field personnel employ methods in accordance with this procedure and any other applicable SOPs. The site manager must also ensure the water level measurement procedures meet the requirements of the site specific plans.

The field team leader is responsible for ensuring that field personnel follow methods in accordance with this procedure and other relevant procedures.

Note: Responsibilities may vary from site to site. All field team member responsibilities shall be defined in the field plan or site/quality assurance project plan (QAPP).

5.0 Methods

In order to determine horizontal hydraulic gradient(s) within the uppermost water-bearing zone and potential routes of contaminant migration, water level measurements will be taken at each newly installed well using the following procedures:

1. After noting the general conditions of the well (surface seal, lock, etc.) the bottom of the well will be sounded by lowering a decontaminated weighted probe into the well.

2. Well bottom conditions will be noted (silt, blockages, etc.). The distance from the base of the screen to the top of the casing will be recorded to the nearest 1/100th of a foot.

3. The static water level will be measured and noted by sounding with an electronic tape or "popper" to the nearest 1/100th of a foot.

4. The water level readings will always be taken from a marked point on the well casing.

5. Other measurements to be taken are:

   a. Stickup of well casing from ground surface or surface seal
   b. Depth to bottom of well from the top of the riser

6. The date and time will be recorded for these measurements. Also, pertinent weather conditions will be noted (i.e., significant recent precipitation or drought conditions).

7. Upon completion, the wells will be secured and downhole equipment will be decontaminated with Alconox and deionized water.

8. As practicable, water levels should be collected on the same day.

6.0 References

No references were used in the development of this SOP.

Monitoring Well Sampling	SOP #:	10
	Revision:	2
	Date:	June 2015

Prepared by:	Nathan J. Shaffer	QA Review:	Steg B. Stern Signature
Approved by:	Scott D 6/3/15 Signature/Date		06/02/2015 Date

1.0 Objectives

The purpose of this Standard Operating Procedure (SOP) is to define the procedural requirements for monitoring well sampling. This procedure is followed in order to collect groundwater samples from monitoring wells while exerting minimum stress on the water-bearing formation and minimizing the disturbance of sediment in the well. The "low-flow" purging and sample collection technique follows the technique described within the USEPA document entitled "EPA Ground Water Issue: Low-flow (Minimal Drawdown) Ground-water Sampling Procedures" (EPA/540/S-95/504, April 1996) and the USEPA Region II document entitled "Ground water Sampling Procedure Low Stress (Low Flow) Purging and Sampling" (March 16, 1998). The general approach is to minimize the drawdown in the well during purging, thereby reducing disturbance prior to and during sampling. Typically this is accomplished by limiting the flow rate during purging and sampling to rates in the 100 to 500 ml/min range. The intended advantage of this procedure is the reduction in the turbidity and aeration of the samples; thereby producing samples which are more representative of the natural groundwater conditions.

2.0 Scope and Applicability

The procedures of this SOP are applicable to personnel involved in the planning, coordination, preparation, conducting and reporting related to monitoring well sampling.

3.0 Required Materials

- Project plans (work plan/health and safety plan)
- Personal protective equipment as specified in the site-specific health and safety plan
- Bound field log book
- Water level probe
- Measuring tape

- Decontamination supplies (5 gallon buckets, decontamination fluids, distilled (DI) water)
- Peristaltic pumps may be used in very shallow wells for inorganic sample collection unless there is concern for the potential effects of some increase in the dissolved oxygen (D.O.) in the sample due to possible generation of "microbubbles" during purging and sampling. Adjustable rate, positive displacement groundwater sampling pumps, such as a bladder pump or small diameter electric submersible pump (e.g., Grundfos Redi-Flo2 or equivalent), is preferred when increased levels of D.O. is a concern in the collected groundwater sample.
- The discharge tubing shall be Teflon®, Teflon® lined polyethylene, PVC, Tygon, or polyethylene, dedicated to each well. For organic analyses, the tubing shall be Teflon® or Teflon® lined polyethylene.
- The length and diameter of the discharge tubing shall be minimized (e.g., 1/4 or 3/8 inch ID) to ensure that the tubing remains filled with water during sampling.
- Monitoring equipment during purging shall include field measuring devices for pH, turbidity, specific conductance, temperature, oxidation-reduction potential (ORP), and/or D.O. D.O. and ORP meters must be installed in-line and have continuous readout capability during the sampling event.
- Flow-rate measurement supplies such as graduated cylinders and stopwatch.
- Well construction data.
- Geologic data such as the depth to higher permeable zones within the screened interval.
- Data from prior monitoring events (e.g., water level, pH, ORP, temperature, D.O.).
- Any additional equipment discussed in section 5.0

4.0 Responsibilities

The site manager is responsible for ensuring that field personnel employ methods in accordance with this procedure and any other applicable SOPs. The site manager must also ensure the monitoring well sampling procedures meet the requirements of the site specific plans.

The field team leader is responsible for ensuring that field personnel follow methods in accordance with this procedure and other relevant procedures.

Note: Responsibilities may vary from site to site. All field team member responsibilities shall be defined in the field plan or site/quality assurance project plan (QAPP).

5.0 Methods

5.1 Preliminary Site Activities

- Start at the well known or believed to have the least contaminated groundwater and proceed sequentially to the well with the most contaminated groundwater.
- Lay out sheet of PE for monitoring and sampling equipment.
- Remove well cap and identify the pre-established elevation reference point on top of inside well casing. If not present, make one by cutting a small "V" notch in the casing with a utility knife.
- Measure and record the depth to groundwater (static water level) to within the nearest 0.01 foot from the reference point in all wells to be sampled prior to commencing purging. Take care to minimize disturbance to the water column and avoid dislodging particulates attached to the sides of the well casing.
- In no cases should the well be sounded prior to sampling as this may mobilize sediment in the bottom of the well.
- If dedicated equipment such as bladder pumps are not used, consideration should be given to placing the pump in the well 24 hours prior to sampling to allow any sediments in the well to settle.

5.2 Sampling Procedures

- Install Pump: Slowly lower the pump (or intake hose, if using a peristaltic pump) and downhole monitoring device, as applicable into the well to a depth corresponding to the center of the screened interval. If a zone of high permeability is present within the screened interval, consideration should be given to vertically centering the intake hose within this zone. This decision should be made based on a review of site specific information. The intake should be kept at least two feet above the bottom of the well to prevent mobilization of sediment from the bottom. If less than two feet of water is present in the well prior to sampling, the intake shall be centered in the water column. For problematic monitoring wells, consideration should be given to installing the pump approximately 24 hours before initiating purging. The approved site-specific Field Sampling Plan/Quality Assurance Project Plan (QAPP) should be reviewed prior to the sampling event to determine the type of pump and other equipment to be used, as well as, the depth to which the pump intake should be lowered in each well. Record the depth to which the pump is lowered.

- If the saturated water column within the screened interval is > 10 feet two samples will be collected from the well corresponding to the approximate center of the top half of the saturated water column and the approximate bottom half of the saturated water column. If a zone of high permeability is present within the saturated water column, consideration should be given to collecting one sample from the center of this zone. This decision should be made based on a review of site specific information. The intake should be kept at least two feet above the bottom of the well to prevent mobilization of sediment from the bottom. Record the depth to which the pump is lowered for each sample collected within the saturated water column.
- Re Measure Groundwater Level: Before starting the pump, measure the water level again with the pump in the well. Do not proceed until the water level has returned to within approximately 0.3 feet of the static level.
- Purging: Start pumping the well at approximately 200 milliliters per minute. The water level should be monitored as frequently as feasible immediately after the start of purging and then at least as frequent as every three to five minutes once the level has generally stabilized. Ideally, a steady flow rate should be maintained which results in a stabilized water level. The goal should be to not induce a drawdown in excess of approximately 0.3 feet (or approximately 2 percent of saturated thickness in low permeability formations). Pumping rates should, if needed, be reduced to the minimum capabilities of the pump to effect stabilization of the water level. However, care should be taken to maintain pump suction and to avoid entrainment of air in the tubing. The water level in the well should not drop below the top of the pump, therefore, pumping should cease before this occurs. If the recharge rate of the well is very low, care should be taken to avoid loss of pressure in the tubing line, cascading through the sand pack, or pumping the well dry. Record each adjustment made to the pumping rate, observation of changes in appearance of the water collected (e.g., increased turbidity or color) and the water level measured immediately after each adjustment.
- Monitor Indicator Parameters: During purging of the well, monitor the following field indicator parameters at the frequencies stated above; turbidity, temperature, specific conductance, pH, ORP and D.O. In line analyzers and continuous readout displays are recommended for all parameters so that the sample is not exposed to air prior to the measurement. However, if this is not feasible, temperature and/or ORP may be omitted from the list of in line parameters. Indicator parameters should be measured approximately every 3 to 5 minutes. The well is considered stabilized and ready for sample collection when three

consecutive readings are within a maximum range (from minimum to maximum measurements) as follows: +0.1 for pH, 3% for specific conductance, +10% for D.O., +10 mV for ORP, and +10% for turbidity. Measurement of the indicator parameters should continue every three to five minutes until these measurements indicate stability in the water quality. If the parameters have not stabilized after about an hour, purge the well until a minimum of 3 well volumes have been removed and proceed to collect the samples. This alternate procedure should be noted on the field data sheet.

- Temperature and pH are commonly used as field indicator parameters; however, they are quite insensitive in distinguishing between formation water and stagnant casing water. These parameters are important parameters for data interpretation purposes, thus they should be measured (Puls and Barcleona, 1996). Temperature readings at the flow cell may differ from the downhole probe values by 3 to 5°C due to seasonal changes in air temperature (Barcelona et al, 1994).
- Collect Samples: Samples should be collected at flow rates of between 100 and 250 ml/min, or under flow conditions such that drawdown of the water level within the well is not induced beyond the tolerances specified above. If VOCs are to be analyzed, they should be collected first and discharged directly from the pump discharge tubing into pre preserved sample containers. Sample containers should be filled by allowing the pump discharge to flow gently down the inside of the container with minimal turbulence.
- Remove Pump and Tubing: After collection of the samples, the pump's tubing, unless permanently installed, shall be properly discarded.
- Well Depth: Measure and record well depth.
- Close Down: Secure the well.

6.0 References

Barcelona, Michael J., H.A. Wehrmann, and M.D. Varljen, 1994. "Reproducible Well Purging Procedures and VOC Stabilization Criteria for Ground-Water Sampling." Ground Water. Vol. 32, No. 1, pp. 12-22.

Puls, R.W. and M.J. Barcelona, 1996, EPA Ground Water Issue Low-Flow (Minimal Drawdown) Ground-water Sampling Procedures, EPA/540/S-95/504.

United States Environmental Protection Agency – Region II, March 16, 1998, Ground water Sampling Procedure Low Stress (Low Flow) Purging and Sampling.

Field Equipment Maintenance and Calibration	SOP #:	12
	Revision:	2
	Date:	June 2015

Prepared by:	Nathan J. Shaffer	QA Review:	Signature
Approved by:	6/3/15		06/02/2015
	Signature/Date		Date

1.0 Objectives

The purpose of this Standard Operating Procedure (SOP) is to define the procedural requirements for field equipment maintenance and calibration.

2.0 Scope and Applicability

The procedures of this SOP are applicable to personnel involved in the planning, coordination, preparation, conducting and reporting related to field equipment maintenance and calibration.

3.0 Required Materials

- Project plans (work plan/health and safety plan)
- Personal protective equipment as specified in the site-specific health and safety plan
- Bound field log book
- Applicable field calibration logs
- Any additional equipment discussed in section 5.0

4.0 Responsibilities

The site manager is responsible for ensuring that field personnel employ methods in accordance with this procedure and any other applicable SOPs. The site manager must also ensure the field equipment maintenance and calibration procedures meet the requirements of the site specific plans.

The field team leader is responsible for ensuring that field personnel follow methods in accordance with this procedure and other relevant procedures.

Note: Responsibilities may vary from site to site. All field team member responsibilities shall be defined in the field plan or site/quality assurance project plan (QAPP).

5.0 Methods

The onsite B&L personnel are responsible for assuring that a master calibration/ maintenance log will be maintained for each measuring device. Each log will include at least the following information where applicable:

- Name of device and/or instrument calibrated
- Device/instrument serial and/or ID number
- Frequency of calibration
- Date of calibration
- Results of calibration
- Name of person performing the calibration
- Identification of the calibration gas for PID
- Buffer solutions (pH meter)

6.0 References

No references were used in the development of this SOP.

BENCHMARK
ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

LOW FLOW METHOD GROUNDWATER PURGE & SAMPLE COLLECTION LOG

Project Name:	WELL LOCATION:
Project Number:	Sample Matrix: groundwater
Client:	Weather:

WELL DATA:

DATE:	TIME:

Casing Diameter (inches):	Casing Material:
Screened interval (fbTOR):	Screen Material:
Static Water Level (fbTOR):	Bottom Depth (fbTOR):
Elevation Top of Well Riser (fmsl):	Ground Surface Elevation (fmsl):
Elevation Top of Screen (fmsl):	Stick-up (feet):
Standing volume in gallons:	
[(bottom depth - static water level) x vol calculation in table per well diameter]:	

Volume Calculation

Well Diameter	Volume gal/ft
1"	0.041
2"	0.163
3"	0.367
4"	0.653
5"	1.020
6"	1.469

PURGING DATA:

Pump Type:

Is equipment dedicated to location? yes no	Is tubing dedicated to location? yes no
Depth of Sample (i.e. Level of Intake) (fbTOR):	Approximate Purge Rate (gal/min):

Time	Water Level (fbTOR)	Accumulated Volume (gallons)	pH (units)	Temperature (degrees C)	Specific conductance (μS/cm)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Appearance & Odor
	Initial								

SAMPLING DATA:

DATE:	START TIME:	END TIME:

Method: low-flow with dedicated tubing	Was well sampled to dryness? yes no
Initial Water Level (fbTOR):	Was well sampled below top of sand pack? yes no
Final Water Level (fbTOR):	Field Personnel:

PHYSICAL & CHEMICAL DATA:

Appearance:	
Color:	
Odor:	
Sediment Present?	

WATER QUALITY MEASUREMENTS

pH (units)	TEMP. (°C)	SC (uS)	TURB. (NTU)	DO (ppm)	ORP (mV)

REMARKS:

PREPARED BY:

EXHIBIT C1

EPA REGION II LOW STRESS (OR LOW FLOW) PURGING AND SAMPLING PROCEDURE

United States Environmental Protection Agency
Office of Research and Development
Office of Solid Waste and Emergency Response
EPA/540/S-95/504
April 1996

Ground Water Issue

LOW-FLOW (MINIMAL DRAWDOWN) GROUND-WATER SAMPLING PROCEDURES

by Robert W. Puls[1] and Michael J. Barcelona[2]

Background

The Regional Superfund Ground Water Forum is a group of ground-water scientists, representing EPA's Regional Superfund Offices, organized to exchange information related to ground-water remediation at Superfund sites. One of the major concerns of the Forum is the sampling of ground water to support site assessment and remedial performance monitoring objectives. This paper is intended to provide background information on the development of low-flow sampling procedures and its application under a variety of hydrogeologic settings. It is hoped that the paper will support the production of standard operating procedures for use by EPA Regional personnel and other environmental professionals engaged in ground-water sampling.

For further information contact: Robert Puls, 405-436-8543, Subsurface Remediation and Protection Division, NRMRL, Ada, Oklahoma.

I. Introduction

The methods and objectives of ground-water sampling to assess water quality have evolved over time. Initially the emphasis was on the assessment of water quality of aquifers as sources of drinking water. Large water-bearing units were identified and sampled in keeping with that objective. These were highly productive aquifers that supplied drinking water via private wells or through public water supply systems. Gradually, with the increasing awareness of subsurface pollution of these water resources, the understanding of complex hydrogeochemical processes which govern the fate and transport of contaminants in the subsurface increased. This increase in understanding was also due to advances in a number of scientific disciplines and improvements in tools used for site characterization and ground-water sampling. Ground-water quality investigations where pollution was detected initially borrowed ideas, methods, and materials for site characterization from the water supply field and water analysis from public health practices. This included the materials and manner in which monitoring wells were installed and the way in which water was brought to the surface, treated, preserved and analyzed. The prevailing conceptual ideas included convenient generalizations of ground-water resources in terms of large and relatively homogeneous hydrologic *units*. With time it became apparent that conventional water supply generalizations of *homogeneity* did not adequately represent field data regarding pollution of these subsurface resources. The important role of *heterogeneity* became increasingly clear not only in geologic terms, but also in terms of complex physical,

[1]***National Risk Management Research Laboratory, U.S. EPA***
[2]***University of Michigan***

Superfund Technology Support Center for Ground Water

National Risk Management Research Laboratory
Subsurface Protection and Remediation Division
Robert S. Kerr Environmental Research Center
Ada, Oklahoma

Technology Innovation Office
Office of Solid Waste and Emergency Response, US EPA, Washington, DC

Walter W. Kovalick, Jr., Ph.D.
Director

chemical and biological subsurface processes. With greater appreciation of the role of heterogeneity, it became evident that subsurface pollution was ubiquitous and encompassed the unsaturated zone to the deep subsurface and included unconsolidated sediments, fractured rock, and *aquitards* or low-yielding or impermeable formations. Small-scale processes and heterogeneities were shown to be important in identifying contaminant distributions and in controlling water and contaminant flow paths.

It is beyond the scope of this paper to summarize all the advances in the field of ground-water quality investigations and remediation, but two particular issues have bearing on ground-water sampling today: aquifer heterogeneity and colloidal transport. Aquifer heterogeneities affect contaminant flow paths and include variations in geology, geochemistry, hydrology and microbiology. As methods and the tools available for subsurface investigations have become increasingly sophisticated and understanding of the subsurface environment has advanced, there is an awareness that in most cases a primary concern for site investigations is characterization of contaminant flow paths rather than entire aquifers. In fact, in many cases, plume thickness can be less than well screen lengths (e.g., 3-6 m) typically installed at hazardous waste sites to detect and monitor plume movement over time. Small-scale differences have increasingly been shown to be important and there is a general trend toward smaller diameter wells and shorter screens.

The hydrogeochemical significance of colloidal-size particles in subsurface systems has been realized during the past several years (Gschwend and Reynolds, 1987; McCarthy and Zachara, 1989; Puls, 1990; Ryan and Gschwend, 1990). This realization resulted from both field and laboratory studies that showed faster contaminant migration over greater distances and at higher concentrations than flow and transport model predictions would suggest (Buddemeier and Hunt, 1988; Enfield and Bengtsson, 1988; Penrose et al., 1990). Such models typically account for interaction between the mobile aqueous and immobile solid phases, but do not allow for a mobile, reactive solid phase. It is recognition of this third *phase* as a possible means of contaminant transport that has brought increasing attention to the manner in which samples are collected and processed for analysis (Puls et al., 1990; McCarthy and Degueldre, 1993; Backhus et al., 1993; U. S. EPA, 1995). If such a phase is present in sufficient mass, possesses high sorption reactivity, large surface area, and remains stable in suspension, it can serve as an important mechanism to facilitate contaminant transport in many types of subsurface systems.

Colloids are particles that are sufficiently small so that the surface free energy of the particle dominates the bulk free energy. Typically, in ground water, this includes particles with diameters between 1 and 1000 nm. The most commonly observed mobile particles include: secondary clay minerals; hydrous iron, aluminum, and manganese oxides; dissolved and particulate organic materials, and viruses and bacteria. These reactive particles have been shown to be mobile under a variety of conditions in both field studies and laboratory column experiments, and as such need to be included in monitoring programs where identification of the *total* mobile contaminant loading (dissolved + naturally suspended particles) at a site is an objective. To that end, sampling methodologies must be used which do not artificially bias *naturally* suspended particle concentrations.

Currently the most common ground-water purging and sampling methodology is to purge a well using bailers or high speed pumps to remove 3 to 5 casing volumes followed by sample collection. This method can cause adverse impacts on sample quality through collection of samples with high levels of turbidity. This results in the inclusion of otherwise immobile artifactual particles which produce an overestimation of certain analytes of interest (e.g., metals or hydrophobic organic compounds). Numerous documented problems associated with filtration (Danielsson, 1982; Laxen and Chandler, 1982; Horowitz et al., 1992) make this an undesirable method of rectifying the turbidity problem, and include the removal of potentially mobile (contaminant-associated) particles during filtration, thus artificially biasing contaminant concentrations low. Sampling-induced turbidity problems can often be mitigated by using low-flow purging and sampling techniques.

Current subsurface conceptual models have undergone considerable refinement due to the recent development and increased use of field screening tools. So-called hydraulic *push* technologies (e.g., cone penetrometer, Geoprobe®, QED HydroPunch®) enable relatively fast screening site characterization which can then be used to design and install a monitoring well network. Indeed, alternatives to conventional monitoring wells are now being considered for some hydrogeologic settings. The ultimate design of any monitoring system should however be based upon adequate site characterization and be consistent with established monitoring objectives.

If the sampling program objectives include accurate assessment of the magnitude and extent of subsurface contamination over time and/or accurate assessment of subsequent remedial performance, then some information regarding plume delineation in three-dimensional space is necessary prior to monitoring well network design and installation. This can be accomplished with a variety of different tools and equipment ranging from hand-operated augers to screening tools mentioned above and large drilling rigs. Detailed information on ground-water flow velocity, direction, and horizontal and vertical variability are essential baseline data requirements. Detailed soil and geologic data are required prior to and during the installation of sampling points. This includes historical as well as detailed soil and geologic logs which accumulate during the site investigation. The use of borehole geophysical techniques is also recommended. With this information (together with other site characterization data) and a clear understanding of sampling objectives, then appropriate location, screen length, well diameter, slot size, etc. for the monitoring well network can be decided. This is especially critical for new in situ remedial approaches or natural attenuation assessments at hazardous waste sites.

In general, the overall goal of any ground-water sampling program is to collect water samples with no alteration in water chemistry; analytical data thus obtained may be used for a variety of specific monitoring programs depending on the regulatory requirements. The sampling methodology described in this paper assumes that the monitoring goal is to sample monitoring wells for the presence of contaminants and it is applicable whether mobile colloids are a concern or not and whether the analytes of concern are metals (and metalloids) or organic compounds.

II. Monitoring Objectives and Design Considerations

The following issues are important to consider prior to the design and implementation of any ground-water monitoring program, including those which anticipate using low-flow purging and sampling procedures.

A. Data Quality Objectives (DQOs)

Monitoring objectives include four main types: detection, assessment, corrective-action evaluation and resource evaluation, along with *hybrid* variations such as site-assessments for property transfers and water availability investigations. Monitoring objectives may change as contamination or water quality problems are discovered. However, there are a number of common components of monitoring programs which should be recognized as important regardless of initial objectives. These components include:

1) Development of a conceptual model that incorporates elements of the regional geology to the local geologic framework. The conceptual model development also includes initial site characterization efforts to identify hydrostratigraphic units and likely flow-paths using a minimum number of borings and well completions;

2) Cost-effective and well documented collection of high quality data utilizing simple, accurate, and reproducible techniques; and

3) Refinement of the conceptual model based on supplementary data collection and analysis.

These fundamental components serve many types of monitoring programs and provide a basis for future efforts that evolve in complexity and level of spatial detail as purposes and objectives expand. High quality, reproducible data collection is a common goal regardless of program objectives.

High quality data collection implies data of sufficient accuracy, precision, and completeness (i.e., ratio of valid analytical results to the minimum sample number called for by the program design) to meet the program objectives. Accuracy depends on the correct choice of monitoring tools and procedures to minimize sample and subsurface disturbance from collection to analysis. Precision depends on the repeatability of sampling and analytical protocols. It can be assured or improved by replication of sample analyses including blanks, field/lab standards and reference standards.

B. Sample Representativeness

An important goal of any monitoring program is collection of data that is truly representative of conditions at the site. The term *representativeness* applies to chemical and hydrogeologic data collected via wells, borings, piezometers, geophysical and soil gas measurements, lysimeters, and temporary sampling points. It involves a recognition of the statistical variability of individual subsurface physical properties, and contaminant or major ion concentration levels, while explaining extreme values. Subsurface temporal and spatial variability are facts. Good professional practice seeks to maximize representativeness by using proven accurate and reproducible techniques to define limits on the distribution of measurements collected at a site. However, measures of representativeness are dynamic and are controlled by evolving site characterization and monitoring objectives. An evolutionary site characterization model, as shown in Figure 1, provides a systematic approach to the goal of consistent data collection.

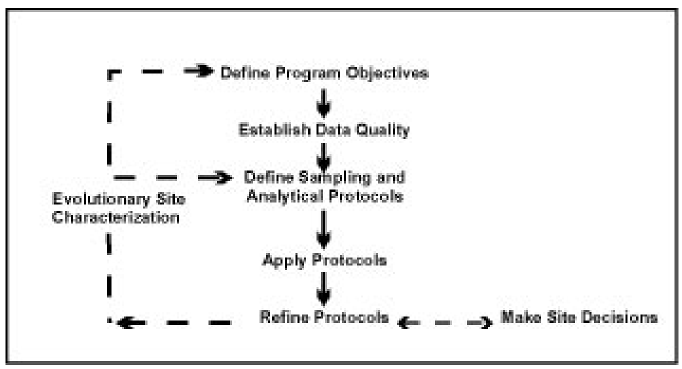


Figure 1. Evolutionary Site Characterization Model

The model emphasizes a recognition of the causes of the variability (e.g., use of inappropriate technology such as using bailers to purge wells; imprecise or operator-dependent methods) and the need to control avoidable errors.

1) Questions of Scale

A sampling plan designed to collect representative samples must take into account the potential scale of changes in site conditions through space and time as well as the chemical associations and behavior of the parameters that are targeted for investigation. In subsurface systems, physical (i.e., aquifer) and chemical properties over time or space are not statistically independent. In fact, samples taken in close proximity (i.e., within distances of a few meters) or within short time periods (i.e., more frequently than monthly) are highly auto-correlated. This means that designs employing high-sampling frequency (e.g., monthly) or dense spatial monitoring designs run the risk of redundant data collection and misleading inferences regarding trends in values that aren't statistically valid. In practice, contaminant detection and assessment monitoring programs rarely suffer these *over-sampling* concerns. In corrective-action evaluation programs, it is also possible that too little data may be collected over space or time. In these cases, false interpretation of the spatial extent of contamination or underestimation of temporal concentration variability may result.

2) Target Parameters

Parameter selection in monitoring program design is most often dictated by the regulatory status of the site. However, background water quality constituents, purging indicator parameters, and contaminants, all represent targets for data collection programs. The tools and procedures used in these programs should be equally rigorous and applicable to all categories of data, since all may be needed to determine or support regulatory action.

C. Sampling Point Design and Construction

Detailed site characterization is central to all decision-making purposes and the basis for this characterization resides in identification of the geologic framework and major hydro-stratigraphic units. Fundamental data for sample point location include: subsurface lithology, head-differences and background geochemical conditions. Each sampling point has a proper use or uses which should be documented at a level which is appropriate for the program's data quality objectives. Individual sampling points may not always be able to fulfill multiple monitoring objectives (e.g., detection, assessment, corrective action).

1) Compatibility with Monitoring Program and Data Quality Objectives

Specifics of sampling point location and design will be dictated by the complexity of subsurface lithology and variability in contaminant and/or geochemical conditions. It should be noted that, regardless of the ground-water sampling approach, few sampling points (e.g., wells, drive-points, screened augers) have zones of influence in excess of a few feet. Therefore, the spatial frequency of sampling points should be carefully selected and designed.

2) Flexibility of Sampling Point Design

In most cases *well-point* diameters in excess of 1 7/8 inches will permit the use of most types of submersible pumping devices for low-flow (minimal drawdown) sampling. It is suggested that *short* (e.g., less than 1.6 m) screens be incorporated into the monitoring design where possible so that comparable results from one device to another might be expected. *Short*, of course, is relative to the degree of vertical water quality variability expected at a site.

3) Equilibration of Sampling Point

Time should be allowed for equilibration of the well or sampling point with the formation after installation. Placement of well or sampling points in the subsurface produces some disturbance of ambient conditions. Drilling techniques (e.g., auger, rotary, etc.) are generally considered to cause more disturbance than *direct-push* technologies. In either case, there may be a period (i.e., days to months) during which water quality near the point may be distinctly different from that in the formation. Proper development of the sampling point and adjacent formation to remove fines created during emplacement will shorten this water quality *recovery* period.

III. Definition of Low-Flow Purging and Sampling

It is generally accepted that water in the well casing is non-representative of the formation water and needs to be purged prior to collection of ground-water samples. However, the water in the screened interval may indeed be representative of the formation, depending upon well construction and site hydrogeology. Wells are purged to some extent for the following reasons: the presence of the air interface at the top of the water column resulting in an oxygen concentration gradient with depth, loss of volatiles up the water column, leaching from or sorption to the casing or filter pack, chemical changes due to clay seals or backfill, and surface infiltration.

Low-flow purging, whether using portable or dedicated systems, should be done using pump-intake located in the middle or slightly above the middle of the screened interval. Placement of the pump too close to the bottom of the well will cause increased entrainment of solids which have collected in the well over time. These particles are present as a result of well development, prior purging and sampling events, and natural colloidal transport and deposition. Therefore, placement of the pump in the middle or toward the top of the screened interval is suggested. Placement of the pump at the top of the water column for sampling is only recommended in unconfined aquifers, screened across the water table, where this is the desired sampling point. Low-flow purging has the advantage of minimizing mixing between the overlying stagnant casing water and water within the screened interval.

A. Low-Flow Purging and Sampling

Low-flow refers to the velocity with which water enters the pump intake and that is imparted to the formation pore water in the immediate vicinity of the well screen. It does not necessarily refer to the flow rate of water discharged at the surface which can be affected by flow regulators or restrictions. Water level drawdown provides the best indication of the stress imparted by a given flow-rate for a given hydrological situation. The objective is to pump in a manner that minimizes stress (drawdown) to the system to the extent practical taking into account established site sampling objectives. Typically, flow rates on the order of 0.1 - 0.5 L/min are used, however this is dependent on site-specific hydrogeology. Some extremely coarse-textured formations have been successfully sampled in this manner at flow rates to 1 L/min. The effectiveness of using low-flow purging is intimately linked with proper screen location, screen length, and well construction and development techniques. The reestablishment of natural flow paths in both the vertical and horizontal directions is important for correct interpretation of the data. For high resolution sampling needs, screens less than 1 m should be used. Most of the need for purging has been found to be due to passing the sampling device through the overlying casing water which causes mixing of these stagnant waters and the dynamic waters within the screened interval. Additionally, there is disturbance to suspended sediment collected in the bottom of the casing and the displacement of water out into the formation immediately adjacent to the well screen. These disturbances and impacts can be avoided using dedicated sampling equipment, which precludes the need to insert the sampling device prior to purging and sampling.

Isolation of the screened interval water from the overlying stagnant casing water may be accomplished using low-flow minimal drawdown techniques. If the pump intake is located within the screened interval, most of the water pumped will be drawn in directly from the formation with little mixing of casing water or disturbance to the sampling zone. However, if the wells are not constructed and developed properly, zones other than those intended may be sampled. At some sites where geologic heterogeneities are sufficiently different within the screened interval, higher conductivity zones may be preferentially sampled. This is another reason to use shorter screened intervals, especially where high spatial resolution is a sampling objective.

B. Water Quality Indicator Parameters

It is recommended that water quality indicator parameters be used to determine purging needs prior to sample collection in each well. Stabilization of parameters such as pH, specific conductance, dissolved oxygen, oxidation-reduction potential, temperature and turbidity should be used to determine when formation water is accessed during purging. In general, the order of stabilization is pH, temperature, and specific conductance, followed by oxidation-reduction potential, dissolved oxygen and turbidity. Temperature and pH, while commonly used as purging indicators, are actually quite insensitive in distinguishing between formation water and stagnant casing water; nevertheless, these are important parameters for data interpretation purposes and should also be measured. Performance criteria for determination of stabilization should be based on water-level drawdown, pumping rate and equipment specifications for measuring indicator parameters. Instruments are available which utilize in-line flow cells to continuously measure the above parameters.

It is important to establish specific well stabilization criteria and then consistently follow the same methods thereafter, particularly with respect to drawdown, flow rate and sampling device. Generally, the time or purge volume required for parameter stabilization is independent of well depth or well volumes. Dependent variables are well diameter, sampling device, hydrogeochemistry, pump flow rate, and whether the devices are used in a portable or dedicated manner. If the sampling device is already in place (i.e., dedicated sampling systems), then the time and purge volume needed for stabilization is much shorter. Other advantages of dedicated equipment include less purge water for waste disposal, much less decontamination of equipment, less time spent in preparation of sampling as well as time in the field, and more consistency in the sampling approach which probably will translate into less variability in sampling results. The use of dedicated equipment is strongly recommended at wells which will undergo routine sampling over time.

If parameter stabilization criteria are too stringent, then minor oscillations in indicator parameters may cause purging operations to become unnecessarily protracted. It should also be noted that turbidity is a very conservative parameter in terms of stabilization. Turbidity is always the last parameter to stabilize. Excessive purge times are invariably related to the establishment of too stringent turbidity stabilization criteria. It should be noted that natural turbidity levels in ground water may exceed 10 nephelometric turbidity units (NTU).

C. Advantages and Disadvantages of Low-Flow (Minimum Drawdown) Purging

In general, the advantages of low-flow purging include:

- samples which are representative of the *mobile* load of contaminants present (dissolved and colloid-associated);
- minimal disturbance of the sampling point thereby minimizing sampling artifacts;
- less operator variability, greater operator control;

- reduced stress on the formation (minimal drawdown);
- less mixing of stagnant casing water with formation water;
- reduced need for filtration and, therefore, less time required for sampling;
- smaller purging volume which decreases waste disposal costs and sampling time;
- better sample consistency; reduced artificial sample variability.

Some disadvantages of low-flow purging are:

- higher initial capital costs,
- greater set-up time in the field,
- need to transport additional equipment to and from the site,
- increased training needs,
- resistance to change on the part of sampling practitioners,
- concern that new data will indicate a *change in conditions* and trigger an *action*.

IV. Low-Flow (Minimal Drawdown) Sampling Protocols

The following ground-water sampling procedure has evolved over many years of experience in ground-water sampling for organic and inorganic compound determinations and as such summarizes the authors' (and others) experiences to date (Barcelona et al., 1984, 1994; Barcelona and Helfrich, 1986; Puls and Barcelona, 1989; Puls et. al. 1990, 1992; Puls and Powell, 1992; Puls and Paul, 1995). High-quality chemical data collection is essential in ground-water monitoring and site characterization. The primary limitations to the collection of *representative* ground-water samples include: mixing of the stagnant casing and *fresh* screen waters during insertion of the sampling device or ground-water level measurement device; disturbance and resuspension of settled solids at the bottom of the well when using high pumping rates or raising and lowering a pump or bailer; introduction of atmospheric gases or degassing from the water during sample handling and transfer, or inappropriate use of vacuum sampling device, etc.

A. Sampling Recommendations

Water samples should not be taken immediately following well development. Sufficient time should be allowed for the ground-water flow regime in the vicinity of the monitoring well to stabilize and to approach chemical equilibrium with the well construction materials. This lag time will depend on site conditions and methods of installation but often exceeds one week.

Well purging is nearly always necessary to obtain samples of water flowing through the geologic formations in the screened interval. Rather than using a general but arbitrary guideline of purging three casing volumes prior to sampling, it is recommended that an in-line water quality measurement device (e.g., flow-through cell) be used to establish the stabilization time for several parameters (e.g. , pH, specific conductance, redox, dissolved oxygen, turbidity) on a well-specific basis. Data on pumping rate, drawdown, and volume required for parameter stabilization can be used as a guide for conducting subsequent sampling activities.

The following are recommendations to be considered before, during and after sampling:

- use low-flow rates (<0.5 L/min), during both purging and sampling to maintain minimal drawdown in the well;
- maximize tubing wall thickness, minimize tubing length;
- place the sampling device intake at the desired sampling point;
- minimize disturbances of the stagnant water column above the screened interval during water level measurement and sampling device insertion;
- make proper adjustments to stabilize the flow rate as soon as possible;
- monitor water quality indicators during purging;
- collect unfiltered samples to estimate contaminant loading and transport potential in the subsurface system.

B. Equipment Calibration

Prior to sampling, all sampling device and monitoring equipment should be calibrated according to manufacturer's recommendations and the site Quality Assurance Project Plan (QAPP) and Field Sampling Plan (FSP). Calibration of pH should be performed with at least two buffers which bracket the expected range. Dissolved oxygen calibration must be corrected for local barometric pressure readings and elevation.

C. Water Level Measurement and Monitoring

It is recommended that a device be used which will least disturb the water surface in the casing. Well depth should be obtained from the well logs. Measuring to the bottom of the well casing will only cause resuspension of settled solids from the formation and require longer purging times for turbidity equilibration. Measure well depth after sampling is completed. The water level measurement should be taken from a permanent reference point which is surveyed relative to ground elevation.

D. Pump Type

The use of low-flow (e.g., 0.1-0.5 L/min) pumps is suggested for purging and sampling all types of analytes. All pumps have some limitation and these should be investigated with respect to application at a particular site. Bailers are inappropriate devices for low-flow sampling.

1) General Considerations

There are no unusual requirements for ground-water sampling devices when using low-flow, minimal drawdown techniques. The major concern is that the device give consistent results and minimal disturbance of the sample across a range of *low* flow rates (i.e., < 0.5 L/min). Clearly, pumping rates that cause minimal to no drawdown in one well could easily cause *significant* drawdown in another well finished in a less transmissive formation. In this sense, the pump should not cause undue pressure or temperature changes or physical disturbance on the water sample over a reasonable sampling range. Consistency in operation is critical to meet accuracy and precision goals.

2) Advantages and Disadvantages of Sampling Devices

A variety of sampling devices are available for low-flow (minimal drawdown) purging and sampling and include peristaltic pumps, bladder pumps, electrical submersible pumps, and gas-driven pumps. Devices which lend themselves to both dedication and consistent operation at definable low-flow rates are preferred. It is desirable that the pump be easily adjustable and operate reliably at these lower flow rates. The peristaltic pump is limited to shallow applications and can cause degassing resulting in alteration of pH, alkalinity, and some volatiles loss. Gas-driven pumps should be of a type that does not allow the gas to be in direct contact with the sampled fluid.

Clearly, bailers and other *grab* type samplers are ill-suited for low-flow sampling since they will cause repeated disturbance and mixing of *stagnant* water in the casing and the *dynamic* water in the screened interval. Similarly, the use of inertial lift foot-valve type samplers may cause too much disturbance at the point of sampling. Use of these devices also tends to introduce uncontrolled and unacceptable operator variability.

Summaries of advantages and disadvantages of various sampling devices are listed in Herzog et al. (1991), U. S. EPA (1992), Parker (1994) and Thurnblad (1994).

E. Pump Installation

Dedicated sampling devices (left in the well) capable of pumping and sampling are preferred over <u>any</u> other type of device. Any portable sampling device should be slowly and carefully lowered to the middle of the screened interval or slightly above the middle (e.g., 1-1.5 m below the top of a 3 m screen). This is to minimize excessive mixing of the stagnant water in the casing above the screen with the screened interval zone water, and to minimize resuspension of solids which will have collected at the bottom of the well. These two disturbance effects have been shown to directly affect the time required for purging. There also appears to be a direct correlation between size of portable sampling devices relative to the well bore and resulting purge volumes and times. The key is to minimize disturbance of water and solids in the well casing.

F. Filtration

Decisions to filter samples should be dictated by sampling objectives rather than as a *fix* for poor sampling practices, and field-filtering of certain constituents should not be the default. Consideration should be given as to what the application of field-filtration is trying to accomplish. For assessment of truly dissolved (as opposed to operationally *dissolved* [i.e., samples filtered with 0.45 µm filters]) concentrations of major ions and trace metals, 0.1 µm filters are recommended although 0.45 µm filters are normally used for most regulatory programs. Alkalinity samples must also be filtered if significant particulate calcium carbonate is suspected, since this material is likely to impact alkalinity titration results (although filtration itself may alter the CO_2 composition of the sample and, therefore, affect the results).

Although filtration may be appropriate, filtration of a sample may cause a number of unintended changes to occur (e.g. oxidation, aeration) possibly leading to filtration-induced artifacts during sample analysis and uncertainty in the results. Some of these unintended changes may be unavoidable but the factors leading to them must be recognized. Deleterious effects can be minimized by consistent application of certain filtration guidelines. Guidelines should address selection of filter type, media, pore size, etc. in order to identify and minimize potential sources of uncertainty when filtering samples.

In-line filtration is recommended because it provides better consistency through less sample handling, and minimizes sample exposure to the atmosphere. In-line filters are available in both disposable (barrel filters) and non-disposable (in-line filter holder, flat membrane filters) formats and various filter pore sizes (0.1-5.0 µm). Disposable filter cartridges have the advantage of greater sediment handling capacity when compared to traditional membrane filters. Filters must be pre-rinsed following manufacturer's recommendations. If there are no recommendations for rinsing, pass through a minimum of 1 L of ground water following purging and prior to sampling. Once filtration has begun, a filter cake may develop as particles larger than the pore size accumulate on the filter membrane. The result is that the effective pore diameter of the membrane is reduced and particles smaller than the stated pore size are excluded from the filtrate. Possible corrective measures include prefiltering (with larger pore size filters), minimizing particle loads to begin with, and reducing sample volume.

G. Monitoring of Water Level and Water Quality Indicator Parameters

Check water level periodically to monitor drawdown in the well as a guide to flow rate adjustment. The goal is minimal drawdown (<0.1 m) during purging. This goal may be difficult to achieve under some circumstances due to geologic heterogeneities within the screened interval, and may require adjustment based on site-specific conditions and personal experience. In-line water quality indicator parameters should be continuously monitored during purging. The water quality indicator parameters monitored can include pH, redox potential, conductivity, dissolved oxygen (DO) and turbidity. The last three parameters are often most sensitive. Pumping rate, drawdown, and the time or volume required to obtain stabilization of parameter readings can be used as a future guide to purge the well. Measurements should be taken every three to five minutes if the above suggested rates are used. Stabilization is achieved after all parameters have stabilized for three successive readings. In lieu of measuring all five parameters, a minimum subset would include pH, conductivity, and turbidity or DO. Three successive readings should be within ± 0.1 for pH, ± 3% for conductivity, ± 10 mv for redox potential, and ± 10% for turbidity and DO. Stabilized purge indicator parameter trends are generally obvious and follow either an exponential or asymptotic change to stable values during purging. Dissolved oxygen and turbidity usually require the longest time for stabilization. The above stabilization guidelines are provided for rough estimates based on experience.

H. Sampling, Sample Containers, Preservation and Decontamination

Upon parameter stabilization, sampling can be initiated. If an in-line device is used to monitor water quality parameters, it should be disconnected or bypassed during sample collection. Sampling flow rate may remain at established purge rate or may be adjusted slightly to minimize aeration, bubble formation, turbulent filling of sample bottles, or loss of volatiles due to extended residence time in tubing. Typically, flow rates less than 0.5 L/min are appropriate. The same device should be used for sampling as was used for purging. Sampling should occur in a progression from least to most contaminated well, if this is known. Generally, volatile (e.g., solvents and fuel constituents) and gas sensitive (e.g., Fe^{2+}, CH_4, H_2S/HS^-, alkalinity) parameters should be sampled first. The sequence in which samples for most inorganic parameters are collected is immaterial unless filtered (dissolved) samples are desired. Filtering should be done last and in-line filters should be used as discussed above. During both well purging and sampling, proper protective clothing and equipment must be used based upon the type and level of contaminants present.

The appropriate sample container will be prepared in advance of actual sample collection for the analytes of interest and include sample preservative where necessary. Water samples should be collected directly into this container from the pump tubing.

Immediately after a sample bottle has been filled, it must be preserved as specified in the site (QAPP). Sample preservation requirements are based on the analyses being performed (use site QAPP, FSP, RCRA guidance document [U. S. EPA, 1992] or EPA SW-846 [U. S. EPA, 1982]). It may be advisable to add preservatives to sample bottles in a controlled setting prior to entering the field in order to reduce the chances of improperly preserving sample bottles or introducing field contaminants into a sample bottle while adding the preservatives.

The preservatives should be transferred from the chemical bottle to the sample container using a disposable polyethylene pipet and the disposable pipet should be used only once and then discarded.

After a sample container has been filled with ground water, a Teflon™ (or tin)-lined cap is screwed on tightly to prevent the container from leaking. A sample label is filled out as specified in the FSP. The samples should be stored inverted at 4°C.

Specific decontamination protocols for sampling devices are dependent to some extent on the type of device used and the type of contaminants encountered. Refer to the site QAPP and FSP for specific requirements.

I. Blanks

The following blanks should be collected:

(1) field blank: one field blank should be collected from each source water (distilled/deionized water) used for sampling equipment decontamination or for assisting well development procedures.

(2) equipment blank: one equipment blank should be taken prior to the commencement of field work, from each set of sampling equipment to be used for that day. Refer to site QAPP or FSP for specific requirements.

(3) trip blank: a trip blank is required to accompany each volatile sample shipment. These blanks are prepared in the laboratory by filling a 40-mL volatile organic analysis (VOA) bottle with distilled/deionized water.

V. Low-Permeability Formations and Fractured Rock

The overall sampling program goals or sampling objectives will drive how the sampling points are located, installed, and choice of sampling device. Likewise, site-specific hydrogeologic factors will affect these decisions. Sites with very low permeability formations or fractures causing discrete flow channels may require a unique monitoring approach. Unlike water supply wells, wells installed for ground-water quality assessment and restoration programs are often installed in low water-yielding settings (e.g., clays, silts). Alternative types of sampling points and sampling methods are often needed in these types of environments, because low-permeability settings may require extremely low-flow purging (<0.1 L/min) and may be technology-limited. Where devices are not readily available to pump at such low flow rates, the primary consideration is to avoid dewatering of the well screen. This may require repeated recovery of the water during purging while leaving the pump in place within the well screen.

Use of low-flow techniques may be impractical in these settings, depending upon the water recharge rates. The sampler and the end-user of data collected from such wells need to understand the limitations of the data collected; i.e., a strong potential for underestimation of actual contaminant concentrations for volatile organics, potential false negatives for filtered metals and potential false positives for unfiltered metals. It is suggested that comparisons be made between samples recovered using low-flow purging techniques and samples recovered using passive sampling techniques (i.e., two sets of samples). Passive sample collection would essentially entail acquisition of the sample with no or very little purging using a dedicated sampling system installed within the screened interval or a passive sample collection device.

A. Low-Permeability Formations (<0.1 L/min recharge)

1. Low-Flow Purging and Sampling with Pumps

a. "portable or non-dedicated mode" - Lower the pump (one capable of pumping at <0.1 L/min) to mid-screen or slightly above and set in place for minimum of 48 hours (to lessen purge volume requirements). After 48 hours, use procedures listed in Part IV above regarding monitoring water quality parameters for stabilization, etc., but do not dewater the screen. If excessive drawdown and slow recovery is a problem, then alternate approaches such as those listed below may be better.

b. "dedicated mode" - Set the pump as above at least a week prior to sampling; that is, operate in a dedicated pump mode. With this approach significant reductions in purge volume should be realized. Water quality parameters should stabilize quite rapidly due to less disturbance of the sampling zone.

2. Passive Sample Collection

Passive sampling collection requires insertion of the device into the screened interval for a sufficient time period to allow flow and sample equilibration before extraction for analysis. Conceptually, the extraction of water from low yielding formations seems more akin to the collection of water from the unsaturated zone and passive sampling techniques may be more appropriate in terms of obtaining "representative" samples. Satisfying usual sample volume requirements is typically a problem with this approach and some latitude will be needed on the part of regulatory entities to achieve sampling objectives.

B. Fractured Rock

In fractured rock formations, a low-flow to zero purging approach using pumps in conjunction with packers to isolate the sampling zone in the borehole is suggested. Passive multi-layer sampling devices may also provide the most "representative" samples. It is imperative in these settings to identify flow paths or water-producing fractures prior to sampling using tools such as borehole flowmeters and/or other geophysical tools.

After identification of water-bearing fractures, install packer(s) and pump assembly for sample collection using low-flow sampling in "dedicated mode" or use a passive sampling device which can isolate the identified water-bearing fractures.

VI. Documentation

The usual practices for documenting the sampling event should be used for low-flow purging and sampling techniques. This should include, at a minimum: information on the conduct of purging operations (flow-rate, drawdown, water-quality parameter values, volumes extracted and times for measurements), field instrument calibration data, water sampling forms and chain of custody forms. See Figures 2 and 3 and "Ground Water Sampling Workshop -- A Workshop Summary" (U. S. EPA, 1995) for example forms and other documentation suggestions and information. This information coupled with laboratory analytical data and validation data are needed to judge the "useability" of the sampling data.

VII. Notice

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Figure 2. **Ground Water Sampling Log**

Project ________________ **Site** ________________ **Well No.** ______________ **Date** ___________________________

Well Depth _____________ **Screen Length** ___________ **Well Diameter** __________ **Casing Type** _____________

Sampling Device ________________ **Tubing type** ______________________ **Water Level** ___________________

Measuring Point ____________________ **Other Infor** ____

____

Sampling Personnel ____

Time	pH	Temp	Cond.	Dis.O_2	Turb.	[ ]Conc			Notes

Type of Samples Collected

____

Information: 2 in = 617 ml/ft, 4 in = 2470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi\, r^3$

Figure 3. **Ground Water Sampling Log** (with automatic data logging for most water quality parameters)

Project ________________ **Site** ________________ **Well No.** ______________ **Date** __________________________

Well Depth _____________ **Screen Length** ___________ **Well Diameter** __________ **Casing Type** ____________

Sampling Device ________________ **Tubing type** ______________________ **Water Level** __________________

Measuring Point ____________________ **Other Infor** ____

____

Sampling Personnel ____

Time	Pump Rate	Turbidity	Alkalinity	[ ] Conc	Notes

Type of Samples Collected

____

Information: 2 in = 617 ml/ft, 4 in = 2470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi\ r^3$

ATTACHMENT C2

CALCULATION PROCEDURE-CONTAMINANT LOADING CALCULATION

(TO BE REVISED)

CALCULATION PROCEDURE
CONTAMINANT LOADING CALCULATION

1.0 GENERAL

This procedure presents a method to calculate contaminant loading from the former Steel Manufacturing Site to the Buffalo River, if necessary. This calculation would only be required along the affected segment if an increasing trend in contaminant concentration occurs along the Buffalo River during long-term groundwater monitoring of the site.

2.0 SITE-SPECIFIC CONTAMINANT LOADINGS TO BUFFALO RIVER

Data collected during the long term groundwater monitoring will be used to estimate the groundwater contaminant loading offsite (toward South Park or to the Buffalo River). The calculation of groundwater contaminant mass loading from the Site will be based upon the following assumptions:

- The shoreline of the Buffalo River and the segment along South Park Avenue to the north-northeast will be approximated as four straight lines. Each line will be further segmented as shown on Figure C2-1 and described below:

  Line 1: Segment 1-1 from monitoring well A1-MW-7 to A1-P-4 (approximately 940 feet long). Segment 1-2 from monitoring well A1-P-4 to A1-MW-3 (approximately 1000 feet long).

  Line 2: Segment 2-1 from monitoring well A1-MW-3 to monitoring well A1-MW-6 (approximately 682 feet long). Segment 2-2 from monitoring well A1-MW-6 to monitoring well A1-MW-2 (approximately 700 feet long).

  Line 3: Segment 3-1 from monitoring well A1-MW-2 to monitoring well A1-MW-1 (approximately 1030 feet). Segment 3-2 from monitoring well A1-MW-1 to approximately 230 feet south.

  Line 4: Segment 4-1 from 230 feet south of monitoring well A1-MW-1 to A1-MW-9 (approximately 245 feet). Segment 4-2 from A1-MW-9 to monitoring well A1-MW-M2 (approximately 360 feet). Segment 4-3 from monitoring well A1-MW-M2 approximately 506 feet northwest.

- Only groundwater in the uppermost-saturated zone (viz. fill material) is contributing contaminants to the Buffalo River. Table C2-1 provides saturated fill thickness of existing monitoring wells measured on September 23, 2004.

- The hydraulic conductivity, hydraulic gradient, and groundwater constituent concentration for each segment will be calculated by taking the arithmetic average of the specific variable for each of the wells that define the segment (the values that currently exist are presented in Tables C2-2 and C2-3).

- The west end point of Segment 4-3 will be assumed to have the same chemical properties as monitoring well A1-MW-M2.

- Segment 4-3 hydraulic conductivity will be the average hydraulic conductivity of A1-MW-M2, A1-MW-9, and A1-P-2.

- The hydraulic and chemical properties of south end of Segment 3-2 and the east end of Segment 4-1 will be estimated by interpolating data between A1-MW-1 and A1-MW-9.

- For compounds where the practical quantitation limit exceeds the groundwater quality standard and was detected in Area I groundwater, a value of one-half the method detection limit will be factored into the loading calculations for that compound.

- Any segments with the water table surface existing in the alluvium will be represented with a zero because there would be no flow contribution from saturated fill offsite (Table C-3).

Using the data described above, the groundwater flow rate from the northern boundary of Area I to the Buffalo River will be estimated for each segment using Darcy's Law:

2.1.1.1 **Q=kiA**

where:

Q = Groundwater flow rate

k = average hydraulic conductivity of the segment

i = average hydraulic gradient of the segment

A = saturated cross-sectional area

The estimated groundwater flows from each segment will then be combined to give the total estimated groundwater flow rate from the Site to the River (of 82,446) in cubic feet per day. Groundwater flow rate calculations will be summarized in tabular form (Table 4-7).

Using the groundwater flow rate and the estimated groundwater concentrations for each segment, the off-site contaminant loading will be calculated using the following equation:

$$(\text{Mass Loading})_{i,j} = (6.243 \times 10^{-8})\, Q_i\, C_{i,j}$$

where:

$(\text{Mass Loading})_{i,j}$ = mass loading of constituent j in segment i (lb/day)

Q_i = groundwater flow rate through segment i (ft^3/day)

$C_{i,j}$ = concentration of constituent j in segment i (ug/l)

6.243×10^{-8} = conversion factor to lb/day

Calculations of groundwater contaminant mass loadings for each segment will be summarized in tabular form (Table 4-8) and total off-site contaminant mass loadings from the Site to the Buffalo River summarized in tabular form (Table 4-9). Total off-site VOC and SVOC loadings to the Buffalo River will be estimated in lb/day and shown in tabular (4-9) form.

2.2 3.0 Assessment of Groundwater Impacts on Buffalo River Quality

Using the groundwater contaminant loadings procedure presented above, the estimated increase in downstream constituent concentrations in the Buffalo River at average summer flow rates of 49 million gallons per day (Source: Buffalo River Remedial Action Plan, NYSDEC, November 1989), will be calculated and then compared with New York State Class "D" Water Quality Standards or Guidance Values.

TABLE 2-1

SATURATED FILL THICKNESS FOR MONITORING WELLS

RD/RA Work Plan Appendix C - Long Term Groundwater Monitoring Plan
Steelfields, LTD.
Buffalo, New York

Well Designation	Measurement Date	Ground Elevation (fmsl)	Groundwater Elevation (09/23/04) (fmsl)	Depth to Native Soil (fbgs)	Bottom of Fill Elevation (fmsl)	Saturated Soil/Fill Thickness (feet)
A1-MW-1	09/23/04	583.94	574.94	5.5	578.4	*note 1*
A1-MW-2	09/23/04	584.30	577.78	12.7	571.6	6.2
A1-MW-3	09/23/04	589.68	573.48	17.0	572.7	0.8
A1-MW-6	09/23/04	589.74	573.20	10.0	579.7	*note 1*
A1-MW-7	09/23/04	584.32	574.39	2.0	582.3	*note 1*
A1-MW-9 [2]	09/23/04	585.73	574.75	11.5	574.2	0.5
A1-P-4	09/23/04	586.97	576.21	4.0	583.0	*note 1*
A1-MW-M2	09/23/04	586.08	580.66	6.5	579.6	1.1

Notes:
1. Well screened within native soil. No saturated fill at this location.
2. Monitoring well A1-MW-9 was installed adjacent to and within 6-feet of decommissioned piezometer A1-P-1 on May 10, 2004.

Table 2-2

Calculated Average Groundwater Constituent Concentrations By Segment

Site Assessment Report (Area I)
LTV Steel Company

Constituent	Segment 1-1	Segment 1-2	Segment 1-3	Segment 1-4	Segment 2-1	Segment 2-2	Segment 2-3	Segment 3-1	Segment 3-2	Segment 3-3
Volatile Organic Compounds (ug/L):										
Acetone	27	0	0	0	0	0	0	0	11.5	23
Benzene [1]	0.435	0.435	0.435	0.435	0.435	0.435	0.435	0.435	0.435	0.435
Ethylbenzene	0	0	0.0	0.2	1.2	1	0	0	0	0
Toluene	0	0	3.5	6.3	2.8	0	0	0	0	0
Xylene (total) [2]	1.75	1.75	7.9	12.7	6.2	1.375	1.75	1.75	1.75	1.75
Semivolatile Organic Compounds (ug/L):										
Acenaphthene	0	0	2	5.1	10.6	7.5	0.21	0.61	0.4	0
Anthracene	0	0	0	0	0	0	0.26	0.76	0.5	0
Fluorene	0	0	3	7.8	16.8	12	0	0	0	0
2-Methylnaphthalene	0	0	10.5	30.8	80.3	60	0	0	0	0
Naphthalene	0	0	4.5	14.6	43.1	33.5	0.74	0.24	0	0
Phenanthrene	0	0	4	11.2	27.2	20	0.26	0.76	0.5	0
Phenol [3]	0.465	0.465	1.233	1.848	1.081	0.465	0.465	0.465	0.465	0.465

Notes:

1. Benzene was not detected in the site perimeter groundwater samples. Since the practical quantitation limit was above the groundwater quality standard, a concentration of 1/2 the method detection limit (0.87 ug/L) was used.
2. Xylene was not detected in the site perimeter groundwater samples that define Segments 1-1, 1-2, 2-3, 3-1, 3-2, and 3-3. Since the practical quantitation limit was above the groundwater quality standard, a concentration of 1/2 the method detection limit (3.5 ug/L) was used.
3. Phenol was not detected in the site perimeter groundwater samples that define Segments 1-1, 1-2, 2-2, 2-3, 3-1, 3-2, and 3-3. Since the practical quantitation limit was above the groundwater quality standard, a concentration of 1/2 the method detection limit (0.93 ug/L) was used.

TABLE 2-3

CALCULATION OF GROUNDWATER FLOW CONTRIBUTION TO BUFFALO RIVER FROM AREA I

SITE MANAGEMENT PLAN - PART I -APPENDIX IV
Steelfields, LTD.
Buffalo, New York

Line No.	Segment	Location	I (ft/ft)	K (ft/day)	A (ft^2)	Groundwater Flow (ft^3/day)
1	1-1	A1-MW-7	0.0025		0	0.0
		A1-P-4	0.0037	0.68		
	1-2	A1-P-4	0.0037	0.68	292.228	9.2
		A1-MW-3	0.0066	11.6		
2	2-1	A1-MW-3	0.0066	11.6	412.336	15.7
		A1-MW-6	0.0066			
	2-2	A1-MW-6	0.0066		1485.8883	3899.6
		A1-MW-2	0.0181	425.2		
3	3-1	A1-MW-2	0.0181	425.2	1010.739	5831.2
		A1-MW-1	0.0232	133.2		
	3-2	A1-MW-1	0.0232	133.2	97.2675	506.0
		south end	0.0221	325.8		
4	4-1	south end	0.0221	325.8	122.7009	1628.7
		A1-MW-9	0.0355	595.3		
	4-2	A1-MW-9	0.0355	595.3	286.232	2526.4
		A1-MW-M2	0.0238	0.12		
	4-3	A1-MW-M2	0.0238	0.12	774.2628	1.7
		NW end	0.0119	0.12		

Notes:

1. Interpolated groundwater elevations were taken from the September 2004 isopotential map, upgradient of the well location.

= slug testing to be performed

PART II

SOIL / FILL MANAGEMENT PLAN

SOIL/FILL MANAGEMENT PLAN
for
FORMER STEEL MANUFACTURING SITE

FORMER STEEL MANUFACTURING SITE
BUFFALO, NY

March 2000
Revised September 2006
Revised April 2007

0062-001-100

Prepared for:

Steelfields, LTD.
Buffalo, NY

Note: The October 2020 NYSDEC Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Guidelines, and NYSDOH's current air monitoring procedures will be followed during onsite soil/fill management.

SOIL/FILL MANAGEMENT PLAN FOR FORMER STEEL MANUFACTURING SITE

Table of Contents

SOIL/FILL MANAGEMENT PLAN FOR FORMER STEEL MANUFACTURING SITE

LIST OF TABLES

LIST OF FIGURES

LIST OF ATTACHMENTS

1.0 INTRODUCTION

1.1 Background

LTV Steel Company owns, or co-owns with The Hanna Furnace Corporation, a vacant industrial property located along the Buffalo River in Buffalo, New York (See Figure 1-1 and Figure 1-2). The property, hereinafter referred to as the Former Steel Manufacturing Site or Site, is subdivided into four parcels (refer to Figure 1-3) totaling 219 acres, more or less, based on the operational and ownership history of each. The parcels are designated:

- Area I –Republic Steel Plant Parcel
- Area II –Donner-Hanna Coke Plant Parcel
- Area III –Republic Warehouse Parcel
- Area IV –Donner-Hanna Coke Yard Parcel

Two Voluntary Cleanup Site Assessment Reports (April, 1999) were prepared; one characterizing environmental conditions in Area I and the other characterizing the environmental conditions in Area II, III and IV. Two addendum reports to the Area I report (October 1999 and January 2000) and one to the Area II, III, and IV report (January 2000) were prepared to present supplemental site investigation data.

A voluntary cleanup of the Site will be performed in accordance with a Remedial Design/Remedial Action (RD/RA) Work Plan approved by the New York State Department of Environmental Conservation (NYSDEC). The voluntary cleanup program will render the Site suitable for planned redevelopment and use for commercial and industrial purposes.

1.2 Purpose and Scope

The purpose of this Soil/Fill Management Plan (S/FMP) is to protect both the environment and human health during redevelopment of the Site, subsequent to completion of Voluntary Cleanup activities.

While an assessment of surface and subsurface soil/fill and groundwater at the Site has already been performed and additional off-site field investigations are planned in accordance with the RD/RA Work Plan, subsurface information is never 100 percent complete or accurate, especially on such a large site with a long and diverse manufacturing history. As such, it is not unreasonable to anticipate the possibility that some quantity of subsurface soil/fill contamination may be encountered after completion of the Voluntary Cleanup. In particular, soil/fill contamination may be encountered during development activities such as infrastructure construction (i.e. roads, waterline, sewers, electric cable etc.) or foundation excavation and site grading.

Compliance with this S/FMP is required to properly manage subsurface soil contamination. This S/FMP was developed and incorporated into the Voluntary Cleanup Agreement for the Site with the express purpose of addressing unknown subsurface contamination if and when encountered, thus maintaining the release and covenant not to sue by the NYSDEC. The S/FMP also facilitates the transfer of responsibilities with property ownership.

This S/FMP provides protocols for the proper handling of site soil/fill during development activities, including:

- excavation, grading, sampling and handling of site soils.
- acceptability of soils/fill from off-site sources for backfill or subgrade fill.
- erosion and dust control measures.
- fencing and other access controls.
- health and safety procedures for subsurface construction work and the protection of the surrounding community.
- acceptability and placement of final soil and vegetative cover.
- deed restrictions.

- rezoning of the property.
- program responsibilities.
- notification and reporting requirements.

1.3 Soil/Fill Management Program Responsibility

The developer, Steelfields, LLC and the property owner(s) will be responsible for all monitoring, implementation and reporting requirements of the S/FMP. The developer and owner will not perform, nor contract, nor permit their employees, agents, or assigns to perform any excavations or disturbance of site soils, except as delineated in this S/FMP. Any excavation, regrading or disturbance of on-site soils inconsistent with the provisions of the Plan may be grounds for NYSDEC to void its release from claims, actions, suits, proceeding by the Department against the site owner(s), successor(s) or assigns for environmental conditions on the Site. Such nonconformance with this S/FMP may also void or limit environmental insurance protection of the owner(s) and their successors and assigns in accordance with policy terms and conditions. The property owner(s) or their agents will be responsible for proper notification and reporting to regulatory agencies (i.e., NYSDEC Region 9, Division of Environmental Remediation and NYS Department of Health) prior to and following site development as described in Section 2.8.

The NYSDEC will provide periodic construction oversight and monitoring during site redevelopment activities to verify that the requirements of this S/FMP are adhered to.

2.0 SOIL/FILL MANAGEMENT

2.1 Excavation and Handling of On-Site Soil/Fill

TurnKey Environmental Restoration, LLC or a Professional Engineer with experience in environmental site investigations and the New York State Voluntary Cleanup Program will inspect soil/fill excavations or disturbances on behalf of the subject property owner. The soil/fill will be inspected for staining or discoloration, and will be field screened for the presence of volatile organic compounds (VOCs) with a photoionization detector (PID). The PID detector will be calibrated as per the manufacturer's requirements. Excavated soil/fill that is visibly petroleum or tar-stained, discolored or produces elevated PID readings (i.e. sustained readings of 5 ppm above background or greater) will be stockpiled in an area away from the primary work activities and then sampled for reuse, treatment or disposal. The length of time that potentially impacted soil can be temporarily stockpiled while awaiting analytical results shall be limited to 21 days. Sampling and analysis will be in accordance with the protocols delineated in Section 2.3. Analyzed soil/fill that is determined to contain one or more constituents in excess of the site-specific action levels (SSALs) and additional criteria shown in Table 2-1 shall be covered or treated on-site according to a NYSDEC-approved treatment plan or transported off-site to a permitted waste management facility for disposal. Soil/fill that exhibits no petroleum or tar staining, discoloration or elevated PID readings, or soil/fill, which has been analyzed and found to meet SSALs, may be reused on-site as subgrade backfill. No excavated soil/fill may be removed from the site except for off-site disposal at a permitted waste management facility.

2.2 Subgrade Material

Subgrade material used to backfill excavations or to increase site grades or elevations shall meet the following criteria:

- Excavated on-site soil/fill meeting the requirements of Section 2.1.

- On-site soil/fill treated in accordance with a NYSDEC-approved treatment plan and tested to meet the requirements of Table 2-1.

- Off-site soil/fill originating from known sources having no evidence of disposal or releases of hazardous substances, hazardous, toxic or radioactive wastes, or petroleum and tested to meet all SSALs.

- All off-site sources of material to be used as backfill must be tested in accordance with the Sampling and Analytical Protocol (Section 2.3), and found to contain concentrations less than criteria listed in Table 2-1 plus organic pesticides/herbicides and PCBs as defined in Appendix A of Technical and Administrative Guidance Memorandum (TAGM) Number 4046.

- No off-site materials meeting the definition of a solid waste as defined in 6 NYCRR, Part 360-1.2 (a) shall be used as backfill.

TABLE 2-1

PARAMETER	MAXIMUM CONCENTRATION IN SOIL/FILL (mg/kg) (1,2)
Individual VOC	1
Total VOCs (3)	10
Total SVOCs (4)	500
Total cPAHs (5)	10
Arsenic	75
Barium	1,000
Cadmium	15
Chromium	1,000
Lead	1,000
Mercury	10
Selenium	61
Silver	10
Cyanide (Total Amenable)	1,600

NOTES:

(1) Off-site backfill material shall also meet recommended soil cleanup objectives for organic pesticides/herbicides and PCBs as defined in TAGM 4046.
(2) All analyses shall be performed per USEPA SW-846 methodology or other methods acceptable to NYSDEC.
(3) NYSDEC STARS List VOCs per USEPA Method 8021
(4) Target Compound List (TCL) SVOCs per USEPA Method 8270

(5) Carcinogenic polynuclear aromatic hydrocarbons (i.e., benzo(a)anthracene, benzo(a)pyrene, dibenzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, indeno(1,2,3-c,d)pyrene per USEPA Method 8270.

2.3 Soil/Fill Sampling and Analysis Protocol

2.3.1 Excavated On-Site Soil/Fill

Excavated soil/fill that is visibly stained, discolored or produces elevated PID readings will be sampled and classified for reuse, treatment or off-site disposal. A tiered approach based upon the volume of soil/fill being excavated will be used to determine the frequency of sampling. A minimum of one composite sample will be collected for each 250 cubic yards up to1000 cubic yards of material excavated. If more than 1,000 cubic yards of soils are excavated from the same general vicinity and all samples of the first 1,000 cubic yards meet the SSALs in Table 2-1, the sample collection frequency may be reduced to one composite for each additional 1,000 cubic yards of soil from the same general vicinity, up to 5,000 cubic yards. For excavations that generate greater than 5,000 cubic yards, sampling frequency may be reduced to one sample per 5,000 cubic yards, providing all earlier samples met SSALs. A minimum of four grab samples will be collected for each composite sample. Approximately equal aliquots of the grab samples will be composited in the field using a stainless steel trowel and bowl. The trowel and bowl shall be decontaminated with detergent and tap water between sampling locations. The composite sample will be analyzed by a NYSDOH ELAP certified laboratory for the parameters listed on Table 2-1. VOCs may be excluded from the analysis provided that the soil/fill does not exhibit elevated PID readings.

Any excavated soil that produces elevated PID readings will be separately stockpiled in 1000 cubic yard or smaller piles. A single grab sample will be collected from the stockpile from the zone displaying the most elevated field PID reading. The grab sample will be analyzed by a NYSDOH ELAP certified laboratory for volatile organic compounds (EPA Method 8021). A composite sample shall also be prepared from each stockpile for analysis of the other parameters listed in Table 2-1.

If the analysis of the soil/fill samples reveals levels of parameters greater than one or more SSAL, then a duplicate sample will be analyzed by the Toxicity Characteristic Leaching Procedure (TCLP) method for the particular metal or compounds in question to determine the appropriate off-site disposal method. If TCLP hazardous waste characteristic values are exceeded, the soil/fill will be disposed of in a permitted hazardous waste disposal facility. If TCLP analytical results are below hazardous waste characteristic values, the soil/fill will be either disposed of off-site in a permitted sanitary landfill or possibly on-site within the Area II containment cell.

The containment cell may be used as an on-site disposal area only if:

- The groundwater collection, containment and treatment systems are fully functional,
- The final cover system construction has not been completed,
- There is sufficient space available based on the containment cell design, and
- Prior written approval is received from both the NYSDEC and owner/operator of the containment cell.

All soil/fill disposed of within the containment cell will be compacted in maximum twelve-inch lifts to specified density and uniformly graded to promote positive surface water runoff. Proper erosion and dust control methods as described in Section 2.5 will be implemented during soil placement activities.

2.4 Final Surface Coverage

Vegetative or other (e.g., asphalt, buildings, concrete) surface coverage over the entire redeveloped parcel will be required by the developer or owner as a pre-condition of occupancy.

Topsoil used for the final soil cover shall meet the following general specifications:

1. Fertile, friable, natural loam surface soil, capable of sustaining plant growth, free of, clods of hard earth, plants or roots, sticks or other extraneous material harmful to plant growth. Supply a well-graded topsoil with the following approximate analysis:

(a)

Sieve Size	Percent Passing by Weight
3-inch	100
No. 4	>75
No. 200	>30
0.002 mm	<20

(b) pH 5.5 to pH 7.6.

(c) Minimum organic content of 2.5 percent as determined by ignition loss.

(d) Soluble salt content not greater than 500 ppm.

2. Before delivery, collect soil samples for every 5,000 cubic yards of topsoil provided by Developer.

In addition to the above specifications, all topsoil must be tested and found to contain constituent concentrations less than those specified in NYSDEC Technical and Administrative Guidance Memorandum (TAGM) 4046.
TAGM 4046 establishes soil cleanup objectives for inorganics based on site background. The following background levels for heavy metals will be utilized for topsoil:

Parameter	Concentration (mg/kg)
Arsenic	25
Barium	1000
Cadmium	15
Chromium	350
Lead	400
Mercury	1.0
Selenium	5.0
Silver	5.0

(Note: The methodology used to develop background levels for the above described metals (except lead) is based on background concentrations throughout the Buffalo, N.Y. area as described in Appendix A of the April 1999 Site

Assessment Reports. The proposed limit for lead was derived from the February 1998 NYSDEC document entitled Guidelines for Petroleum Spill Inactivation.)

Grass seed used for the final soil cover shall meet the following general specifications:

1. Grass seed mixture: Provide fresh, clean, new-crop seed complying with the tolerance for purity and germination established by the Official Seed Analysts of North America. Provide seed of the grass species, proportions and minimum percentages of purity, germination, and maximum percentage of weed seed, as specified.

2. The entire ground surface disturbed by construction operations shall be seeded with 100 lbs/acre of seed conforming to the following:

Name of Grass	**Application Rate (lbs/acre)**	**Purity (%)**	**Germination (%)**
Perennial Ryegrass	10	95	85
Kentucky Bluegrass	20	85	75
Strong Creeping Red Fescue	20	95	80
Chewings Fescue	20	95	80
Hard Fescue	20	95	80
White Clover	10	98	75

(a) Germination and purity percentages should equal or exceed the minimum seed standards listed. If it is necessary to use seed with a germination percentage less than the minimum recommended above, increase the seeding rate accordingly to compensate for the lower germinations.

(b) Weed seed content not over 0.25 percent and free of noxious weeds.

(c) All seed shall be rejected if the label lists any of the following grasses:
   1) Sheep Fescue
   2) Meadow Fescue
   3) Canada Blue
   4) Alta Fescue
   5) Kentucky 31 Fescue
   6) Bent Grass

3. In addition to the seed mixtures listed above, one bushel per acre of oats or rye seed shall be sowed over the entire area, including drainage ditches, to provide a quick shade cover and to prevent erosion during turf establishment.

2.5 Erosion Controls

An important element of soil and fill management on this site is the mitigation and control of surface erosion from stormwater runoff. For this reason a Master Erosion Control Plan to be used by all developers has been developed and incorporated as Attachment A2.

2.6 Dust Controls

Particulate monitoring will be performed along the downwind occupied perimeter of subareas or parcels during subgrade excavation, grading and handling activities in accordance with the Community Monitoring Plan further detailed in Section 3.0 as well as in accordance with NYSDEC TAGM 4031 (Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites) presented in Appendix A4.

Dust suppression techniques will be employed as necessary to mitigate fugitive dust from unvegetated or disturbed soil/fill to the extent practicable during post-remediation construction and redevelopment. Such techniques shall be employed even if the community air monitoring results indicate particulate levels are below action levels. Techniques to be utilized may include one or more of the following:

- Applying water on haul roads.
- Wetting equipment and excavation faces.
- Spraying water on buckets during excavation and dumping.
- Hauling materials in properly tarped containers or vehicles.
- Restricting vehicle speeds on-site.
- Covering excavated areas and materials after excavation activity ceases.
- Reducing the excavation size and/or number of excavations.

All reasonable attempts will be made to keep visible and/or fugitive dust to a minimum.

2.7 Fencing and Access Control

A 6-foot tall chain link fence currently surrounds Area I. Additional interior fencing shall be erected and maintained as necessary by the property owner as remediation/redevelopment proceeds to control access to subdivided or undeveloped parcels and separate them from parcels in active use. Fencing will be relocated by the property owner(s) as necessary as development proceeds. The Area II containment cell and groundwater pretreatment system will be isolated from the remainder of the Site by a 6-foot chain link fence. All fencing around undeveloped areas will be posted with "No Trespassing" signs.

2.8 Property Use Limitations

Requirements for surface coverage over the site and limitations placed on the type of buildings to be constructed will be enforced through the issuance of building permits by the City of Buffalo. Obtaining a building permit from the City will be contingent upon agreeing to implement and comply with this S/FMP. Site limitations will be enforced through the same deed restrictions described in the Voluntary Cleanup Agreement. Deed restrictions shall be applicable to successors and assigns of the property. Specifically, the deed restrictions will be recorded with the Erie County Clerk and:

1. shall prohibit any parcel or subparcel of the Site from being used for purposes other than for the industrial, commercial, and recreational use (and designed) to preclude contact with contamination by humans without the express written waiver of such prohibition by the NYSDEC (Department), or if at such time the Department shall no longer exist, any New York State department, bureau, or other entity replacing the Department;

2. shall prohibit the use of the groundwater underlying any parcel or subparcel of the Site for drinking water, industrial, or other purposes;

3. shall require owner(s) or the site and subparcels thereof and their successors and assigns to continue in full force and effect any institutional controls, operation and maintenance, and/or soils management required by the Voluntary Cleanup Agreement (VCA), the RD/RA Work Plan (including the Soil/Fill Management Plan), and/or the O&M Plan;

4. shall provide that Volunteers, on behalf of themselves and their successors and assigns, consent to the enforcement by the Department, or if at such time the Department shall no longer exist, any New York State department, bureau, or

other entity replacing the Department, of the prohibitions and restrictions that the VCA requires to be recorded, and thereby covenant not to contest such enforcement.

5. the prohibitions described in the VCA shall be for the duration provided in that document and shall be enforceable only by the Department, or, if at such time the Department shall no longer exist, any New York State department, bureau, or other entity replacing the Department, but shall not be enforceable by any other party,

6. if there is performed on the Site an additional response action acceptable to the Department, or, if at such time the Department shall no longer exist, any New York State department, bureau, or other entity replacing the Department, such as to allow it to be used for residential or other purposes, the Department or its successor shall execute a document in recordable form terminating that portion of the instrument relating to the matter identified in the VCA for the area in the Site which the Department has determined may be used for residential purposes; and

7. in the event of a conflict between the above-described Deed Restrictions and those contained in or attached to the VCA, those contained in or attached to the VCA shall apply.

The industrial/commercial use of the site will also be controlled by the City through zoning restrictions. The responsibility for the operation and maintenance of the collection/cover system and groundwater monitoring shall remain with LTV Steel Company and the Hanna Furnace Corporation and/or their successors or assigns. Said responsibilities will be clearly described in any purchase or sale agreements between LTV Steel/The Hanna Furnace Corporation and possible future property owner(s).

Certain stormwater system design criteria will also be required to be implemented during site development. In areas with known groundwater impacts, subsurface injection of storm water from building and parking area stormwater systems could mobilize additional contaminants. In these areas, stormwater injection (drywells) will be prohibited on the Site and stormwater conveyance pipes will be required to have gasketed joints for water tightness to prevent the infiltration of impacted groundwater into the collection systems.

2.9 Notification and Reporting Requirements

The following minimum notification and reporting requirements shall be followed by the property owner prior to and following site development, as appropriate:

- The NYSDEC and NYSDOH will be notified that subgrade activities are being initiated a minimum of 5 working days in advance of construction.
- A construction certification report stamped by a NYS-licensed Professional Engineer, will be prepared and submitted to the NYSDEC and NYSDOH within 90 days after development of each parcel. At a minimum, the report will include:
    - An area map showing the parcel that was developed;
    - A topographic map of the developed property showing actual building locations and dimensions, roads, parking areas, utility locations, berms, fences, property lines, sidewalks, green areas, contours and other pertinent improvements and features;
    - Plans showing areas and depth of fill removal;
    - Copies of daily inspection reports;
    - Description of erosion control measures;
    - A text narrative describing the excavation activities performed, health and safety monitoring performed (both site specific and Community Air Monitoring), quantities and locations of soil/fill excavated, disposal locations for the soil/fill, soil sampling locations and results, a description of any problems encountered, location and acceptability test results for backfill sources, and other pertinent information necessary to document that the site activities were carried out properly;
    - Plans showing before and after survey elevations on a 100-foot grid system to document the thickness of the clean soil cover system; and
    - A certification that all work was performed in conformance with the S/FMP.
- The owners of developed parcels shall complete and submit to the New York State

Department of Environmental Conservation, an Annual Report by January 15th of the following year. This report shall contain certification that the institutional controls put in place, pursuit to the Soil/Fill Management Plan, are still in place, have not been altered and are still effective. The recommended NYSDEC Certification Form is included as Appendix A3, of this Soil/Fill Management Plan.

3.0 HEALTH AND SAFETY PROCEDURES

During redevelopment activities, the developer shall be responsible for implementing suitable procedures to prevent both site construction workers and the community from adverse exposure to residual parameters of concern and other potential hazards posed by the redevelopment work. This will be accomplished through adherence to a written, parcel-specific worker Health and Safety Plan, prepared in accordance with the regulations contained in OSHA 29CFR 1910.120 and the attached Community Air Monitoring Plan.

Although voluntary cleanup remedial measures are anticipated to reduce the potential for encountering parameters of concern above site-specific action levels, the redevelopment activities governed by this Soils Management Plan are a required element of the Voluntary Cleanup Agreement for the site. Thus, 29CFR 1910.120(a)(1)(iii) indicates that these activities are subject to OSHA's hazardous waste operations and emergency response (Hazwopper) standard. This includes the requirement for preparation and implementation of a site-specific worker Health and Safety Plan addressing the following items:

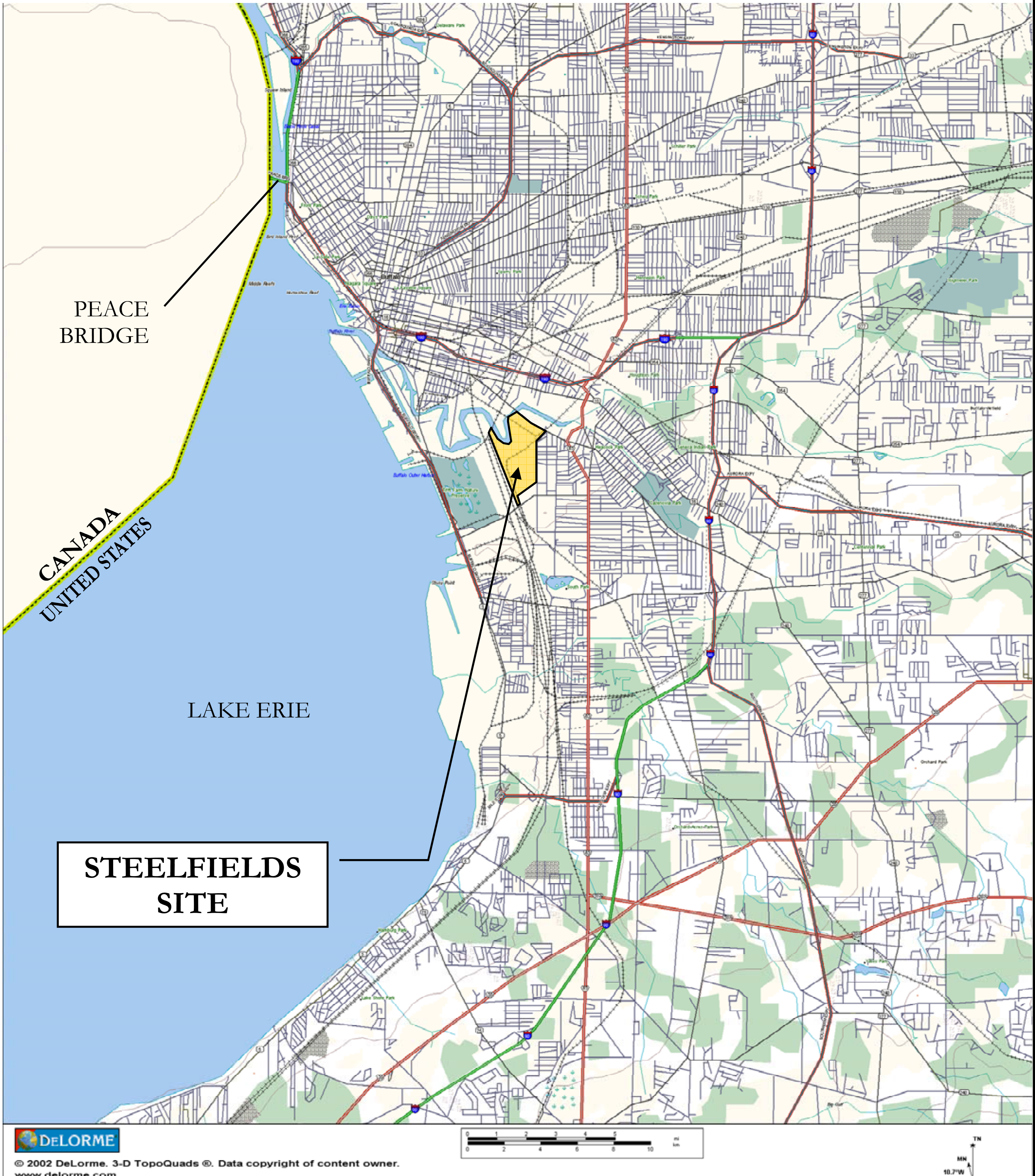
- A safety and health or hazard analysis for each site task and operation.
- Employee training requirements.
- Personal protective equipment (PPE) to be used by employees for the site tasks.
- Medical surveillance requirements.
- Frequency and type of air monitoring, personnel monitoring , and environmental sampling techniques and instrumentation to be used, including methods of maintenance and calibration of equipment.
- Site control measures.
- Decontamination procedures.
- An emergency response plan.
- Confined space entry procedures.

- A spill containment program.

As an integral component of the worker HASP, the developer or site/parcel owner will be responsible for implementing a Community Air Monitoring Plan designed to prevent the surrounding community from adverse exposures due to potential release/migration of airborne particulates or vapors. The community as referenced herein includes potential receptors located off-site (e.g., neighboring residents or businesses) as well as on-site receptors not directly involved in redevelopment activities (e.g. businesses or contractors occupying the site prior to final redevelopment). The Community Air Monitoring Plan presented as Attachment A will be implemented during redevelopment work involving disturbance or handling of Site fill soils. The Plan includes appropriate monitoring, mitigation and response measures consistent with NYSDOH and NYSDEC guidelines. The results of the Community Air Monitoring Plan must be documented to the NYSDEC as described in Section 2.8.

FIGURES

FIGURE 1-1



TurnKey Environmental Restoration, LLC

726 EXCHANGE STREET
SUITE 624
BUFFALO, NEW YORK 14210
(716) 856-0635

PROJECT NO.: 0062-008-400

DATE: SEPTEMBER 2004

DRAFTED BY: BCH

SITE REGIONAL MAP

SOIL/FILL MANAGEMENT PLAN

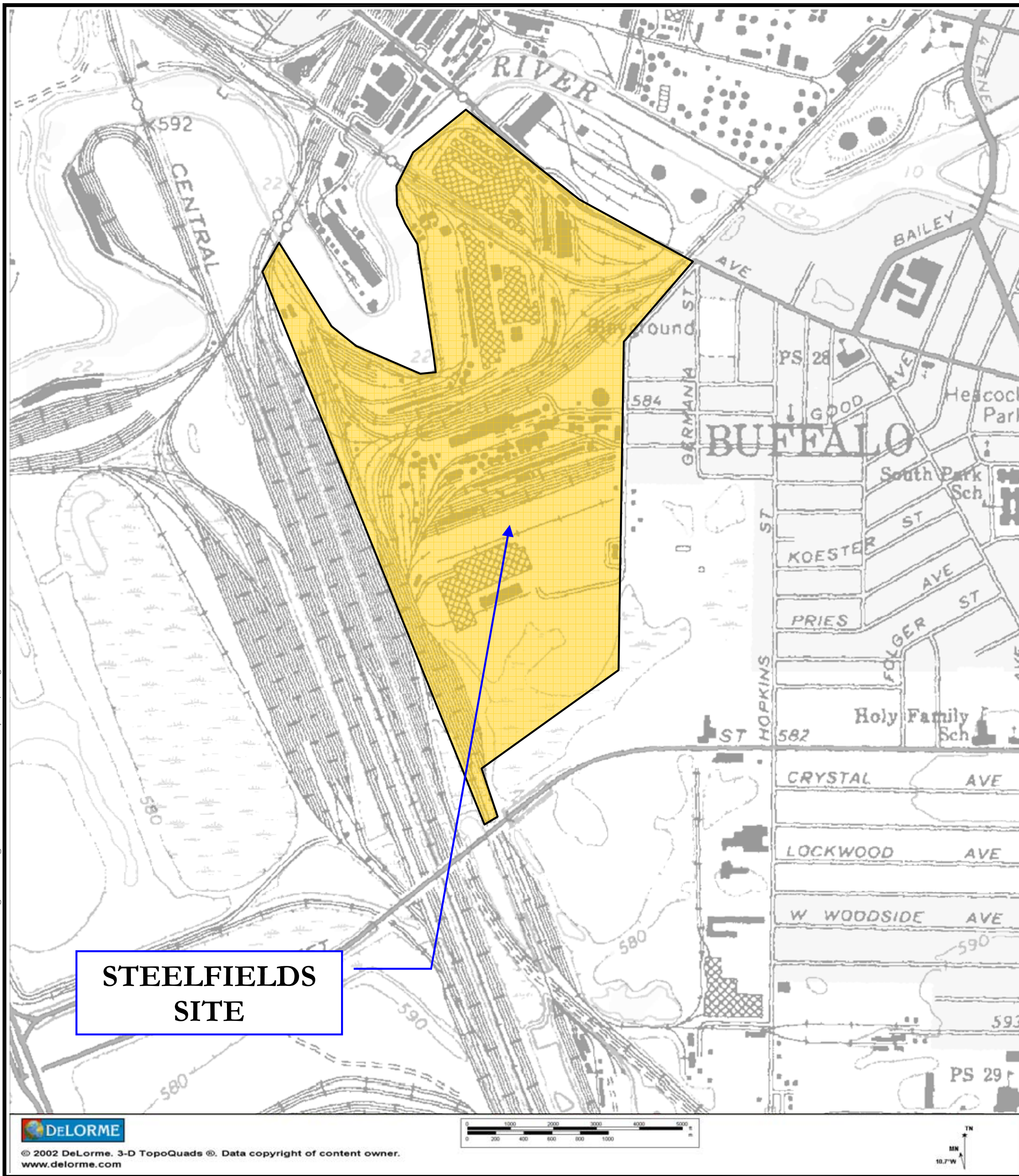
AREA I - FORMER REPUBLIC (LTV) STEEL PARCEL
BUFFALO, NEW YORK

PREPARED FOR

STEELFIELDS, LTD.

FILEPATH:g:\cad\turnkey\steelfields\2003 cmr\area 1 construction closeout\figures\figure 1-1; site regional map.dwg

FIGURE 1-2



TurnKey Environmental Restoration, LLC
726 EXCHANGE STREET
SUITE 624
BUFFALO, NEW YORK 14210
(716) 856-0635

PROJECT NO.: 0062-008-400

DATE: SEPTEMBER 2004

DRAFTED BY: BCH

SITE VICINITY MAP

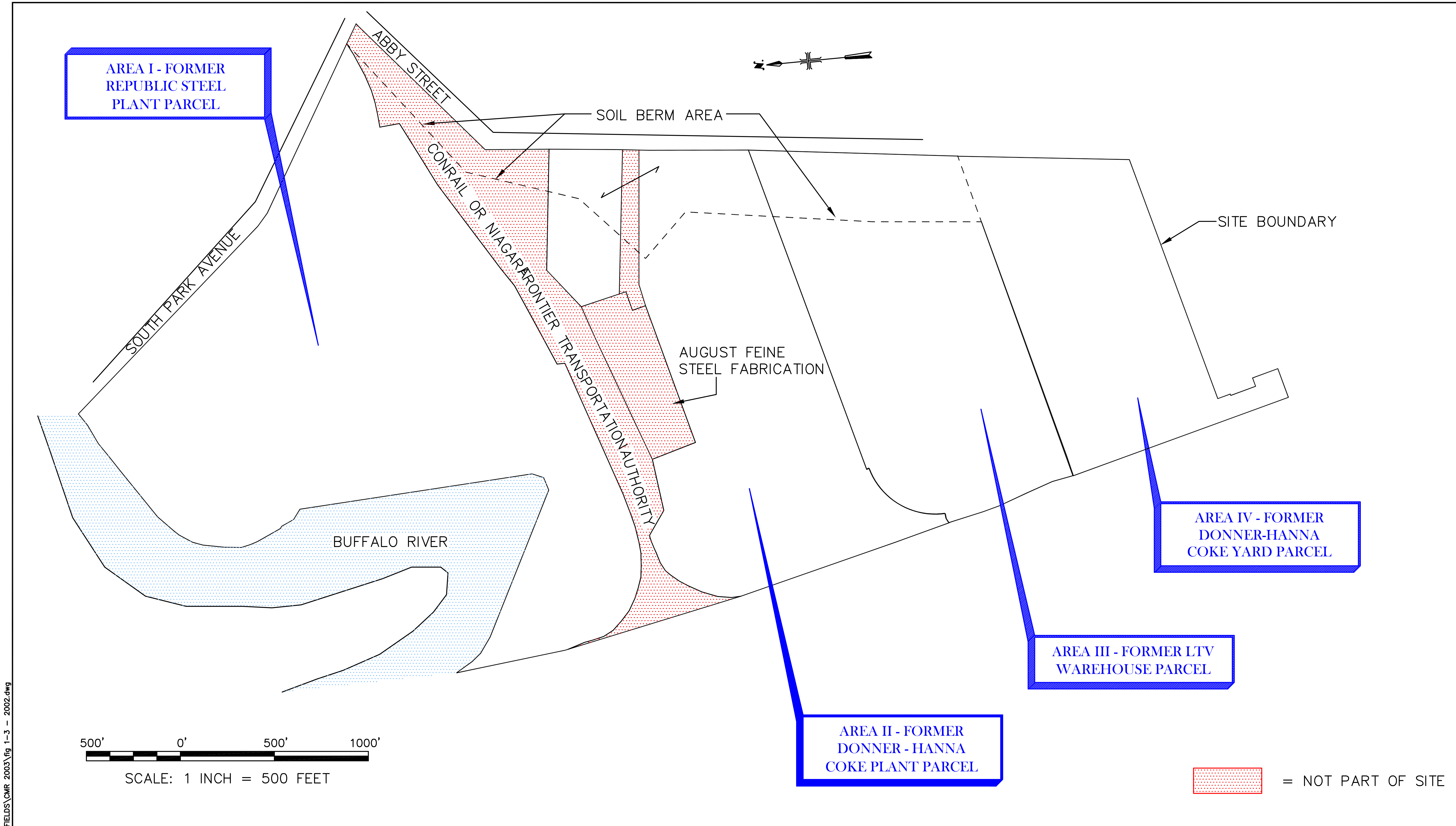
SOIL/FILL MANAGEMENT PLAN

AREA I - FORMER REPUBLIC (LTV) STEEL PARCEL
BUFFALO, NEW YORK

PREPARED FOR

STEELFIELDS, LTD.

FILEPATH:g:\cad\turnkey\steelfields\2003 cmr\area 1 construction closeout\figures\figure 1-2; site vicinity map.dwg



TurnKey Environmental Restoration, LLC

FORMER STEEL MANUFACTURING SITE
SITE MAP
AREA I CLOSE-OUT REPORT
STEELFIELDS LTD

FIGURE 1-3

PROJECT NO.: 0062-008-400
PROJECT LOCATION: BUFFALO, NEW YORK

DATE: JANUARY 2004
DRAFTED BY: BCH/WJM
FILEPATH: f:\turnkey\cad\STEELFIELDS\CMR 2003\fig 1-3 - 2002.dwg

ATTACHMENT A1

Community Air Monitoring Documentation Forms

COMMUNITY AIR MONITORING PLAN:
PARTICULATE MONITORING RECORD

PROJECT: ______________________ **DATE/ TIME:** ____________

AIR MONITORING PERSONNEL: ______________________ **WEATHER:** ____________

______________________ **Temp:** ____________

AIR MONITORING EQUIPMENT: ______________________ **Wind:** ____________

____

DAILY INSTRUMENT CALIBRATION:

Calibration Time: ______________________

Type/Concentration of Calibration Standard(s): ______________________

Post-Calibration Meter Response: ______________________

Calibration Notes: ______________________

____

UPWIND PARTICULATE MONITORING RESULTS: (See Side 2 for Downwind Particulate Monitoring)

Location:	Time:	Result (ug/m^3):	Location:	Time:	Result (ug/m^3):

SKETCH OF WORK ZONE(S):

Monitoring Personnel Signature(s): ______________________

____

____

COMMUNITY AIR MONITORING PLAN:
PARTICULATE MONITORING RECORD (CONT.)

DOWNWIND PARTICULATE MONITORING RESULTS:

Location:	Time:	Result (ug/m^3):	Location:	Time:	Result (ug/m^3)

DESCRIPTION OF DUST SUPPRESSION TECHNIQUES EMPLOYED:

NOTES:

ATTACHMENT A2

Master Erosion Control Plan

MASTER EROSION CONTROL PLAN for FORMER STEEL MANUFACTURING SITE

FORMER STEEL MANUFACTURING SITE
BUFFALO, NY

April 2002
Revised July 2002

0062-001-100

Prepared for:

Steelfields LLC
Buffalo, NY

MASTER EROSION CONTROL PLAN
FORMER STEEL MANUFACTURING SITE

Table of Contents

<u>ATTACHMENTS</u>

1.0 INTRODUCTION

1.1 Background

LTV Steel Company owns, or co-owns with The Hanna Furnace Corporation, an industrial property located along the Buffalo River in Buffalo, New York (See Figure 1-1 and 1-2). The property, referred to as the Former Steel Manufacturing Site or Site, is subdivided into four parcels totaling 219 acres, more or less, based on the operational and ownership history of each. The parcels are designated:

- Area I – Republic Steel Plant Parcel
- Area II – Donner-Hanna Coke Plant Parcel
- Area III – Republic Warehouse Parcel
- Area IV – Donner-Hanna Coke Yard Parcel

A voluntary cleanup of the Site will be performed in accordance the Remedial Design/Remedial Action (RD/RA) Work Plan approved by the New York State Department of Environmental Conservation (NYSDEC). The voluntary cleanup program will render the Site suitable for planned redevelopment and use for commercial and industrial purposes.

1.2 Purpose and Scope

A Soil/Fill Management Plan (S/FMP) was prepared as part of the RD/RA Work Plan that describes protocols for the proper handling of site soil/fill during development activities. The property owner at the time of development will be responsible for all monitoring, implementation and reporting requirements of the S/FMP.

Since erosion control will be a critical component of preventing the potential migration of contaminants onto developed property or off-site during development of the site, this Master Erosion Control Plan (MECP) was prepared to provide guidance to developers during build-out activities on the properties. This MECP is a critical component of the S/FMP. This document is generic in nature and provides minimum erosion control practices to be utilized by site owners and/or developers. More specific plans for each parcel may be developed by the property owner(s) after the long-term development approach for each property has been determined.

2.0 GENERAL PERMIT REQUIREMENTS

Redevelopment of the Site will be in accordance with the S/FMP and Voluntary Cleanup Agreement. Since development activities will disturb more than five acres of land, the Federal Water Pollution Control Act (as amended, 33 U.S.C. 1251 et.seq.), and the New York State Environmental Conservation Law (Article 17, Titles 7 and 8, and Article 70) require that the project developer obtain coverage under the NYS Department of Environmental Conservation SPDES General Permit for Storm Water Discharges from Construction Activities that are classified as "Associated with Industrial Activity", Permit #GP-93-06 (Construction Storm Water General Permit).

Requirements for coverage under the general permit includes the submittal of a Notice of Intent form and the development of a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP must fulfill permit requirements and should be prepared in accordance with "Chapter Four: The Storm Water Management and Erosion Control Plan" in *Reducing Impacts of Storm Water Runoff from New York Development, NYSDEC, 1992*. The Notice of Intent application form and the text of the Construction Storm Water General Permit are provided in Attachment A2-1.

A complete Storm Water Management and Erosion Control Plan (SWM & ECP) should provide the following information:

- A background discussion of the scope of the construction project;
- A statement of the storm water management objectives;
- An evaluation of post-development runoff conditions;
- A description of proposed storm water control measures; and

- A description of the type and frequency of maintenance activities required to support the control measure.

The Plan should be parcel-specific and address issues such as erosion prevention, sedimentation control, hydraulic loading, pollutant loading, ecological protection, physical site characteristics that impact design, and site management planning. Descriptions of proposed features and structures at the site should include a description of drainage structure placement, supporting engineering data and calculations, construction scheduling, and references to established detailed design criteria.

3.0 POTENTIAL EROSION AND SEDIMENT CONTROL CONCERNS

Following remediation of individual parcels, redevelopment activities will proceed for commercial and light industrial uses of the properties. Parcel-specific design measures regarding erosion and sediment control measures will need to be determined at that time after the development approach for each area of the site has been determined.

Potential areas and items of concern during site re-development activities include the following:

- All portions of the site not covered by buildings, sidewalks, roadways, parking areas, or other structures will be required to be covered with 6"-12" of "clean" soils to limit exposure to remaining subsurface soil/fill materials. The transportation and placement activities associated with this work will require erosion and sediment controls to prevent the surface soil from being washed off the area being developed.

- Some portions of the river bank along the Buffalo River in Area I are protected by sheet piling while others are currently very steep, unstable, and prone to erosion. Any activities in the vicinity of the unprotected areas will require erosion measures to prevent runoff into the river.

- Remediated areas or off-site properties adjacent to unremediated parcels need protection so they do not become impacted by site operations.

- Storm water inlets will require protective measures to limit sediment transfer to storm sewers.
- Runoff from soil stockpiles will require erosion controls.
- Surface slopes need to be minimized as much as practical to control sediment transfer.
- Soil/fill excavated during development will require proper handling and disposal.

4.0 EROSION AND SEDIMENT CONTROL MEASURES

4.1 Background

Standard soil conservation practices need to be incorporated into the construction and development plans to mitigate soil erosion damage, off-site sediment migration, and water pollution from erosion. These practices combine vegetative and structural measures, many of which will be permanent in nature and become part of the completed project (ie. drainage channels and grading). Other measures will be temporary and serve only during the construction stage. Selected erosion and sediment control measures will meet the following criteria:

- Minimize erosion through project design (maximum slopes, phased construction, etc.)
- Incorporate temporary and permanent erosion control measures; and
- Remove sediment from sediment-laden storm water before it leaves the site.

4.2 Temporary Measures

Temporary erosion and sedimentation control measures and facilities will be utilized during construction. They will be installed by the site Developer and will be maintained until they are either no longer needed or until such time as permanent measures are installed and become effective. At a minimum, the following temporary measures will be used:

- Silt fencing
- Straw/hay bales
- Temporary vegetation/mulching
- Temporary sedimentation basins
- Cautious placement, compaction and grading of stockpiles

4.2.1 Silt Fencing

Construction and regrading activities will result in surface water flow to drainage ditches and swales, storm sewers, the Buffalo River, and adjacent properties. Silt fencing will be the primary sediment control measure used in these areas. Prior to extensive soil excavation or grading activities, silt fences will be installed along the perimeter of all construction areas. The orientation of the fencing will be adjusted as necessary as the work proceeds to accommodate changing site conditions.

Intermediate fencing will be utilized upgradient of the perimeter fencing to help lower surface water runoff velocities and reduce the volume of sediment to perimeter fencing. Stockpiles will also be surrounded with silt fencing.

As sediment collects, the silt fences will be cleaned as necessary to maintain their integrity. Removed sediment will be utilized elsewhere on-site as general fill. All perimeter silt fences will remain in place until construction activities in an area are completed and vegetative cover has been established. Silt fences will be installed in accordance with the details presented in Attachment A2-2.

4.2.2 Straw and/or Hay Bales

Straw and/or hay bales will be used to intercept sediment laden storm water runoff in drainage channels during construction. The use of either hay or straw will be based on the availability of materials at the time of construction.

Bales will be placed in swales and ditches where the anticipated flow velocity is not expected to be greater than 5 feet/second (fps). Intermediate bales will be placed upgradient of the final barrier to reduce flow velocities and sediment loadings where higher velocities are anticipated.

As with silt fencing, sediment will be removed as necessary from behind the bales and disposed of on-site. Bales that have become laden with sediment or that have lost their structural integrity or effectiveness due to the weather will be replaced. Bales should be installed in accordance with the details presented in Attachment A2-2.

4.2.3 Temporary Vegetation and Mulching

Due to the extensive nature of the planned site remediation activities and the anticipated project schedule, development of the site is expected to occur in phases as the remediation proceeds. As a result, intermediate areas where development activities will not occur or resume for an extended period of time (greater than 90 days) will be seeded with a quick germinating variety of grass or covered with a layer of mulch to control fugitive dust and erosion. Soil/fill stockpiles that will not be utilized for an extended period of time will also vegetated or covered.

4.2.4 Temporary Sedimentation Basins

Temporary sedimentation basins will be constructed as necessary upgradient of storm water inlets to reduce the volume of sediment laden runoff from the site. The basins can be as simple as a small excavated area along the alignment of a storm water ditch or as elaborate as a full-scale sedimentation basin with outlet structures designed for certain storm events from a given area of the site. The basins will be cleaned as necessary and the removed sediment utilized elsewhere on-site as subgrade fill material.

4.2.5 Cautious Placement of Stockpiles

As development occurs, excavation activities will produce stockpiles of soil and subgrade fill materials. Careful placement and construction of stockpiles will be required to control erosion. Stockpiles will be placed no closer than fifty feet from the Buffalo River, storm water inlets and parcel boundaries. Additionally, stockpiles will be graded and compacted as necessary for positive surface water runoff and dust control.

4.3 Permanent Control Measures During Site Redevelopment

Permanent erosion and sedimentation control measures and structures will be installed as soon as practical during construction for long-term erosion protection. Since the detailed development approach for the site has not been determined, specific design features are yet to be selected. Examples of permanent erosion control measures could include:

- Utilizing maximum slopes in erosion prone areas (ie. along the Buffalo River) to limit erosion.
- Minimizing the potential contact with, and migration of, subsurface soil/fill through the placement of a "clean" soil cover system in all areas not covered with structures, roads, parking areas, sidewalks, etc.
- Construction of permanent storm water detention ponds where appropriate.
- Planting and maintaining vegetation.
- Limiting runoff flow velocities to the extent practical.
- Lining collection channels with riprap, erosion control fabric, vegetation, or similar materials.

5.0 CONSTRUCTION MANAGEMENT PRACTICES

5.1 General

The following general construction practices should be evaluated for erosion and sedimentation control purposes during site development activities:

- Clearing and grading only as much area as is necessary to accommodate the construction needs to minimize disturbance of areas subject to erosion (ie. phasing the work).
- Covering exposed or disturbed areas of the site as quickly as practical.
- All erosion and sediment control measures should be installed prior to disturbing the site subgrade.
- Both on-site and off-site tracking of soil by vehicles should be minimized by utilizing routine entry/exit routes.

5.2 Monitoring, Inspection and Maintenance

All erosion and sedimentation controls described in this Plan will be inspected by a qualified representative of the site developer within 24 hours of a heavy rainfall event and repaired or modified as necessary to effectively control erosion of turbidity problems. Inspections should include areas under construction, stockpile areas, erosion control devices (ie. silt fences, hay bales, etc.) and locations where vehicles enter and leave the site. Routine inspections of the entire site should also be made on a monthly basis during development.

If inspections indicate problems, corrective measures should be implemented within 24 hours. A report summarizing the scope of the inspection, name of the inspector, date, observations made, and a description of the corrective actions taken should be completed. Examples of inspection forms to be completed are included in Attachment A2-3.

ATTACHMENT A2-1

NYSDEC SPDES GENERAL PERMIT FOR STORM WATER DISCHARGES FROM CONSTRUCTION ACTIVITIES

1. Notice of Intent
2. NYSDEC SPDES General Permit For Storm Water Discharges from Construction

Notice of Intent ("NOI")

See Reverse for Instructions

SPDES FORM

DEC

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233-3505

Notice of Intent (NOI) for Storm Water Discharges Associated with Industrial Activity Under the SPDES General Permit

Submission of this Notice of Intent constitutes notice that the party identified in Section I of this form intends to be authorized by a SPDES permit issued for storm water discharges associated with industrial activity in the State in Section II of this form. Becoming a permittee obligates such discharger to comply with the terms and conditions of the permit. ALL NECESSARY INFORMATION MUST BE PROVIDED ON THIS FORM.

I. Facility Operator Information

Name: Phone:

Address: Status of Owner/Operator:

City: State: ZIP Code:

II. Facility/Site Location Information

Name: Is the Facility Located on Indian Lands? (Y or N)

Address:

City: State: ZIP Code:

Latitude: Longitude: Quarter: Section: Township: Range:

III. Site Activity Information

MS4 Operator Name:

Receiving Water Body:

If You are Filing as a Co-permittee, Enter Storm Water General Permit Number:

Are There Existing Quantitative Data? (Y or N)

Is the Facility Required to Submit Monitoring Data? (1, 2, or 3)

SIC or Designated Activity Code: Primary: 2nd: 3rd: 4th:

If This Facility is a Member of a Group Application, Enter Group Application Number:

If You Have Other Existing NPDES Permits, Enter Permit Numbers:

IV. Additional Information Required for Construction Activities Only

Project Start Date:

Completion Date:

Estimated Area to be Disturbed (in Acres):

Is the Storm Water Pollution Prevention Plan in Compliance with State and/or Local Sediment and Erosion Plans? (Y or N)

V. Certification: I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Print Name: Date:

Signature:

91-19-12 (9/92)—10g

Instruction—NYSDEC Form 91-19-12 (9/92)

Notice of Intent (NOI)

For Storm Water Discharges Associated With Industrial Activity to Be Covered Under the SPDES General Permit

Who Must File A Notice Of Intent Form

Federal law at 40 CFR Part 122 prohibits point source discharges of storm water associated with industrial activity to a water body(ies) of the U.S. without a National Pollutant Discharge Elimination System (NPDES) permit. New York State has been delegated the NPDES program and administers its State Pollutant Discharge Elimination System (SPDES) program in lieu of EPA's NPDES program. Wherever the term "NPDES" is used in the NOI form, the reader should substitute "SPDES". The operator of an industrial activity that has a storm water discharge that qualifies for coverage under a SPDES Storm Water General Permit must submit the NOI form to obtain coverage. If you have questions about whether federal regulations require you to obtain a permit for your storm water discharge, contact the EPA Storm Water Hotline at (703) 821-4823. If you have questions concerning the applicability and coverage of the SPDES Storm Water General Permits, contact the New York State of Environmental Conservation at (518) 457-9601. In order to cancel your coverage under the General Permit you must submit a Notice of Termination (NOT) form. Failure to submit a NOT will result in the obligation to pay a yearly Regulatory Fee.

Where To File The NOI Form

New York State intends on using EPA's information management system. Therefore, NOIs must be sent to the following address:

Storm Water Notice of Intent
PO Box 1215
Newington, VA 22122

Completing The Form

You must type or print using upper-case letters, in the appropriate areas only. Please place each character between the marks. Abbreviate if necessary to stay within the number of characters allowed for each item. Use one space for breaks between words, but not for punctuation marks unless they are needed to clarify your response. If you have any questions on this form, call the EPA Storm Water Hotline at (703) 821-4823.

Section I—Facility Operator Information

Give the legal name of the person, firm, public organization, or any other entity that operates the facility or site described in this application. The name of the operator may or may not be the same as the name of the facility. The responsible party is the legal entity that controls the facility's operation, rather than the plant or site manager. Do not use a colloquial name. Enter the complete address and telephone number of the operator.

Enter the appropriate letter to indicate the legal status of the operator of the facility:

F—Federal	M—Public (other than federal or state)
S—State	P—Private

Section II—Facility/Site Location Information

Give the facility's or site's official or legal name and complete street address, including city, state, and ZIP code. If the facility or site lacks a street address, indicate the state, the latitude and longitude of the facility to the nearest 15 seconds, or the quarter, section, township, and range (to the nearest quarter section) of the approximate center of the site.

Indicate whether the facility is located on Indian lands.

Section III—Site Activity Information

If the storm water discharges to a municipal separate storm sewer system (MS4), enter the name of the operator of the MS4 (e.g. municipality name, county name) and the receiving water of the discharge from the MS4. (A MS4 is defined as a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains) that is owned or operated by a state, city, town, borough, county, parish, district, association, or other public body which is designed or used for collecting or conveying storm water.)

If the facility discharges storm water directly to receiving water(s), enter the name of the receiving water.

If you are filing as a co-permittee and a storm water general permit number has been issued, enter that number in the space provided.

Indicate whether or not the owner or operator of the facility has existing quantitative data that represent the characteristics and concentration of pollutants in storm water discharges.

Indicate whether the facility is required to submit monthly data by entering one of the following:

1 Not required to submit monitoring date;
2 Required to submit monitoring data;
3 Not required to submit monitoring data; submitting certification for monitoring exclusion.

Those facilities that must submit monitoring data (e.g. choice 2) are Section 313 EPCRA facilities; primary metal industries; land disposal units/incinerators/BIFs; wood treatment facilities; facilities with coal pile runoff, and battery reclaimers.

List, in decreasing order of significance, up to four 4-digit standard industrial classification (SIC) codes that best describe the principal products or services provided at the facility or site identified in Section II of this application.

For industrial activities defined in 40 CFR 122.26(b)(14)(i)-(xi) that do not have SIC codes that accurately describe the principal products produced or services provided, the following 2-character codes are to be used

- HZ Hazardous waste treatment, storage, or disposal facilities, including those that are operating under interim status or a permit under subtitle C of RCRA [40 CFR 122.26(b)(14)(iv)],
- LF Landfills, land application sites, and open dumps that receive or have received any industrial wastes, including those that are subject to regulation under subtitle D of RCRA [40 CFR 122.26(b)(14)(v)],
- SE Steam electric power generating facilities, including coal handling sites [40 CFR 122.26(b)(14)(vii)];
- TW Treatment works treating domestic sewage or any other sewage sludge or wastewater treatment device or system, used in the storage, treatment, recycling, and reclamation of municipal or domestic sewage [40 CFR 122.26(b)(14)(ix)];
- CO Construction activities [40 CFR 122.26(b)(14)(x)].

If the facility listed in Section II has participated in Part 1 of an approved storm water group application and a group number has been assigned, enter the group application number in the space provided.

If there are other SPDES permits presently issued for the facility or site listed in Section II, list the permit numbers. If an application for the facility has been submitted but no permit number has been assigned, enter the application number.

Section IV—Additional Information Required for Construction Activities Only

Construction activities must complete Section IV in addition to Sections I through III. Only construction activities need to complete Section IV.

Enter the project start date and the estimated completion date for the entire development plan.

Provide an estimate of the total number of acres of the site on which soil will be disturbed (round to the nearest acre).

Indicate whether the storm water pollution prevention plan for the site is in compliance with approved state and/or local sediment and erosion plans, or storm water management plans.

Section V—Certification

Federal statutes provide for severe penalties for submitting false information on this application form. Federal regulations require this application to be signed as follows:

For a corporation: by a responsible corporate officer, which means: (i) president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions, or (ii) the manage of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million (in second-quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

For a partnership or sole proprietorship: by a general partner or the proprietor; or

For a municipality, state, federal, or other public facility: by either a principal executive officer or ranking elected official.

Paperwork Reduction Notice

Public reporting burden for this application is estimated to average 0.5 hours per application, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate, any other aspect of the collection of information, or suggestions for improving this form, including any suggestions which may decrease or reduce the burden to: Chief, Information Policy Branch, PM-223, U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20490, or Director, Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, D.C. 20603.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SPDES GENERAL PERMIT

FOR STORM WATER DISCHARGES FROM CONSTRUCTION ACTIVITIES

Permit No. GP-93-06

Issued Pursuant to Article 17, Titles 7, 8 and Article 70
of the Environmental Conservation Law

Effective Date: August 1, 1993

Expiration Date: August 1, 1998

George A. Danskin
Chief Permit Administrator

George A Danskin
Authorized Signature

Address:
50 Wolf Road
Albany, N.Y. 12233-1750

Date: July 14, 1993

PREFACE

The Clean Water Act ("CWA")[1] provides that storm water discharges associated with industrial activity from a point source[2] (including discharges through a municipal separate storm sewer system) to waters of the United States[3] are unlawful, unless authorized by a National Pollutant Discharge Elimination System ("NPDES") permit. In New York which is a NPDES-delegated state, this is accomplished through the administration of the state Pollutant Discharge Elimination System ("SPDES") program.

A discharger which is subject to the federal storm water (NPDES) regulations may be eligible to obtain coverage under a general permit by submitting a Notice of Intent ("NOI") to the address given on the NOI form.

---

[1] Also referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972 (Pub.L. 92-500, as amended Pub. L. 95-217, Pub. L. 95-576, Pub. L. 96-483 and Pub. L. 97-117, 33 U.S.C. 1251 et.seq.)

[2] "Point Source" means any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharges. This term does not include return flows from irrigated agriculture or agricultural storm water runoff.

[3] "Waters of the United States" means:

(a) All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;

(b) All interstate waters, including interstate "wetlands";

(c) All other waters such as interstate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce including any such waters:

(1) Which are or could be used by interstate or foreign travelers for recreational or other purposes;

(2) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or

(3) Which are used or could be used for industrial purposes by industries in interstate commerce;

(d) All impoundments of waters otherwise defined as waters of the United States under this definition;

(e) Tributaries of waters identified in paragraphs (a) through (d) of this definition;

(f) The territorial sea;

(g) Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) through (f) of this definition.

Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of the CWA are not waters of the United States. This exclusion applies only to manmade bodies of water with neither were originally created in waters of the United States (such as disposal areas in wetlands) nor resulted from the impoundment of waters of the United States.

Copies of the General Permit and the Notice of Intent forms for New York are available by calling 1-(800)-952-2490. The United States Environmental Protection Agency (EPA) has established the Stormwater Hotline at (703) 821-4823 to provide information pertaining to the NPDES stormwater regulations.

If you have questions whether federal regulations require you to obtain a permit for your storm water discharge, contact the EPA Storm Water Hotline. If you have questions concerning the applicability and coverage of the SPDES Storm Water General Permits, contact the New York State Department of Environmental Conservation in Albany at (518) 457-9601. In order to cancel your coverage under the General Permit, you must submit a Notice of Termination ("NOT") form. Failure to submit a NOT will result in the continued obligation to pay a yearly Regulatory Fee.

Additionally, copies of the general permit, the NOI form and the NOT form can be obtained by calling the New York State Department of Environmental Conservation ("DEC") Storm Water Information Line at (800) 952-2490 (in New York State), any DEC Regional Office (See Appendix B), or directly from DEC in Albany at the telephone number given above.

Coverage under this general permit is available August 1, 1993 and expires on August 1, 1998.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
SPDES GENERAL PERMIT
FOR STORM WATER DISCHARGES FROM CONSTRUCTION ACTIVITIES
THAT ARE CLASSIFIED AS "ASSOCIATED WITH INDUSTRIAL ACTIVITY"

TABLE OF CONTENTS

Part I. COVERAGE UNDER THIS PERMIT

A. Permit Area & Applicability. The permit covers all areas of New York State where New York State implements Section 402 of the CWA. Except as in compliance with this general permit or with a duly authorized individual permit from DEC, discharge of stormwater associated with industrial activity from construction activity by any person shall be unlawful.

B. Eligibility.

1. This permit may authorize all discharges of storm water associated with industrial activity from construction activity[4], (those sites or common plans of development or sale that will result in the disturbance of five or more acres total land area[5]), (henceforth referred to as storm water discharges from construction activities) occurring after the effective date of this permit, including discharges occurring after the effective date of this permit where the construction activity was initiated before the effective date of this permit, except for discharges identified under paragraph I.C (see below).

2. This permit may only authorize a storm water discharge from construction activities that is mixed with a storm water discharge associated with industrial activities other than construction, where:

a. the industrial activity other than construction is located on the same site as the construction activity;

b. storm water discharges from construction activities are in compliance with the terms of this permit; and

c. storm water discharges associated with industrial activity other than construction are occurring (including storm water discharges from dedicated asphalt plants and dedicated concrete plants) are covered by a different SPDES general permit or individual permit authorizing such discharges.

C. Limitations on Coverage. The following storm water discharges from construction activities are not authorized by this permit:

[4] "Storm Water Discharges Associated With Industrial Activity" covered under this general permit includes those defined in 40 CFR Section 122.26(b)(14)(x).

[5] On June 4, 1992, the United States Court of Appeals for the Ninth Circuit remanded the exemption for construction sites of less than five acres to the EPA for further rule making. (Nos. 90-70671 and 91-70200). Any effect of this decision on construction sites of less than five acres will not apply until further EPA or DEC action. Regulations for construction sites of five acres or more remain in effect.

1. Discharges associated with industrial activity after construction activities have been completed and the site has undergone final stabilization[6];

2. Discharges that are mixed with sources of non-storm water other than those expressly authorized under this permit (Part II.A, Page 7 and Part III.D.5, Page 15);

3. Discharges that are subject to an existing SPDES individual or general permit or which are issued an individual or alternative general permit (Page 19); and

4. Discharges that are likely to adversely affect a listed or proposed to be listed endangered or threatened species or its critical habitat.

D. <u>Authorization.</u>

1. An operator[7] must submit a completed Notice of Intent ("NOI") form approved and provided by the State Director[8] (or a photocopy thereof), in order to be authorized to discharge under this general permit[9]. The NOI shall be signed in accordance with Part V.G (see Page 18) of this permit and submitted to the address indicated on the approved NOI form.

2. All contractors and subcontractors of the operator identified under Part III.E.1 (Page 16) must provide certification under Part III.E.2 (Page 16) of this permit in order to be authorized to discharge storm water under this permit.

3. Unless notified by the State Director to the contrary, operators who submit an NOI in accordance with the requirements of this permit are authorized to discharge storm water from construction activities under the terms and conditions of this permit 2 days after the date that the NOI is postmarked. The State Director may deny coverage under this permit and require submittal of an application for an individual SPDES permit at any time based on a review of the NOI or other information (see Part V.J of this permit, Page 19).

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[6] "Final Stabilization" means that all soil disturbing activities at the site have been completed, and that a uniform perennial vegetative cover with a density of 70% the cover for the area has been established or equivalent stabilization measures (such as the use of mulches or geotextiles) have been employed.

[7] For the purposes of this permit, the term "operator" means the person, persons, or legal entity which owns or leases the property on which the construction activity is occurring.

[8] "State Director" means the New York State Commissioner of Environmental Conservation, or an authorized representative.

[9] A copy of the approved NOI form is provided in Appendix A of this notice.

4. A copy of the NOI or other indication that storm water discharges from the site are covered under a SPDES permit, and a brief description of the project shall be posted at the construction site in a prominent place for public viewing (such as alongside a building permit).

5. A signed copy of the NOI shall also be submitted concurrently to the local governing body and any other authorized agency[10] having jurisdiction or regulatory control over the construction project.

6. New storm water discharges from construction activities which require any other Uniform Procedures Act permit (Environmental Conservation Law, 6 NYCRR Part 621) must submit the information specified in Appendix G.

   Upon review of this information, DEC may authorize the applicant to submit an NOI to obtain coverage under this general permit.

7. **Renotification**. Upon renewal of this general permit or issuance of a new general permit, the permittee is required to notify the State Director of his intent to be covered by the new general permit.

E. **Deadlines for Notification**.

1. Operators who intend to obtain coverage under this general permit for storm water discharges from construction activities shall submit an NOI in accordance with the requirements of this Part at least 2 days prior to the commencement of construction[11] activities ;

2. For storm water discharges from construction activities where the operator changes, a new NOI in accordance with the requirements of this Part shall be submitted by the new operator at least 2 days prior to the change in operator. Additionally, the operator being replaced must submit a Notice of Termination ("NOT") in accordance with Part VI (Page 21) of this permit and notify the new operator of the requirement to submit a new NOI to obtain coverage under this permit. The new operator must also review and sign the pollution prevention plan in accordance with Part III.B.

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[10] For the purposes of this general permit, "any other authorized agency" shall include any local, regional, or state entity or agency except the Department of Environmental Conservation (DEC) which has authority to review storm water discharge from the project, including authority under any approved watershed protection plan or regulations.

[11] "Commencement of Construction" means the initial disturbance of soils associated with clearing, grading, or excavating activities. or other construction activities

Part II. SPECIAL CONDITIONS AND PROHIBITIONS

A. Prohibition On Non-Stormwater Discharges.

Discharges other than storm water must be in compliance with a SPDES permit (other than this permit). However, the following non-storm water discharges are authorized by this permit: discharges from fire fighting activities; fire hydrant flushings; waters used to wash vehicles or control dust in accordance with Part III.D.2.e.(2) (Page 13); routine external building washdown which does not use detergents; pavement washwaters where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed) and where detergents are not used; air conditioning condensate; springs; and foundation or footing drains where flows are not contaminated with process materials such as solvents. Except for flows from fire fighting activities, these discharges must be included in the storm water pollution prevention plan (See Part III).

B. Maintaining Water Quality - The discharge authorized by this general permit shall neither cause nor contribute to a violation of water quality standards as contained in Parts 700 through 705 of Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York including, but not limited to:

1. There shall be no increase in turbidity that will cause a substantial visible contrast to natural conditions;

2. There shall be no suspended, colloidal and settleable solids that will cause deposition or impair the waters for their best usages; and

3. There shall be no: residue from oil and floating substances; visible oil film; globules; or grease.

Part III. STORM WATER POLLUTION PREVENTION PLANS

A storm water pollution prevention plan shall be developed by the operator for construction activities at each site to be covered by this permit. Storm water pollution prevention plans shall be prepared in accordance with good engineering practices. The plan shall identify potential sources of pollution which may reasonably be expected to affect the quality of storm water discharges. In addition, the plan shall describe and ensure the implementation of practices which will be used to reduce the pollutants in storm water discharges and to assure compliance with the terms and conditions of this permit. Operators are responsible for implementing the provisions of the storm water pollution prevention plan and ensuring that all contractors and subcontractors who perform professional services at the site provide certification of the pollution prevention plan in accordance with Part I.D.2. (Page 5) and Part III.E.2. (Page 14) of this permit. All contractors and subcontractors identified in the storm water pollution prevention plan in accordance with Part III.E.1 (Page 16) of this permit must agree to implement applicable provisions of the pollution prevention plan and satisfy the certification requirement of Part III.E.2 (Page 16). Contractors and subcontractors which are not operators, as defined in this permit (Page 5), do not have to submit a NOI in addition to the NOI submitted by the operator.

A. <u>Deadlines for Plan Preparation and Compliance</u>.

1. For construction activities that have begun on or before February 1, 1994, the plan shall be developed prior to, and provide compliance with the terms and schedule of the plan beginning on, February 1, 1994. However, the plan for sedimentation basins shall provide for compliance no later that April 1, 1994.

2. For construction activities that begin after February 1, 1994, the plan shall be developed prior to the submittal of an NOI and provide for compliance with the terms and schedule of the plan beginning with the initiation of construction activities.

B. <u>Signature and Plan Review</u>

1. The plan shall be signed in accordance with Part V.G (Page 18), and be retained at the site where the construction activity occurs in accordance with Part IV (retention of records, Page 17) of this permit.

2. The permittee shall submit a copy of the pollution prevention plan and any amendments thereto to the local governing body and any other authorized agency having jurisdiction or regulatory control over the construction activity. The operator shall make plans available upon request to the State Director and any local agency having jurisdiction; or in the case of a storm water discharge associated with industrial activity which discharges through a municipal separate storm sewer system , to the municipal operator of the system.

3. The State Director, or authorized representative, may notify the permittee at any time that the plan does not meet one or more of the minimum requirements of this Permit. Such notification shall identify those provisions of the permit which are not being met by the plan, and identify which provisions of the plan requires modifications in order to meet the minimum requirements of this Permit. Within 7 days of such notification, (or

as otherwise provided by the State Director), the permittee shall make the required changes to the plan and shall submit to the State Director a written certification that the requested changes have been made.

C. Keeping Plans Current. The permittee shall amend the plan whenever:

1. There is a change in design, construction, operation, or maintenance, which has a significant effect on the potential for the discharge of pollutants to the waters of the United States and which has not otherwise been addressed in the plan; or

2. The storm water pollution prevention plan proves to be ineffective in:

a. Eliminating or significantly minimizing pollutants from sources identified under Part III.D.2 (See below) of this permit, or in otherwise

b. Achieving the general objectives of controlling pollutants in storm water discharges from construction activity.

3. Additionally, the plan shall be amended to identify any new contractor and/or subcontractor that will implement a measure of the storm water pollution prevention plan (See Part III.E, Page 16). Amendments to the plan may be reviewed by the State Director in the same manner as provided by Part III.B above.

D. Contents of Plan. The storm water pollution prevention plan shall include the following items and shall be prepared in accordance with Appendix F (THE STORMWATER MANAGEMENT AND EROSION CONTROL PLAN). Any deviation from Appendix F or the requireents listed below shall be explained and justified in the storm water pollution prevention plan.

1. Site Description. Each plan shall provide a description of pollutant sources and other information as indicated:

a. A description of the nature of the construction activity;

b. A description of the intended sequence of major activities which disturb soils for major portions of the site (e.g. grubbing, excavation, grading);

c. Estimates of the total area of the site and the total area of the site that is expected to be disturbed by excavation, grading, or other activities;

d. An estimate of the runoff coefficient[12] of the site after construction activities are completed and existing data describing the soil or the quality of any discharge from the site;

e. A site map indicating drainage patterns and approximate slopes anticipated after major grading activities, areas of soil disturbance, an outline of areas which will not be disturbed, the location of major structural and nonstructural controls identified in the plan, the location of areas where stabilization practices are expected to occur, surface waters (including wetlands), and locations where storm water is discharged to surface or ground water(s); and

f. The name of the receiving water(s) and areal extent of wetland acreage at the site.

2. <u>Controls</u>. Each plan shall include a description of appropriate controls and measures that will be implemented at the construction site. The plan will clearly describe for each major activity identified in Part III.D.1.b above, appropriate control measures and the timing during the construction process that the measures will be implemented. For example, the plan might provide the following: perimeter controls for one portion of the site will be installed after the clearing and grubbing necessary for installation of the measure, but before the clearing and grubbing for the remaining portions of the site; perimeter controls will be actively maintained until final stabilization of those portions of the site upward of the perimeter control; temporary perimeter controls will be removed after final stabilization. The description and implementation of controls shall address the following minimum components:

a. <u>Erosion and Sediment Controls</u>

Except as noted below in Part III.D.2.b, the erosion and sediment control component of a storm water pollution prevention plan shall conform to and be implemented in a manner consistent with the technical standards set forth in Appendix E. Where conformance to Appendix E is not attainable, the operator shall describe what equivalent erosion and sediment control practices will be implemented together with an explanation as to why conformance with Appendix E cannot be achieved. This explanation, together with the alternative erosion and sediment control measures and design specifications, shall be presented in the storm water pollution prevention plan.

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[12] "Runoff coefficient" means the fraction of total rainfall that will appear at the conveyance as runoff.

A description of interim and permanent stabilization practices, including site-specific scheduling of the implementation of the practices. Site plans should ensure that existing vegetation is preserved where attainable and that disturbed portions of the site are stabilized. Stabilization practices may include: temporary seeding, permanent seeding, mulching, geotextiles, sod stabilization, vegetative buffer strips, protection of trees, preservation of mature vegetation, and other appropriate measures. A record of the dates when major grading activities occur, when construction activities temporarily or permanently cease on a portion of the site, and when stabilization measures are initiated shall be included in the plan. Except as provided in Parts III.D.2.(a)(1)and (2) below, stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased.

(1). Where the initiation of stabilization measures by the 14th day after construction activity temporary or permanently cease is precluded by snow cover, stabilization measures shall be initiated as soon as practicable.

(2). Where construction activity will resume on a portion of the site within 21 days from when activities ceased, (e.g. the total time period that construction activity is temporarily ceased is less than 21 days) then stabilization measures do not have to be initiated on that portion of site by the 14th day after construction activity temporarily ceased.

b. **Erosion and Sediment Controls - Structural Practices**.

A description of structural practices to divert flows from exposed soils, store flows or otherwise limit runoff and the discharge of pollutants from exposed areas of the site to the degree attainable. Such practices may include silt fences, earth dikes, drainage swales, sediment traps, check dams, subsurface drains, pipe slope drains, level spreaders, storm drain inlet protection, rock outlet protection, reinforced soil retaining systems, gabions, and temporary or permanent sediment basins. Structural practices should be placed on upland soils to the degree attainable.

(1) For common drainage locations that serve an area with 10 or more disturbed acres at one time, a

temporary (or permanent) sediment basin providing 3,600 cubic feet of storage per acre drained, or equivalent control measures, shall be provided where attainable until final stabilization of the site. The 3,600 cubic feet of storage area per acre drained does not apply to flows from offsite areas and flows from onsite areas that are either undisturbed or have undergone final stabilization where such flows are diverted around both the disturbed area and the sediment basin. For drainage locations which serve 10 or more disturbed acres at one time and where a temporary sediment basin providing 3,600 cubic feet of storage per acre drained, or equivalent controls is not attainable, smaller sediment basins and/or traps shall be used.

(2) For drainage locations serving less than 10 acres, sediment basins and/or sediment traps should be used. At a minimum, silt fences or equivalent sediment controls are required for all sideslope and downslope boundaries of the construction area unless a sediment basin providing storage for 3,600 cubic feet of storage per acre drained is provided.

c. <u>Storm Water Management</u>.

Storm water management controls shall conform to and be implemented in a manner consistent with the technical standards set forth in Appendix D). Where conformance to Appendix D is not attainable, the operator shall describe what practices will be implemented together with an explanation as to why conformance with Appendix D cannot be achieved. This explanation, together with the alternative storm water management practices and design specifications shall be presented in the storm water pollution prevention plan.

A description of measures that will be installed during the construction process to control storm water discharges that will occur after construction operations have been completed. Structural measures should be placed on upland soils to the degree attainable.

(1) Such practices may include: storm water detention structures (including wet ponds); storm water retention structures; flow attenuation by use of open vegetated swales and natural depressions; infiltration of runoff onsite; and sequential systems (which combine several practices). The pollution prevention plan shall include an explanation of the technical basis used to select the practices to control pollution where flows exceed predevelopment levels.

(2) Velocity dissipation devices shall be placed at discharge locations and along the length of any outfall channel for the purpose of providing a non-erosive velocity flow from the structure to a water course so that the natural physical and biological characteristics and functions are maintained and protected (e.g., no significant changes in the hydrological regime of the receiving water).

d. Other Controls.

(1) Waste Disposal. No solid materials, including building materials, shall be discharged to waters of the United States, except as authorized by a federal or State law.

(2) Off-site vehicle tracking of sediments and the generation of dust shall be minimized.

(3) The plan shall ensure and demonstrate compliance with applicable State and local waste disposal, sanitary sewer or septic system regulations.

e. Approved Local or Regional Control Plans.

(1) Storm water pollution prevention plans must include procedures and requirements specified in applicable sediment and erosion site plans, site permits, storm water management site plans or site permits or duly adopted regulations approved by local officials or any authorized agency. Permittees shall provide a certification in their storm water pollution prevention plan that their storm water pollution prevention plan complies with all requirements applicable to protecting surface and ground water resources in sediment and erosion site plans or site permits, storm water management site plans, site permits, or duly adopted regulations approved by local governing bodies or any authorized agency. Permittees shall comply with any such requirements during the term of the permit.

(2) Storm water pollution prevention plans must be amended to reflect any change applicable to protecting surface and ground water resources in sediment and erosion site plans or site permits, storm water management site plans or site permits, or duly adopted regulations approved by local officials or any authorized agency for which the permittee receives written notice. Where the permittee receives such written notice of a change, the permittee shall provide a recertification in

the storm water pollution prevention plan that the storm water pollution prevention plan has been modified to address such changes.

(3) Operators seeking alternative permit requirements shall submit an individual permit application in accordance with Part V.J (Page 19) of the permit at the address indicated in Part IV.C (Page 17) of this permit for the appropriate DEC Office, along with a description of why requirements in approved local or regional plans, permits or regulations or changes to such plans, permits, or regulations, should not be applicable as a condition of a SPDES permit.

3. Maintenance. A description of procedures to ensure the timely maintenance of vegetation, erosion and sediment control measures and other protective measures identified in the site plan in good and effective operating condition.

In cases where the installed structural controls are designed, in whole or part, to provide for storm water management after construction activity is completed and final stabilization of the site, a description of the post-construction operation and maintenance needs shall be included.

A description of any arrangements that have been made to ensure long term maintenance of storm water facilities after construction operations have been completed and permit coverage is terminated, and a statement describing who will be responsible for maintenance shall be included.

4. Inspections. The operator or qualified personnel of the operator shall inspect disturbed areas of the construction site that have not been finally stabilized, areas used for storage of materials that are exposed to precipitation that have not been finally stabilized, structural control measures, and locations where vehicles enter or exit the site at least once every seven calendar days and within 24 hours of the end of a storm that is 0.5 inches or greater. Where portions of the construction area have been finally stabilized, inspection of such portions shall be conducted at least once every month until the entire site is finally stabilized.

a. Disturbed areas and areas used for storage of materials that are exposed to precipitation shall be inspected for evidence of, or the potential for, pollutants entering the drainage system. Erosion and sediment control measures identified in the plan shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters. Locations where vehicles enter or exit the site shall be inspected for evidence of offsite sediment tracking.

b. Based on the results of the inspection, the site description identified in the plan in accordance with paragraph III.D.1 (Page 9) of this permit and pollution prevention measures identified in the plan in accordance with paragraph III.D.2 (Page 10) of this permit shall be revised as appropriate, but in no case later than 7 calendar days following the inspection. Such modifications shall provide for timely implementation of any changes to the plan within 7 calendar days following the inspection.

c. A report summarizing the scope of the inspection, name(s) and qualifications of personnel making the inspection, the date(s) of the inspection, major observations relating to the implementation of the storm water pollution prevention plan, and actions taken in accordance with paragraph III.D.4.b (See above) of the permit shall be made and retained as part of the storm water pollution prevention plan for at least three years from the date that the site is finally stabilized. Such reports shall identify any incidents of non-compliance. Where a report does not identify any incidents of non-compliance, the report shall contain a certification that the facility is in compliance with the storm water pollution prevention plan and this permit. The report shall be signed in accordance with Part V.G (Page 18) of this permit.

5. <u>Non-Storm Water Discharges</u> - Except for flows from fire fighting activities, sources of non-storm water listed in Part II.A (Page 7) of this permit that are combined with storm water discharges from the construction activity must be identified in the plan. The plan shall identify and ensure the implementation of appropriate pollution prevention measures for the non-storm water component(s) of the discharge.

E. Contractors

1. The storm water pollution prevention plan must clearly identify for each measure identified in the plan, the contractor(s) and/or subcontractor(s) that will implement the measure. All contractors and subcontractors identified in the plan must sign a copy of the certification statement in Part III.E.2 (See below) of this permit in accordance with Part V.G (Page 18) of this permit. All certifications must be included in the storm water pollution prevention plan.

2. Certification Statement. All contractors and subcontractors identified in a storm water pollution prevention plan in accordance with Part III.E.1 (Page 16) of this permit shall sign a copy of the following certification statement before undertaking any construction activity at the site identified in the storm water pollution prevention plan:

   "I certify under penalty of law that I understand and agree to comply with the terms and conditions of the pollution prevention plan for the construction site identified in such plan as a condition of authorization to discharge storm water. I also understand that the operator must comply with the terms and conditions of the New York State Pollutant Discharge Elimination System ("SPDES") general permit for storm water discharges from construction activities and that it is unlawful for any person to cause or contribute to a violation of water quality standards."

   The certification must include the name and title of the person providing the signature in accordance with Part V.G (Page 18) of this permit; the name, address and telephone number of the contracting firm; the address (or other identifying description) of the site; and the date the certification is made.

Part IV. RETENTION OF RECORDS

A. The operator shall retain copies of storm water pollution prevention plans and all reports required by this permit, and records of all data used to complete the NOI to be covered by this permit, for a period of at least three years from the date that the site is finally stabilized. This period may be extended by the State Director at any time upon written notification.

B. The operator shall retain a copy of the storm water pollution prevention plan required by this permit at the construction site from the date of initiation of construction activities to the date of final stabilization.

C. <u>Addresses</u>. Except for the submittal of NOIs and NOTs, all written correspondence under this permit directed to the DEC, including the submittal of individual permit applications, shall be sent to the address of the appropriate DEC Office as listed in Appendix B.

Part V. STANDARD PERMIT CONDITIONS

A. <u>Duty to Comply</u>.

The operator must comply with all conditions of this permit. All contractors and subcontractors must comply with the terms of the pollution prevention plan. Any permit noncompliance constitutes a violation of the CWA and the Environmental Conservation Law and is grounds for enforcement action; for permit revocation or modification; or for denial of a permit renewal application.

B. <u>Continuation of the Expired General Permit</u>.

This permit expires on August 1, 1998. However, an expired general permit continues in force and effect until a new general permit is issued. Operators seeking authorization under a new general permit must submit a new NOI in accordance with the terms of such new general permit.

C. <u>Need to halt or reduce activity not a defense</u>. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the construction activity in order to maintain compliance with the conditions of this permit.

D. <u>Duty to Mitigate</u>. The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

E. <u>Duty to Provide Information</u>. The permittee shall furnish to the State Director; or local, or any other agency approving sediment and erosion plans, grading plans, or storm water management plans, or with regulatory control over the project; or in the case of a storm water discharge associated with industrial activity which discharges through a municipal separate storm sewer system with a SPDES permit, to the municipal operator of the system, any information which is requested to determine compliance with this permit or other information.

F. <u>Other Information</u>. When the permittee becomes aware that he or she failed to submit any relevant facts or submitted incorrect information in the NOI or in any other report to the State Director, he or she shall promptly submit such facts or information.

G. Signatory Requirements. All NOIs, NOTs, storm water pollution prevention plans, reports, certifications or information required by this permit or submitted pursuant to this permit, shall be signed as follows:

1. All NOIs and NOTs shall be signed as follows:

a. For a corporation: by (1) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person authorized to and who performs similar policy or decision-making functions for the corporation; or (2) the manager of one or more manufacturing, production or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25,000,000 (in second-quarter 1980 dollars) if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

b. For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or

c. For a municipality, State, Federal, or other public agency: by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes (1) the chief executive officer of the agency, or (2) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of EPA).

2. The pollution prevention plan and all reports required by the permit and other information requested by the State Director or local agency shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

a. The authorization is made in writing by a person described above and submitted to the State Director.

b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of manager, operator, superintendent, or position of equivalent responsibility or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position).

c. Certification. Any person signing documents under paragraph V.G (Page 18) shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that false statements made herein are punishable as a class A misdemeanor pursuant to Section 210.45 of the Penal Law."

H. Property Rights. The issuance of this permit does not convey any property rights of any sort, nor any exclusive privileges, nor does it authorize any injury to private property nor any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations.

I. Severability. The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit shall not be affected thereby.

J. Requiring an individual permit or an alternative general permit.

1. The State Director may require any person authorized by this permit to apply for and/or obtain either an individual SPDES permit or an alternative SPDES general permit. Where the State Director requires a discharger authorized to discharge under this permit to apply for an individual SPDES permit, the State Director shall notify the discharger in writing that a permit application is required. This notification shall include a brief statement of the reasons for this decision, an application form, a statement setting a deadline for the discharger to file the application, and a statement that on the effective date of issuance or denial of the individual SPDES permit or the alternative general permit as it applies to the individual permittee, coverage under this general permit shall automatically terminate. Applications shall be submitted to the appropriate DEC Office indicated in Appendix B of this permit. The State Director may grant additional time to submit the application upon request of the applicant. If a discharger fails to submit in a timely manner an individual SPDES permit application as required by the State Director under this paragraph, then the applicability of this permit to the individual SPDES permittee is automatically terminated at the end of the day specified by the State Director for application submittal.

2. Any discharger authorized by this permit may request to be excluded from the coverage of this permit by applying for an individual permit. In such cases, the permittee shall submit an individual application in accordance with the requirements of 40 CFR 122.26(c)(1)(ii) and 6 NYCRR Part 621, with reasons supporting the request, to the State Director at the address for the appropriate DEC Office (see addresses in Appendix B of this permit). The request may be granted by issuance of an individual permit or an alternative general permit at the discretion of the State Director.

3. When an individual SPDES permit is issued to a discharger otherwise subject to this permit, or the discharger is authorized to discharge under an alternative SPDES general permit, the applicability of this permit to the individual SPDES permittee is automatically terminated on the effective date of the individual permit or the date of authorization of coverage under the alternative general permit, whichever the case may be. When an individual SPDES permit is denied to an operator otherwise subject to this permit, or the operator is denied for coverage under an alternative SPDES general permit, the applicability of this permit to the individual SPDES permittee is automatically terminated on the date of such denial, unless otherwise specified by the State Director.

K. Proper Operation and Maintenance. The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit and with the requirements of storm water pollution prevention plans. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. Proper operation and maintenance requires the operation of backup or auxiliary facilities or similar systems, installed by a permittee only when necessary to achieve compliance with the conditions of the permit.

L. Inspection and Entry. The permittee shall allow the State Director or an authorized representative of EPA, the State, or, in the case of a construction site which discharges through a municipal separate storm sewer, an authorized representative of the municipal operator or the separate storm sewer receiving the discharge, upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the permittee's premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of this permit;

2. Have access to and copy at reasonable times, any records that must be kept under the conditions of this permit; and

3. Inspect at reasonable times any facilities or equipment (including monitoring and control equipment).

M. Permit Actions. This permit may, at any time, be modified, revoked, and renewed. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

Part VI. TERMINATION OF COVERAGE

A. Notice of Termination ("NOT"). Where a site has been finally stabilized and all storm water discharges from construction activities that are authorized by this permit are eliminated[13], the operator must submit an NOT form approved and provided by the State Director (or photocopy thereof).The NOT shall be signed in accordance with Part V.G (Page 18) of this permit and submitted to the address indicated on the approved NOT form.

[13] For the purposes of this certification, elimination of storm water discharges from construction activity means that all disturbed soils at the identified facility have been finally stabilized and temporary erosion and sediment control measures have been removed or will be removed at an appropriate time, or that all storm water discharges associated with industrial activities from the identified site that are authorized by a SPDES general permit have otherwise been eliminated.

See Reverse for Instructions

SPDES FORM

DEC

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233-3505

Notice of Intent (NOI) for Storm Water Discharges Associated with Industrial Activity Under the SPDES General Permit

Submission of this Notice of Intent constitutes notice that the party identified in Section I of this form intends to be authorized by a SPDES permit issued for storm water discharges associated with industrial activity in the State in Section II of this form. Becoming a permittee obligates such discharger to comply with the terms and conditions of the permit. ALL NECESSARY INFORMATION MUST BE PROVIDED ON THIS FORM

I. Facility Operator Information

Name: Phone:

Address: Status of Owner/Operator:

City: State: ZIP Code:

II. Facility/Site Location Information

Is the Facility Located on Indian Lands? (Y or N)

Name:

Address:

City: State: ZIP Code:

Latitude: Longitude: Quarter: Section: Township: Range:

III. Site Activity Information

MS4 Operator Name:

Receiving Water Body:

If You are Filing as a Co-permittee, Enter Storm Water General Permit Number:

Are There Existing Quantitative Data? (Y or N)

Is the Facility Required to Submit Monitoring Data? (1, 2, or 3)

SIC or Designated Activity Code: Primary: 2nd: 3rd: 4th:

If This Facility is a Member of a Group Application, Enter Group Application Number:

If You Have Other Existing NPDES Permits, Enter Permit Numbers:

IV. Additional Information Required for Construction Activities Only

Project Start Date:

Completion Date:

Estimated Area to be Disturbed (in Acres):

Is the Storm Water Pollution Prevention Plan in Compliance with State and/or Local Sediment and Erosion Plans? (Y or N)

V. Certification:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Print Name: Date:

Signature:

91-19-12 (9/92)—10g

Printed on Recycled Paper

APPENDIX A - Notice of Intent ("NOI")

Instruction—NYSDEC Form 91-19-12 (9/92)

Notice of Intent (NOI)

For Storm Water Discharges Associated With Industrial Activity to Be Covered Under the SPDES General Permit

Who Must File A Notice Of Intent Form

Federal law at 40 CFR Part 122 prohibits point source discharges of storm water associated with industrial activity to a water body(ies) of the U.S. without a National Pollutant Discharge Elimination System (NPDES) permit. New York State has been delegated the NPDES program and administers its State Pollutant Discharge Elimination System (SPDES) program in lieu of EPA's NPDES program. Wherever the term "NPDES" is used in the NOI form, the reader should substitute "SPDES". The operator of an industrial activity that has a storm water discharge that qualifies for coverage under a SPDES Storm Water General Permit must submit the NOI form to obtain coverage. If you have questions about whether federal regulations require you to obtain a permit for your storm water discharge, contact the EPA Storm Water Hotline at (703) 821-4823. If you have questions concerning the applicability and coverage of the SPDES Storm Water General Permits, contact the New York State of Environmental Conservation at (518) 457-9601. In order to cancel your coverage under the General Permit you must submit a Notice of Termination (NOT) form. Failure to submit a NOT will result in the obligation to pay a yearly Regulatory Fee.

Where To File The NOI Form

New York State intends on using EPA's information management system. Therefore, NOIs must be sent to the following address:

Storm Water Notice of Intent
PO Box 1215
Newington, VA 22122

Completing The Form

You must type or print using upper-case letters, in the appropriate areas only. Please place each character between the marks. Abbreviate if necessary to stay within the number of characters allowed for each item. Use one space for breaks between words, but not for punctuation marks unless they are needed to clarify your response. If you have any questions on this form, call the EPA Storm Water Hotline at (703) 821-4823.

Section I—Facility Operator Information

Give the legal name of the person, firm, public organization, or any other entity that operates the facility or site described in this application. The name of the operator may or may not be the same as the name of the facility. The responsible party is the legal entity that controls the facility's operation, rather than the plant or site manager. Do not use a colloquial name. Enter the complete address and telephone number of the operator.

Enter the appropriate letter to indicate the legal status of the operator of the facility:

F—Federal	M—Public (other than federal or state)
S—State	P—Private

Section II—Facility/Site Location Information

Give the facility's or site's official or legal name and complete street address, including city, state, and ZIP code. If the facility or site lacks a street address, indicate the state, the latitude and longitude of the facility to the nearest 15 seconds, or the quarter, section, township, and range (to the nearest quarter section) of the approximate center of the site.

Indicate whether the facility is located on Indian lands.

Section III—Site Activity Information

If the storm water discharges to a municipal separate storm sewer system (MS4), enter the name of the operator of the MS4 (e.g. municipality name, county name) and the receiving water of the discharge from the MS4. (A MS4 is defined as a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains) that is owned or operated by a state, city, town, borough, county, parish, district, association, or other public body which is designed or used for collecting or conveying storm water.)

If the facility discharges storm water directly to receiving water(s), enter the name of the receiving water.

If you are filing as a co-permittee and a storm water general permit number has been issued, enter that number in the space provided.

Indicate whether or not the owner or operator of the facility has existing quantitative data that represent the characteristics and concentration of pollutants in storm water discharges.

Indicate whether the facility is required to submit monthly data by entering one of the following:

1 Not required to submit monitoring date;
2 Required to submit monitoring data;
3 Not required to submit monitoring data; submitting certification for monitoring exclusion.

Those facilities that must submit monitoring data (e.g. choice 2) are: Section 313 EPCRA facilities; primary metal industries; land disposal units/incinerators/BIFs; wood treatment facilities; facilities with coal pile runoff; and battery reclaimers.

List, in decreasing order of significance, up to four 4-digit standard industrial classification (SIC) codes that best describe the principal products or services provided at the facility or site identified in Section II of this application.

For industrial activities defined in 40 CFR 122.26(b)(14)(i)-(xi) that do not have SIC codes that accurately describe the principal products produced or services provided, the following 2-character codes are to be used:

HZ Hazardous waste treatment, storage, or disposal facilities, including those that are operating under interim status or a permit under subtitle C of RCRA [40 CFR 122.26(b)(14)(iv)].

LF Landfills, land application sites, and open dumps that receive or have received any industrial wastes, including those that are subject to regulation under subtitle D of RCRA [40 CFR 122.26(b)(14)(v)].

SE Steam electric power generating facilities, including coal handling sites [40 CFR 122.26(b)(14)(vii)];

TW Treatment works treating domestic sewage or any other sewage sludge or wastewater treatment device or system, used in the storage, treatment, recycling, and reclamation of municipal or domestic sewage [40 CFR 122.26(b)(14)(ix)];

CO Construction activities [40 CFR 122.26(b)(14)(x)].

If the facility listed in Section II has participated in Part 1 of an approved storm water group application and a group number has been assigned, enter the group application number in the space provided.

If there are other SPDES permits presently issued for the facility or site listed in Section II, list the permit numbers. If an application for the facility has been submitted but no permit number has been assigned, enter the application number.

Section IV—Additional Information Required for Construction Activities Only

Construction activities must complete Section IV in addition to Sections I through III. Only construction activities need to complete Section IV.

Enter the project start date and the estimated completion date for the entire development plan.

Provide an estimate of the total number of acres of the site on which soil will be disturbed (round to the nearest acre).

Indicate whether the storm water pollution prevention plan for the site is in compliance with approved state and/or local sediment and erosion plans, or storm water management plans.

Section V—Certification

Federal statutes provide for severe penalties for submitting false information on this application form. Federal regulations require this application to be signed as follows:

For a corporation: by a responsible corporate officer, which means: (i) president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions, or (ii) the manage of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million (in second-quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

For a partnership or sole proprietorship: by a general partner or the proprietor; or

For a municipality, state, federal, or other public facility: by either a principal executive officer or ranking elected official.

Paperwork Reduction Notice

Public reporting burden for this application is estimated to average 0.5 hours per application, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate, any other aspect of the collection of information, or suggestions for improving this form, including any suggestions which may decrease or reduce the burden to: Chief, Information Policy Branch, PM-223, U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20490, or Director, Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, D.C. 20603.

APPENDIX B - Filing Locations

- Notices of Intent should be sent to: Storm Water Notice of Intent, P. O. Box 1215, Newington, VA 22122:
- Notices of Termination should be sent to: Storm Water Notice of Termination, P. O. Box 1185, Newington, VA 22212
- Discharge Monitoring Reports ("DMRs") should be sent to DEC, Division of Water, 50 Wolf Road, Albany, NY 12233-3506,
- Written reports submitted in accordance with 6 NYCRR Part 595 (Chemical Bulk Storage) should be sent to DEC, Division of Spill Prevention, Response and Remediation, 50 Wolf Road, Albany, NY 12233-3520.

All other reports and submittals required by this permit, including individual SPDES applications, should be submitted in accordance with the table below.

The filing location depends on the county in which the discharge is located. To determine the mailing address for the proper Filing Location, find the county in which the discharge is located in the table below. Use the letter in the "KEY" column to the right of the county name to find the proper mailing address in the list at the right.

Discharge Location - County	NYSDEC Region	KEY	Discharge Location - County	NYSDEC Region	KEY
Albany	4	F	Ontario	8	N
Allegany	9	O	Orange	3	E
Broome	7	L	Orleans	8	N
Cattaraugus	9	O	Oswego	7	L
Cayuga	7	L	Otsego	4	G
Chautauqua	9	O	Putnam	3	E
Chemung	8	N	Rensselaer	4	F
Chenango	7	L	Rockland	3	E
Clinton	5	H	St. Lawrence	6	J
Columbia	4	F	Saratoga	5	I
Cortland	7	L	Schenectady	4	F
Delaware	4	G	Schoharie	4	G
Dutchess	3	E	Schuyler	8	N
Erie	9	O	Seneca	8	N
Essex	5	H	Steuben	8	N
Franklin	5	H	Suffolk	1	A
Fulton	5	I	Sullivan	3	E
Genesee	8	N	Tioga	7	L
Greene	4	F	Tompkins	7	L
Hamilton	5	H	Ulster	3	E
Herkimer	6	K	Warren	5	I
Jefferson	6	J	Washington	5	I
Lewis	6	J	Wayne	8	N
Livingston	8	N	Westchester	3	E
Madison	7	L	Wyoming	9	O
Monroe	8	N	Yates	8	N
Montgomery	4	F	Bronx	2	D
Nassau	1	A	Kings	2	D
Niagara	9	O	New York	2	D
Oneida	6	K	Queens	2	D
Onondaga	7	L	Richmond	2	D

KEY	
A	NYSDEC REGION 1, Bldg. 40 SUNY Stony Brook, NY 11794; Phone: (516) 751-7900
D	NYSDEC REGION 2, One Hunters Point Plaza, 47-40 21st St, Long Island City, NY 11101; Phone: (718) 482-4851
E	NYSDEC REGION 3, 21 South Putt Corners Rd., New Paltz, NY 12561; Phone: (914) 255-5453
F	NYSDEC REGION 4, 2176 Guilderland Ave., Schenectady, NY 12306; Phone: (518) 382-0680
G	NYSDEC REGION 4 SUB-OFFICE, Route 10, Jefferson Road, Stamford, NY 12167; Phone: (607) 652-7364
H	NYSDEC REGION 5, Route 86, Ray Brook, NY 12977; Phone: (518) 891-1370
I	NYSDEC REGION 5 SUB-OFFICE, Hudson St., Warrensburg, NY 12885; Phone: (518) 623-3671
J	NYSDEC REGION 6, State Office Bldg.,317 Washington St., Watertown, NY 13601; Phone: (315) 785-2245
K	NYSDEC REGION 6 SUB-OFFICE, State Office Building., 207 Genesee St., Utica NY 13501-2885; Phone: (315) 793-2554
L	NYSDEC REGION 7, 615 Erie Boulevard West, Syracuse, NY 13204; Phone: (315) 426-7400
N	NYSDEC REGION 8, 6274 East Avon-Lima Rd., Avon, NY 14414; Phone: (716) 226-2466
O	NYSDEC REGION 9, 270 Michigan Ave., Buffalo, NY 14203; Phone: (716) 851-7000

Mail individual SPDES permit applications to "Division of Regulatory Affairs"

Please See Instructions Before Completing This Form

SPDES FORM

DEC

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233-3505

Notice of Termination (NOT) for Coverage Under the SPDES General Permit for Storm Water Discharges Associated with Industrial Activity

Submission of this Notice of Termination constitutes notice that the party identified in Section II of this form is no longer authorized to discharge storm water associated with industrial activity under the SPDES program. ALL NECESSARY INFORMATION MUST BE PROVIDED ON THIS FORM.

I. Permit Information

NPDES Storm Water General Permit Number: ____________

Check Here if You are No Longer the Operator of the Facility: ☐

Check Here if the Storm Water Discharge is Being Terminated: ☐

II. Facility Operator Information

Name: ____________ Phone: ____________

Address: ____________

City: ____________ State: ____ ZIP Code: ____________

III. Facility/Site Location Information

Name: ____________

Address: ____________

City: ____________ State: ____ ZIP Code: ____________

Latitude: ______ Longitude: ______ Quarter: ____ Section: ____ Township: ______ Range: ______

IV. Certification:

I certify under penalty of law that all storm water discharges associated with industrial activity from the identified facility that are authorized by a NPDES general permit have been eliminated or that I am no longer the operator of the facility or construction site. I understand that by submitting this Notice of Termination, I am no longer authorized to discharge storm water associated with industrial activity under this general permit, and that discharging pollutants in storm water associated with industrial activity to waters of the United States is unlawful under the Clean Water Act where the discharge is not authorized by a NPDES permit. I also understand that the submittal of this Notice of Termination does not release an operator from liability for any violations of this permit or the Clean Water Act.

Print Name: ____________ Date: ______

Signature: ____________

Instructions For Completing Notice of Termination (NOT) Form

Who Should File A Notice of Termination (NOT) Form

Permittees who are presently covered under the New York State issued State Pollutant Discharge Elimination System (SPDES) General Permit for Storm Water Associated with Industrial Activity should submit a Notice of Termination (NOT) form when their facilities no longer have any storm water discharges associated with industrial activity as defined in the storm water regulations at 40 CFR 122.26(b)(14), or when they are no longer the operator of the facilities. Failure to file a Notice of Termination will result in the continued obligation to pay a yearly Regulatory Fee.

For construction activities, elimination of all storm water discharges associated with industrial activity occurs when disturbed soils at the construction site have been finally stabilized and temporary erosion and sediment control measures have been removed or will be removed at an appropriate time, or that all storm water discharges associated with industrial activity from the construction site that are authorized by a SPDES general permit have otherwise been eliminated. Final stabilization means that all soil-disturbing activities at the site have been completed, and that a uniform perennial vegetative cover with a density of 70% of the cover for unpaved areas and areas not covered by permanent structures has been established, or equivalent permanent stabilization measures (such as the use of riprap, gabions, or geotextiles) have been employed.

Where to File NOT Form

New York State is using EPA's information management system. Therefore, NOTs must be sent to the following address:

Storm Water Notice of Termination
Box 1185
Newington, VA 22122

Completing the Form

Type or print, using upper-case letters, in the appropriate areas only. Please place each character between the marks. Abbreviate if necessary to stay within the number of characters allowed for each item. Use only spaces for breaks between words, but not for punctuation marks unless they are needed to clarify your response. If you have any questions about this form, call the EPA Storm Water Hotline at (703) 821-4823.

SEE REVERSE SIDE OF THIS FORM FOR FURTHER INSTRUCTIONS

91-19-13 (9/92)—10g

Instructions—NYSDEC Form 91-19-13(9/92)
Notice of Termination (NOT) of Coverage Under The SPDES General Permit for Storm Water Discharges Associated With Industrial Activity

Section I Permit Information

Enter the existing SPDES Storm Water General Permit number assigned to the facility or site identified in Section III. If you do not know the permit number, contact the EPA Storm Water Hotline at (703) 821-4823.

Indicate your reason for submitting this Notice of Termination by checking the appropriate box.

If there has been a change of operator and you are no longer the operator of the facility or site identified in Section III, check the corresponding box.

If all storm water discharges at the facility or site identified in Section III have been terminated, check the corresponding box.

Section II Facility Operator Information

Give the legal name of the person, firm, public organization, or any other entity that operates the facility or site described in this application. The name of the operator may or may not be the same name as the facility. The operator of the facility is the legal entity which controls the facility's operation, rather than the plant or site manager. Do not use a colloquial name. Enter the complete address and telephone number of the operator.

Section III Facility/Site Location Information

Enter the facility's or site's official or legal name and complete address, including city, state and ZIP code. If the facility lacks a street address, indicate the state, the latitude and longitude of the facility to the nearest 15 seconds, or the quarter, section, township, and range (to the nearest quarter section) of the approximate center of the site.

Section IV Certification

Federal statutes provide for severe penalties for submitting false information on this application form. Federal regulations require this application to be signed as follows:

For a corporation: by a responsible corporate officer, which means: (I) president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions, or (II) the manage of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million (in second-quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

For a partnership or sole proprietorship: by a general partner or the proprietor; or

For a municipality, state, federal, or other public facility: by either a principal executive officer or ranking elected official.

Paperwork Reduction Notice

Public reporting burden for this application is estimated to average 0.5 hours per application, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate, any other aspect of the collection of information, or suggestions for improving this form, including any suggestions which may decrease or reduce the burden to: Chief, Information Policy Branch, PM-223, U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20490, or Director, Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, D.C. 20603.

APPENDIX D
STORMWATER MANAGEMENT GUIDELINES FOR NEW DEVELOPMENT

I. BACKGROUND

Stormwater runoff from developing areas can lead to off-site problems including flooding and erosion and water quality degradation. By changing land cover on developed sites, there can be reduced infiltration into the soil, decreased interception of precipitation by vegetation, and changes in the timing of runoff. Large runoff volumes and high rates of discharge from these sites can cause flooding and erosion if not properly controlled and conveyed from the sites. Additionally, pollutants, such as sediment, oil, grease, metals and nutrients, can be washed off impervious areas during storm events and be transported to lakes and streams and may contribute to water quality degradation. This is reflected in the Nonpoint Source Assessment Report published by NYS DEC in February 1989.

To minimize the effects of development, ideally the quantity and quality of stormwater runoff that reaches surface waters during and after development should not be altered from pre–development conditions. A variety of structural and non–structural measures – for example, detention ponds, recharge basins, infiltration pits and trenches, diversion ditches, storage terraces and vegetative swales and other vegetative measures including artificial wetlands – may be used to control and alleviate the adverse impacts of stormwater runoff.

The following guidelines, which include guidance for siting, sizing, and design of stormwater management measures, may be considered in the preparation and review of stormwater management plans to ensure that runoff during and after development is not substantially altered from pre–development conditions. Of course, such preparation and review should proceed on a case–by–case basis, attendant to the facts and circumstances surrounding the particular project involved.

Generally, appropriate stormwater management plans will achieve the following water and natural resource management objectives:

- reduce the rate of runoff from new land development to prevent increases in flooding and flood damage;
- reduce the erosion potential from a development or construction project; assure the adequacy of existing and proposed culverts and bridges; increase water recharge into the ground; decrease nonpoint source pollution and water quality degradation;
- maintain stream channels for their biological functions as well as for drainage through reduced streambank erosion;
- increase opportunities for preserving open space through stream corridor and flood plain protection; and
- increase recreational opportunities through the multiple use of stormwater management facilities.

II. GUIDANCE

The attached guidelines were developed as an aid to persons preparing and reviewing stormwater management plans. They provide guidance on sound management practices, but are not fixed and inflexible rules to be applied in reviewing stormwater management plans without considering the particular facts and circumstances of a particular project. Local conditions, for example the protection of a sensitive lake or trout stream from the influence of urbanization, may indicate the need for additional control measures.

It should be noted that some communities may have duly adopted stormwater management requirements, and that they should be consulted and complied with. For example, special regulations for controlling stormwater runoff in the Lake George Park are being promulgated under Article 43–0112 of the Environmental Conservation Law and watershed rules and regulations for certain water supply watersheds have been adopted.

STORMWATER MANAGEMENT GUIDELINES FOR NEW DEVELOPMENT

1. DEFINITIONS

Baseflow — The portion of stream flow that is not due to storm runoff, is supported by groundwater discharge into a channel.

Conditional negative declaration — A negative declaration may be issued by a lead agency for an unlisted action (under SEQR), in which the action as initially proposed may result in one or more significant adverse environmental effects; however mitigation measures will modify the proposed action so that no significant adverse environmental impacts will result (6 NYCRR 617.6(h)).

Drywell — Similar to infiltration trench but smaller with inflow from pipe; commonly covered with soil and used for drainage areas of less than 1 acre such as roadside inlets and rooftop runoff.

EIS — An Environmental Impact Statement.

Extended detention — A practice designed to store stormwater run—off by collection as a temporary pool of water, usually having at least a 24 hour residence time. A practice which is used to control peak discharge rates, and which provides gravity settling of pollutants.

First flush — The delivery of a disproportionately large load of pollutants during the early part of storms due to the rapid runoff of accumulated pollutants. The first flush in these guidelines is defined as one—half inch of runoff per acre of land which has been made more impervious from pre—development (natural) conditions through land clearing, land grading and construction/development activities.

Flood plain — For a given flood event, that area of land adjoining a continuous watercourse which has been covered temporarily by water.

Forebay — An extra storage area or treatment area, such as a sediment pond or created wetland, near an inlet of a stormwater management facility to trap incoming sediments or take up nutrients before they reach a retention or extended detention pond.

HEC—2 — U.S. Army Corp of Engineers Computer Program 723—X6—L202A intended for calculating water surface profiles for steady or gradually varied flow in natural or man—made channels.

Impervious area — Impermeable surfaces, such as pavement or rooftops, which prevent the infiltration of water into the soil.

Infiltration — A practice designed to promote the recharge of groundwater by containment and concentration of stormwater in porous soils.

Infiltration basin — An impoundment made by excavation or embankment construction; commonly serves a drainage area of 5 to 50 acres; usually closer to 50.

Outfall — The terminus of a storm drain where the contents are released.

Peak flow — The maximum instantaneous flow of water during a storm, usually in reference to a specific design storm event.

Peak flow attenuation — The reduction of the peak discharge of storm runoff by storage and gradual release of that storage.

Retention – A practice designed to store stormwater run–off by collection as a permanent pool of water without release except by means of evaporation, infiltration, or attenuated release when runoff volume exceeds the permanent storage capacity of the permanent pool.

Riparian area – A relatively narrow strip of land that borders a stream or river.

Riprap – A combination of large stone, cobbles and boulders used to line channels, stabilize stream banks, reduce runoff velocities, or filter out sediment.

Riser – A vertical pipe extending from the bottom of a pond that is used to control the discharge rate from the pond for a specified design storm.

Sand attenuating filter – A chamber open to the surface containing a surface layer of sand over a high void aggregate base; these are innovative but apparently effective practices for atypical situations such as where a site is unsuitable for stormwater infiltration or retention.

SEQR – An acronym for the State Environmental Quality Review Act; Article 8 of the Environmental Conservation Law.

Sheetflow – Runoff which flows over the ground surface as a thin, even layer, not concentrated in a channel.

Special flood hazard area – an area in a community that has been identified as susceptible to a 1% or greater chance of flooding in any given year. A 1% probability flood also is known as the 100–year flood.

SPDES – An acronym for the State Pollutant Discharge Elimination System; A regulatory/permit program administered under Article 17 of the Environmental Conservation Law, by the NYS Department of Environmental Conservation to control point source discharges of water pollution.

Storm frequency – The average frequency of occurrence of events having a given volume and duration. For example: a 2–year; 10–year; or 100–year storm.

Storm drain – Any open or closed conduit designed to convey stormwater.

Storm duration – The length of time over which a precipitation event occurs (e.g., 24–hours).

Storm volume – The total amount of precipitation occurring over the storm duration.

Swale – A natural depression or wide shallow ditch used to temporarily route, or filter runoff.

TR–20 – A rainfall runoff model developed by the USDA Soil Conservation Service for hydrologic analyses of a watershed under present conditions of land cover/use and structural or channel modifications using single event storm rainfall–frequency data. Output consists of peaks and/or flood hydrographs, their time of occurrence and water surface elevations at any desired cross section or structure.

2. FLOOD CONTROL GUIDELINES

The following guidelines should be used to ensure that stormwater runoff is safely conveyed through a development site during and after construction. Also through peak flow attenuation, the guidelines can be used to facilitate the control of stormwater runoff so as to minimize or alleviate flooding and stream bank erosion associated with land development and urbanization. The guidelines are as follows:

A. **Peak Flow Attenuation**

(1) The release of stormwater runoff from development should not exceed pre–development (natural) conditions. To accomplish this, stormwater runoff should be controlled so that during and after development, the site will generate no greater peak than prior to development for a 2–year, 10–year, and 100–year 24–hour storm considered individually.

- Attenuation of the 2–year storm is intended to achieve the stream channel erosion control objective.
- Attenuation of the 10–year storm is intended to assure the adequacy of existing and proposed culverts and storm drain systems.
- Attenuation of the 100–year storm is intended to reduce the rate of runoff from development to prevent expansion of the 100–year flood plain so as to alleviate flooding of improved properties and roadways.

(2) It is not necessary that peak flow attenuation requirements be satisfied only by means of detention basins. For example, infiltration trenches, dry wells, or stone reservoirs underneath paving, may be used for the purpose of attenuating peak flows for smaller storms with appropriate consideration for length of life of the stormwater facility, and feasibility of maintenance.

(3) Where dams are to be constructed for attenuating peak flows, approval may have to be obtained from DEC pursuant to Article 15–0503 of the Environmental Conservation Law.

B. **100–Year Flood Plains**

(1) At a minimum, encroachment into the special flood hazard area should be allowed only in compliance with local restrictions adopted for community participation in the National Flood Insurance Program (NFIP). A permit is required for encroachment into flood plains in Part 500 communities [1].

(2) A 50' buffer (building restriction line) should be established from the flood hazard area as a safety factor to allow for inaccuracy in the determination. Pursuant to Article 24 (ECL), a 100-foot buffer is required around a protected wetland.

(3) The stormwater management plan for all developments of 5 or more acres or containing 5 or more dwelling units located wholly or partially within a 100–year flood plain where flood elevation data are not available through the NFIP, must include a study to determine 100–year flood plain elevations in accordance with TR–20, HEC–2 or other standard engineering methods. Such elevation data shall be used to regulate flood plain encroachments in accordance with the NFIP. The 100–year flood plain elevation and the building restriction line should be shown on the plan.

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1 Part 500 community – A community for which flood insurance regulations are administered by the State of New York under 6 NYCRR 500 pursuant to Article 36 of the Environmental Conservation Law.

C. Runoff Conveyance Systems

(1) Priority should be given to maintaining natural drainage systems, including perennial and intermittent streams, swales and drainage ditches in an open condition.

(2) Where closed storm drain systems (i.e., those involving a culvert or similar conduit) are deemed essential, justification should be made as to why it is necessary to have a closed system. When justified, the closed system should be designed to:

(a) convey the 10–year storm flow within the closed storm drain system; and

(b) provide for safe overland conveyance of flow of the 100–year storm through the development (generally over the top of the closed storm drain system). All overland flow conveyance structures should be at least 1' above the 100–year flood plain elevation and the outfalls of such convenances should be stabilized with rip–rap or other suitable material to reduce erosion.

(3) Any alteration to a protected stream, a stream bed or the banks thereof, including the installation of stormwater conveyance systems will require an Article 15, Protection of Water Permit and may require an Article 24, Freshwater Wetlands Permit. When stream protection measures are mandated on a protected stream, a fisheries habitat technician should be involved with the planning and design of such measures.

(4) Any culvert or stormwater structure placed in a stream should not impede fish migration.

D. Stream Corridor Management

(1) Consistent with the State's Stream Corridor Management Program, land clearing and land grading within a stream corridor should be avoided or minimized, except at stream crossing so that stream and drainage courses remain in a natural state. [2]

(2) Care should be exercised to ensure that riparian vegetation, including grasses, shrubs and trees in the stream corridor or along the watercourse, remain undisturbed during land clearing, land grading and land development.

3. WATER QUALITY MANAGEMENT GUIDELINES

The following guidelines should be used in conjunction with the flood control guidelines to protect water quality from runoff associated with land clearing, land grading and construction activities. The guidelines should be followed by a project applicant/sponsor in preparing and implementing a stormwater management plan (SMP). The guidelines should apply to all land areas where soil permeability has been changed as a result of land clearing, land grading and land development.

A. Control of "First Flush"

Control of the "first flush" is important in stormwater management because most runoff–related water quality contaminants are transported from land, particularly impervious surfaces, during the initial stages of a storm event. For example, from 70% to 95% of the contaminants in stormwater can be removed by capturing the first flush of runoff

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2 New York State Department of Environmental Conservation, "Stream Corridor Management: A Basic Reference Manual". Albany, 1986.

through infiltration practices [3]. Regardless of whether infiltration, retention or extended detention practices are used to capture the first flush, the guideline is as follows:

> Provide for control of the first 1/2-inch of runoff from all land areas for which the perviousness has been changed over pre-development (natural) conditions due to land clearing, land grading and construction [4].

B. Control of Thermal Discharges

Control of thermal energy in stormwater runoff in watersheds having streams which support cold water fisheries is essential. Impervious surfaces, for example, asphalt parking areas and roofs, store large quantities of heat during hot weather in summer. The heat from such surfaces is released to stormwater through conduction during storm events. Stormwater runoff having elevated temperatures can, in turn, increase stream temperatures during storm events and adversely impact cold water fisheries. Accordingly:

> Stormwater discharges should be consistent with the thermal criteria found in Part 704 of the Water Quality Regulations, Title 6, Chapter X, New York State Codes, Rules and Regulations.

C. Hierarchy of Methods for Managing Stormwater Quality

The following stormwater management systems, summarized in descending order of preference, should be used to control the first flush when designing stormwater facilities. The practices are: (1) infiltration, (2) retention, and (3) extended detention. When a stream supporting a cold water fishery is the object of protection, extended detention should be placed ahead of retention in the hierarchy. A combination of these practices, including stormwater management adjuncts (number 4 in the hierarchy), may be used to achieve first flush control objectives. The project sponsor/applicant should provide justification for the rejection of practices listed as priority 1, 2, or 3.

(1) **Infiltration** - Infiltration of runoff on-site by use of vegetated depressions and buffer areas, pervious surfaces, drywells, infiltration basins and trenches permits immediate recharge of groundwater and aids quality treatment through soil filtration. This practice eliminates or minimizes direct stormwater discharges to a waterbody and provides thermal benefits to cold water fisheries.

(2) **Retention** - Retention by use of wet ponds and wetlands constructed in upland areas provides for the storage of collected runoff in a holding area prior to release in a waterway allowing quality treatment by sedimentation, flocculation, and biological removal. Retention is used when post-development runoff volume is expected to exceed the capabilities of infiltration. However, summer temperatures of water in a retention facility may exceed temperatures required to sustain a cold water fishery. Therefore, retention is not appropriate where stored (warm) water in a retention facility is displaced by storm runoff and discharged to a trout stream in contravention of Part 704 standards.

(3) **Extended Detention** - Extended detention provides for the temporary storage of collected runoff in a holding area prior to release into a waterway. Settling is the primary pollutant removal mechanism associated with extended detention. As such, the degree of removal is dependent on whether a given pollutant is in particulate or soluble form. Removal is likely

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[3] Maryland Department of Natural Resources, "Minimum Water Quality Objectives and Planning Guidelines for Infiltration Practices," Water Resources Administration, Sediment and Stormwater Division, Annapolis, MD, April,1986.

[4] Note that, in addition to paved surface areas and land areas connected to buildings, the contributory area for which the first 1/2-inch of runoff should be controlled includes lawn and similarly landscaped surfaces.

to be quite high if a pollutant is a particulate, whereas very limited removal can be expected for soluble pollutants.

Extended detention can provide thermal benefits to a trout stream. By using a perforated, low flow drain pipe encased in a gravel jacket having an adequate mass, extended detention may be used to dissipate heat and cool stormwater runoff prior to its discharge to a trout stream.

(4) **Stormwater Management Adjuncts** - Flow and pollutant attenuation by use of open vegetated swales, vegetated buffer zones, or filter strips, provides water quality treatment by filtration, attenuation, buffering, sedimentation, biological and removal and particle retention. These practices should be used to compliment infiltration, retention or extended detention.

4. <u>DESIGN GUIDELINES FOR CONTROLLING THE FIRST ONE-HALF INCH OF RUNOFF</u>

Following are design guidelines for controlling the first 1/2-inch of runoff from the contributory drainage.

A. <u>Infiltration</u>

(1) Infiltration systems should be designed to capture the first one-half inch of stormwater runoff from impervious surfaces, lawns and similarly landscaped areas in the development site. Stormwater volumes in excess of this amount should be managed for quantity control by supplemental practices.

(2) Infiltration systems should incorporate measures which:

a. Recognize that the recommended design time to drain stored runoff from an infiltration system depends on the specific method or practice. Accordingly, the following ponding or storage times represent the maximum design time period for the referenced facility:

TYPE	TIME (24-hour days)
Infiltration Basin	5
Infiltration Trench	15
Dry Wells	15
Porous Pavement	2
Vegetated Depression	1

b. Ensure that infiltration measures are placed at least 100' from septic systems and water supply wells.

c. Recognize that soils with infiltration rates less than .5 inches per hour are unsuitable for infiltration measures.

d. Provide for a vertical separation distance of at least 4 feet between the bottom of the infiltration system and the seasonably high groundwater table or bedrock. (The excavation of an inspection trench/pit or soil borings at the proposed site of the infiltration facilities to determine the elevation of bedrock and groundwater, and the documentation of such tests must be conducted under the direction of a professional engineer, architect, or landscape architect licensed to practice in New York State.)

e. Trap excess loads of sediment, grease, oils, and settleable solids and other objectionable materials including floatable organics, materials from roadways, parking surfaces, and similar paved areas before they enter the infiltration system.

f. Route design runoff flows through an infiltration basin without scouring or eroding the basin floor and clogging the surface soil pores.

g. Route base flow (if any exists) rapidly through the basin to prevent ponding or standing water.

h. Distribute storm runoff volume evenly over the floor of the basin to maximize exfiltration rates.

  i. Provide for safe emergency overflow with measures to provide a non–erosive velocity or flow along its length and at the outfall.

In addition to the above;

j. **Infiltration systems should not receive runoff until the entire contributory drainage area to the infiltration system is permanently stabilized.**

k. **Placement of infiltration facilities in areas which have been filled is unacceptable. Compacted fill material loses permeability and the in situ/fill material interface may cause slope failure due to slippage.**

l. **If on–site septic systems are to be used, soils must be able to accommodate loading from both on–site infiltration facilities and on–site septic systems.**

B. Retention

(1) Retention (Wet) Ponds

a. Retention is the preferred method of stormwater management when the water table or bedrock is too high for infiltration and soils are poorly drained. Retention improves stormwater quality by gravity settling, naturally occurring chemical flocculation, and biological uptake.

b. Wet ponds (another term for retention pond) should not be constructed by impounding existing wetlands unless authorized by the DEC under Article 24 Freshwater Wetlands Act. If existing wetlands are to be located in an anticipated permanent pool area, the maximum normal pool elevation should not increase mean water depth in the wetland area.

c. Retention ponds should be enhanced with areas of shallow water habitat for additional water quality benefits. Retention ponds also can be part of a created shallow water wetland design, (see use of wetlands for stormwater management).

d. Retention ponds (other than shallow marshes addressed later) should be designed as follows:

  i. pond geometry should provide for complete mixing of inflow before discharging.

  ii. in larger ponds, diversion barriers such as small islands should be used to increase effective length of flow and permit maximum mixing.

iii. the depth of the pond will vary depending on its intended use. The pond contour should include:

- an average pond depth of 3–6 feet;
- a shallow area 0.5' to 2' deep at the inlet;
- a littoral area or bench 10 feet in width along the perimeter to promote marsh habitat for filtering and nutrient removal; and
- an area 8' to 14' in depth to promote gravity settling and fish habitat.

iv. the minimum drainage area to be served by a wet (retention) pond should be approximately 10 acres. Soils should have infiltration rates less than 0.5 inches/hour.

v. if soils are so porous that an unreasonably large drainage area is required to sustain a relatively small pond, then infiltration practices should be used.

vi. the residence time of pond water should be 24 to 40 hours to remove a minimum of two–thirds of the suspended solids and other pollutants from the incoming stormwater. For removal of phosphorus compounds in lake watersheds where eutrophication is a threat or problem, larger volume ponds should be designed to provide a 14–day residence time.

vii. retention ponds should accommodate up to 10–year storm volumes. The minimum volume retained should be that associated with the first one–half inch of runoff. Excess volumes, for example, the 100–year storm, may be detained.

viii. velocity dissipation devices should be placed at the outfall of all retention structures and along the length of any outfall channel as necessary to provide a non–erosive velocity of flow from the structure to water course. Velocity dissipation devices may be required in stream channels at outfall locations to prevent erosion and fisheries habitat degradation. Pursuant to Article 15 (ECL), a Protection of Waters Permit may have to be obtained in order to install in–stream velocity dissipation devices in protected streams.

ix. the construction of wet (retention) ponds in and around class AA, A, B, C(T) and (TS) streams (water suitable for trout) may not be appropriate to protect these waters and should not be permitted except where, pursuant to 6 NYCRR Part 704 of the Water Quality Regulations, Title 6, Chapter X, retention will not be injurious to cold water fisheries or their habitat. This practice may elevate water temperatures as well as reduce dissolved oxygen levels.

x. pursuant to Article 15–0503 of the Environmental Conservation Law, approval for construction of a dam for a stormwater retention facility may have to be obtained from DEC.

(2) Use of Wetlands in Stormwater Management

The use of wetlands for stormwater management is receiving increased attention. Wetlands are known to provide water quality benefits by filtering and trapping suspended solids including sediment, chemical adsorption, biological assimilation, microbial decomposition and chemical decomposition.

a. **Use of Existing Wetlands** - It is generally not acceptable to discharge untreated stormwater directly into naturally existing wetlands. Direct, untreated discharges may overload the natural system, and make it impractical to manage (e.g., by periodic sediment removal) resulting in contamination of the wetland and accelerated succession. Direct discharges also may alter the hydrology and hydroperiod of the wetland, which may significantly alter the vegetative community therein.

   However, incorporating an existing wetland in its natural state into a well–designed stormwater management plan may be an acceptable method of stormwater management when adverse impacts to the wetland can be avoided. Natural wetlands should be used only for final polishing after pre–treatment by preliminary practices, such as infiltration, retention or extended detention. In these situations, ultimate discharge to the natural wetland may maintain base flow into the system, thereby helping to maintain the health of the wetland.

   Except as provided for in section B. (1) b.,natural wetlands should not be impounded for the creation of either wet or dry ponds.

b. **Use of Artificially Created Wetlands** - Wetlands may be created as part of a stormwater management plan to provide water quality improvement. They may enhance treatment provided by wet ponds and create extended detention areas by enlarging the wetland portions of existing basins.

   A created wetland also can provide first–flush treatment when one or more smaller ponds are included. Such a design would be essential if no other pre–treatment practices are used. In the winter when vegetative uptake mechanisms are absent, a pond in the wetland retains higher levels of nitrogen compounds which would otherwise escape downstream.

c. **Factors for Consideration in Designing Created Wetlands** -

   i. Location -- the preferred locations are: upland areas adjacent to, but separated from, existing streams and wetlands by vegetated filter

      strips wide enough to provide a buffer; in an upland extended detention basin; or as a forebay to a wet pond or detention basin.

   ii. Hydraulic design -- specific stormwater management plan criteria must be determined for each site to ensure the created wetland is sufficient to meet the demands being place on it and to determine hydrologic impacts to receiving wetlands, if any.

   iii. Expected inflows -- inflows may be composed of stormwater surface water or groundwater. Stormwater should be introduced to wetlands as sheet flow whenever possible. If inflow is conveyed through the outfall, a forebay is necessary. Incoming velocities should not exceed 4 fps during two–year storm events.

iv. Shape and depth -- shallow ponds do not have as long a residence time as deeper ponds. Therefore, caution should be used in substituting deep ponds with shallow marshes. However, the water quality values provided by the substrate, biota and vegetation in wetlands may provide services not provided by deeper ponds. It is important to determine what water quality improvement is needed and whether ponds or wetlands better serve that need.

When creating wetlands, 75% of the wetland should be 18 inches or shallower. Twenty–five percent of the total surface area should be reserved for open water areas that are deeper than 18 inches. However, if the water exits the wetland through an outlet structure, the outlet should be located in water approximately 3 feet deep. Similarly, if a forebay is used, it should be at least 3 feet deep and comprise 10% of the total wetland and pond volume.

v. Vegetative composition -- the plant species selected should be compatible with the physical nature of the wetland (e.g., depth), the climate conditions of the area, and their tolerance to the presence of pollutants. A planting scheme and schedule should be incorporated into the stormwater management plan.

C. **Extended Detention**

(1) Extended detention ponds may be used to enhance water quality in stormwater runoff. Extending the detention time of dry or wet ponds is an effective, low cost means of removing particulate pollutants and controlling increases in downstream bank erosion. Extended detention is preferred over retention where there is a need to maintain stream temperatures in support of a trout fishery pursuant to the thermal criteria found in Part 704 of the Water Quality Regulations, Title 6, Chapter X.

(2) When extended detention ponds are used, they may be acceptable with the following conditions:

a. The "first–flush" runoff volume (i.e., the first one–half inch of runoff from the contributory drainage) should be extended over a 24–hour detention period.

b. Stormwater runoff volume generated from a one–inch storm should be released over a 24–hour detention period. The control device should be adjusted so that smaller runoff events (0.1 to 0.2 inches), which normally pass through the pond quickly, are detained for at least a minimum of six hours. In larger watersheds, up to 40 hours of extended detention may be needed for streambank erosion control.

c. Pond outfall velocities should not exceed 4 fps during 2–year storm events.

d. Velocity dissipation devices should be placed at the outfall of all extended detention structures and along the length of any outfall length channel as necessary to provide a non–erosive velocity of flow from the structure to a water course. Velocity dissipation devices may be required in stream channels at outfall locations to prevent erosion and fisheries habitat degradation. Pursuant to Article 15 (ECL), a Protection of Waters Permit may have to be obtained in order to install in–stream velocity dissipation devices in protected streams.

e. Pursuant to Article 15–0503 of the Environmental Conservation Law, approval for construction of a dam for a stormwater detention facility may have to be obtained from DEC.

D. Stormwater Management Adjuncts

Generally, relatively small volumes of stormwater (i.e., drainage from less than 1 acre or relatively small storms) can be managed entirely by flow and pollution attenuation practices including vegetative swales, filter strips, and water quality inlets. These practices usually are used to supplement other practices such as those described above; therefore, they are referred to herein as stormwater management adjuncts. Where vegetative swales and filter strips will be used, stormwater should to the extent possible be managed as sheetflow and have velocities less than 4 fps during 2–year storm events. The following design criteria should be considered when swales, filter strips and water quality inlets are used to control stormwater runoff.

(1) **Vegetative swales** [5] - Vegetative swales typically are applied in single family residential developments and highway medians as an alternative to curb and gutter drainage systems. When individual lots are greater than 0.5 acre, open section roadways with vegetated swales and check dams are preferred over curb and gutter management systems for stormwater conveyance. In designing and constructing swales:

a. small slopes in the flow of swales should be graded as close to zero as drainage will permit. Side–slopes of swales should be no greater than 3:1.

b. a dense cover of water tolerant, erosion resistant grass must be established. Reed canary grass is recommended for this purpose. Swale grasses should not be mowed close to the ground, as this impedes the filtering and hydraulic functions of the swale. Also, if a swale is adjacent to a roadway, sensitive species with a low salt tolerance (e.g., bluegrass) should be avoided.

c. underlying soils should have a percolation rate of at least 0.5 inches per hour.

d. the swale should be tilled before the grass cover is established to restore infiltration capacity lost as a result of prior construction activities.

e. Check dams can be installed in swales to promote additional infiltration. A preferred method is to sink a railroad tie halfway into the swale, and place stones on the downstream side to prevent a scour hole from forming. If a check dam is used, the designer should make sure that the maximum ponding time of runoff backed up behind the check dam does not exceed 24 hours.

(2) **Filter Strips** [6] - Filter strips do not provide enough storage or infiltration to effectively reduce peak discharges to pre-development levels for design storms. Filter strips are however, viewed as one component of an integrated stormwater management system.

a. The top edge of the filter strip should follow across the same elevational contour. If a section on the top edge of the strips dips below the contour, it is likely that runoff will eventually form a channel toward the low spot.

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5 Adopted from: Schueler, T.R. "Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMPs", Department of Environmental Programs, Metropolitan Washington Council of Governments, Washington, D.C. July, 1987.

6 Ibid.

b. A shallow stone trench which follows the contour can be used as level spreader at the top of the strip to distribute flow evenly. This also can serve to protect the strip from anthropogenic damage.

c. The top edge of the filter strip should directly abut the contributing impervious area. Otherwise, runoff may travel along the top of the filter strip rather than through it. Berms can be placed at 50–100 foot intervals perpendicular to the top edge of the filter strip to prevent runoff from by–passing the strip.

d. As an absolute minimum, a grass strip should be at least 20 feet wide. Improved performance can be achieved if the strip is 50–75 feet wide, plus an additional four feet wide per each one percent of slope at the site (particularly if it is a forested strip).

e. Wooded filter strips are preferred to grassed strips. If an existing wooded belt cannot be preserved at the project site, the grassed strip should be managed to gradually become wooded by intentional plantings.

f. If a filter strip has been used as a sediment control measure during the construction phase, it is advisable to regrade and reseed the top edge of the strip. Otherwise, the sediment trapped in the filter strip may affect the flow patterns across the strip, thereby reducing its effectiveness.

(3) **Water Quality Inlets (oil/grit separators)** - The primary function of a water quality inlet (also known as an oil/grit separator) is to remove sediment and hydrocarbon loadings from impervious surfaces such as parking lots less than one acre in size before runoff reaches an infiltration basin or other stormwater management facility. If contaminants such as sediment and oil or other petroleum–based products found on parking lots and street surfaces are not removed, they will clog soil pores and prevent infiltration of runoff in the soil in infiltration basins or trenches.

A water quality inlet usually is designed as an underground, reinforced concrete vault consisting of three chambers: a sediment/grit removal chamber, an oil separation chamber and an outlet chamber. Owing to their limited capacity, water quality inlets store only a small fraction of the 2–year design storm volume. Therefore, they play no role in attenuating the post–development peak discharge rate. Furthermore, since runoff rapidly flows through an inlet, only moderate removal of coarse sediment, oil/grease, and debris can be expected, while removal of fine–grained particulate pollutants such as silt and clay will be more limited. Water quality inlets have little effect on removing soluble pollutants such as phosphorus. <u>It is to be noted that a State Pollutant Discharge Elimination System (SPDES) Permit may be needed for parking lots or impervious storage areas associated with industrial and commercial activities.</u>

a. oil/grit separators generally should be designed for areas less than one acre in size.

b. the depth of the permanent pool in each chamber should be at least 4 feet, and there should be at least 400 cubic feet of wet storage in the chambers for each impervious acre in the contributory drainage.

c. the first chamber should be designed for grit and sediment removal. The first and second chamber should be separated by a trash rack to prevent clogging orifices between the two chambers.

d. the second chamber should be designed for separation of oil and other hydrocarbons from runoff. Separation can be achieved by installing an inverted pipe with a 90° elbow in the baffle or wall that separates the second from third chamber.

e. the grit/oil separator should be equipped with manholes to facilitate cleanout and maintenance.

5. REFERENCES

The basic design criteria, methodologies and construction specifications for stormwater management should be those of the Soil Conservation Service, the Soil and Water Conservation Society, the Department of Environmental Conservation, and the Metropolitan Council of Governments which may be found in the most current edition of the following publications and their subsequent revisions:

A. Empire State Chapter, Soil and Water Conservation Society, New York Guidelines for Urban Erosion and Sediment Control, Syracuse, 1988.

B. Soil Conservation Service. "Urban Hydrology for Small Watersheds", Technical Release No., 55. June 1986.

C. Soil Conservation Service. "Engineering Field Manual", latest edition, as applicable.

E. "Soil Conservation Service Standards and Specifications for Ponds." Specifications No, 378. July 1981. (This document allows for use of metal pipe risers. Steel structures may corrode in 20 years or less. Therefore, use materials other than steel, especially in aggressive environments.)

F. U.S. Department of Agriculture, Soil Conservation Service, Ponds-Planning Design, Construction. Agriculture Handbook No. 590. 1982.

G. New York State Department of Environmental Conservation, "Guidelines for Design of Dams", Revised January 1988.

H. New York State Department of Environmental Conservation, "An Owners Guidance Manual for the Inspection and Maintenance of Dams in New York State". June 1987.

I. New York State Department of Environmental Conservation. "Stream Corridor Management: A Basic Reference Manual." Albany, 1986

J. Metropolitan Washington Council of Governments, Controlling Urban Runoff-A Practical Manual for Planning and Designing Urban BMPs. July 1987.

NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION
STORMWATER MANAGEMENT
SELF–ASSESSMENT CHECKLIST

File No.: ______________________________ Date Initiated: ______________

Project Name: ____

Location: ____
(Address)

____
(County Region

Applicant: ____
(Last Name) (First Name) (MI)

FLOOD CONTROL

A. Peak Flow Attenuation

- The pre–development peak discharge rates from the project site are:

  2–year storm ________ cfs
  10–year storm ________ cfs
  100–year storm ________ cfs

- The post–development peak discharge rates from the project site are:

  2–year storm ________ cfs
  10–year storm ________ cfs
  100–year storm ________ cfs

- A dam(s) __________________________ (will/will not) be constructed for attenuating peak flows. If a dam is to be constructed, a permit for Dam Construction will/will not), pursuant to Article 15–0503 of the Conservation Law, be required.

- The proposed development project _________________________ (is/is not) in compliance with local restrictions adopted pursuant to the National Flood Insurance Program.

- All closed stormwater drainage systems on the project site are, at a minimum, designed to convey the ____________________-year storm while providing for the ____________________- year storm through the development.

- The proposed project ______________________(is/is not) in compliance with all provisions of Article 15 (Protection of Waters Act), Article 24 (Freshwater Wetlands Act), and Article 25 (Tidal Wetlands Act) of the Environmental Conservation Law.

WATER QUALITY MANAGEMENT

The Stormwater Management Facilities ______________________ (have, don't have) water quality improvement features.

If they do, what management facilities are included

Infiltration ______________________

Retention ______________________

Extended Detention ______________________

Is the first 1/2 inch of runoff from the altered land area being treated?

_______ (Yes) _______ (No)

If not, how much runoff will be captured and treated?

____

If the proposed stormwater facilities do not provide for water quality management, or if less than the first 1/2 inch is managed, explain why:

____

____

____

____

____

____

The classification of the waters which receive the stormwater is

____

The thermal criteria contained in 6 NYCRR Part 704 ______________________ (will/will not) be met.

____
(Signature)

____
(License No.)

APPENDIX E
EROSION AND SEDIMENT CONTROL GUIDELINES

I. BACKGROUND

Sediment in runoff from construction sites can have a significant effect on the quality of downstream waters. Construction sites have also been identified as a significant source category in the State Nonpoint Source Assessment Report.

The potential effects of increased sediment are varied:

> Sediment may destroy fish habitat through blanketing of fish spawning and feeding areas and elimination of certain food organisms, directly impact fish through gill abrasion and fin rot, and reduce sunlight penetration, thereby impairing photosynthesis of aquatic plants. Suspended sediment decreases recreational values, reduces fishery habitat, adds to the mechanical wear of water supply pumps and distribution systems, and adds to treatment costs for water supplies. Nutrients and toxic substances attached to sediment particles are transported to waterbodies and may enter aquatic food chains, cause fish toxicity problems, contribute to algal blooms, impair recreational uses, and degrade the water as a drinking water source. [1]

The following guidelines are designed for consideration by both government officials and project sponsors in the preparation and review of erosion and sediment control plans for a land development project. If implemented properly, the guidelines herein will assist in achieving the following water and natural resource management objectives.

- reduce the erosion potential from a development or construction project;
- decrease nonpoint source pollution and water quality degradation;
- maintain stream channels for their biological functions, as well as for drainage, through reduced sediment deposition.

II. GUIDANCE

The attached guidelines were developed to aid persons in preparing and reviewing erosion and sediment control plans. They provide guidance on sound management practices, but are not fixed and inflexible rules to be applied in reviewing erosion control plans without considering the particular facts and circumstances of a particular project.

[1] Nonpoint Source Management Program. January, 1990.

EROSION AND SEDIMENT CONTROL GUIDELINES FOR NEW DEVELOPMENT

A. Existing vegetation on a project site should be retained and protected as much as possible to minimize soil loss on a project site and to minimize erosion control costs.

B. Sediment control practices/measures, where necessary, should be designed to protect the natural character of rivers, streams, lakes, coastal waters or other waterbodies on–site and minimize erosion and sedimentation off-site from the start of land disturbance activities to establishment of permanent stabilization.

1. The off-site impacts of erosion and sedimentation related to land clearing, grading and construction activities should not be any greater during and following land disturbance activities than under pre–development conditions.

2. Pursuant to Part 700 et seq. of Title 6, Chapter X of NYCRR:

   a. toxic and other deleterious substances shall not be discharged in amounts that will adversely affect the taste, color or odor thereof, or impair the waters of the state for their best (classified) usages,

   b. suspended, colloidal and settleable solids shall not be discharged in amounts that causes substantial visible contrast to natural conditions, or causes deposition or impairs the waters for their best (classified) usages.

This means that stream reaches on-site and downstream of construction areas should not have substantial visible contrast relative to color, taste, odor, turbidity and sediment deposition from the reaches upstream of the construction area. Impacts such as these which result from construction or developmental activities are a violation of Part 700 water quality standards and may be subject to enforcement actions.

C. Erosion and sediment control measures should be constructed in accordance with an erosion and sediment control plan. The plan should:

1. describe the temporary and permanent structural and vegetative measures that will be used to control erosion and sedimentation for each stage of the project from land clearing to the finished stage.

2. provide a map showing the location of erosion and sediment control measures.

3. provide dimensional details of proposed erosion and sediment control facilities as well as calculations used in the siting and sizing sediment basins. (Guidance for performing calculations can be obtained in the reference cited in Section E.8.)

4. identify temporary erosion and sediment control facilities which will be converted to permanent stormwater management facilities.

5. provide an implementation schedule for staging temporary and permanent erosion and sediment control facilities.

6. provide a maintenance schedule for soil erosion and sediment control facilities and describe maintenance activities to be performed.

D. Erosion and sediment control measures should be constructed prior to beginning any other land disturbances. The devices should not be removed until the disturbed land areas are stabilized.

E. Specify guidance.

1. Exposure Restrictions: No more than 5 acres of unprotected soil should be exposed at any one time. Previous earthwork should be stabilized in accord with approved design standards and specifications referenced in Section E.8 before additional area is exposed. (Site factors including topography, soil erosion potential, proximity to wetlands and water courses may require limiting the amount of raw earth that can be exposed at any one time to less than 5 acres.)

2. Grading: Perimeter grading should blend with adjoining properties.

3. Vegetative Protection: Where protection of trees and/or other vegetation is required, the location of the site to be protected should be shown on the erosion control plan. The method of protecting vegetation during construction should conform to the design criteria referenced in Section E.8.

4. Drainage control.

   a. Surface runoff that is relatively clean and sediment free should be diverted or otherwise prevented from flowing through areas of construction activity on the project site. This will greatly reduce sediment loading in surface runoff.

   b. A fill associated with an approved temporary sediment control structure or permanent stormwater management structure, should not be created which causes water to pond off–site on adjacent property, without first having obtained ownership or permanent easement for such use from the owner of the off–site or adjacent property.

   c. Natural drainage channels should not be altered or relocated without the proper approvals. Pursuant to Article 15 of the Environmental Conservation Law, a protected stream and the bed and banks thereof should not be altered or relocated without the approval of the Department of Environmental Conservation. [2]

   d. Runoff from any land disturbing activity should not be discharged or have the potential to be discharged off-site or into storm drains or into watercourses unless such discharge is directed through a properly designed, installed and maintained structure, such as a sediment trap, to retain sediment on-site. Accumulated sediment should be removed when 60% of the storage capacity of the sediment retention structure is filled with sediment.

   e. For finished grading, adequate gradients should be provided so as to prevent water from standing on the surface of lawns for more than 24 hours after the end of a rainfall, except in a swale flow area which may drain as long as 48 hours after the end of rainfall.

   f. Permanent swales or other points of concentrated water flow should be stabilized with sod, rip–rap, paving, or covered with a approved erosion control matting as provided for in the design criteria referenced in Section E.8.

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[2] A natural drainage channel refers to a swale, water course in a gully, or a protected or unprotected stream. Natural drainage channels should not be altered or relocated on adjacent properties without first having obtained ownership or a permanent easement for the altered or relocated drainage channel from the owner of the off-site or adjacent property.

g. Surface flows over cut and fill slopes should be controlled as provided for in the design criteria for vegetating waterways referenced in Section E.8.

5. Timing.

a. Except as noted below, all sites should be seeded and stabilized with erosion control materials, such as straw mulch, jute mesh, or excelsior within 15 days of final grading. If construction has been suspended, or sections completed, areas should be seeded immediately and stabilized with erosion control materials. Maintenance should be performed as necessary to ensure continued stabilization.

i. For active construction areas such as borrow or stockpile areas, roadway improvements, and areas within 50 ft. of a building under construction, a perimeter sediment control system consisting, for example, of silt fencing or hay bales, should be installed and maintained to contain soil.

ii. On cut side of roads, ditches should be stabilized immediately with rock rip–rap or other non-erodible liners, or where appropriate, vegetative measures such as sod. When seeding is approved, an anchor mulch should be used and soil should be limed and fertilized in accord with recommendations referenced in Section E.8.

iii. Permanent seeding should optimally be undertaken in the spring from March 21 through May 20, and in late summer and early fall from August 25 to October 15. During the peak summer months and in the fall after October 15 when seeding is found to be impracticable, an appropriate mulch should be applied. Permanent seeding may be undertaken during summer if plans provide for adequate watering of the seedbed.

iv. All slopes steeper than 3:1 (h:v), as well as basin or trap embankments, and perimeter dikes should, upon completion, be immediately stabilized with sod, seed and anchored straw mulch, or other approved stabilization measures. Areas outside of the perimeter sediment control system should not be disturbed. Maintenance should be performed as necessary to ensure continued stabilization.

b. Temporary sediment trapping devices should be removed within thirty (30) calendar days following establishment of permanent stabilization in all contributory drainage areas. Stormwater management structures used temporarily for sediment control should be converted to the permanent configuration within this time period as well.

6. Stream protection.

a. The bed and banks of all on-site and off-site streams that may be impacted by land clearing, grading, and construction activities should be protected to prevent stream, river, lake or coastal sedimentation, streambank erosion, stream enlargement and degradation or loss of fisheries habitat. Measures for protecting the bed and/or banks of a stream may include; for example, gabion baskets, rip-rap, log cribbing, and vegetative measures. [3]

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[3] Whenever possible, vegetative streambank stabilization practices are recommended over structural practices such as rip-rap and gabion linings which may unnecessarily alter the existing stream ecosystem.

b. Where temporary work roads or haul roads cross stream channels, adequate waterway openings must be constructed using spans, culverts, washed rock backfill or other acceptable, clean methods that will ensure that road construction and use do not result in turbidity and sediment downstream. All stream crossing activities and appurtenances shall be in compliance with a permit issued pursuant to Article 15 of the Environmental Conservation Law, where applicable, and should be carried out in conformance with guidelines in DEC's Stream Corridor Management manual.[4]

7. Maintenance.

a. An erosion control plan for a project site should identify maintenance requirements for erosion and sediment control practices utilized, and it should provide a maintenance schedule. All erosion and sediment control measures should be inspected periodically and maintained in conformance with the schedule so as to ensure they remain in effective, operating condition until such times as they are removed.

b. All points of construction ingress and egress should be protected to prevent the deposition of materials onto traversed public thoroughfare, either by installing and maintaining a stabilized construction entrance, or by washing all vehicle wheels in a safe disposal area. All materials deposited onto public thoroughfares should be removed immediately. Proper precautions should be taken to ensure that materials deposited onto public thoroughfares are removed so that they do not enter catch basins, storm sewers, or combined sewers.

c. Accumulated sediment should be removed when 60% of the storage capacity of the retention structure is filled with sediment.

8. Design specifications.

Designs, standards and specifications for controlling erosion and sedimentation are found in the following publication and should be identified and shown in the erosion control plan:

> Empire State Chapter, Soil & Water Conservation Society, New York Guidelines for Urban Erosion and Sediment Control, Syracuse. March 1988.

[4] New York State Department of Environmental Conservation, "Stream Corridor Management: A Basic Reference Manual," Albany, 1986.

Appendix F

THE STORMWATER MANAGEMENT AND EROSION CONTROL PLAN*
(Structure and Content)

INTRODUCTION

Water quality impacts and flooding associated with land development can be mitigated by installing structural and vegetative stormwater control measures. In order to properly choose, size and site a stormwater management measure or a combination of measures for a specific project or development site, certain information must be gathered and analyzed beforehand. Such information gathering and analyses can best be accomplished within the framework of a stormwater management and erosion control plan. Such a plan should be required for all development proposals that meet applicability criteria set forth by the locality. Suggested criteria are presented in Chapter III. The purpose of this chapter is to provide local planning agencies, developers and consultants with a framework for (1) structuring a stormwater management and erosion control plan, (2) identifying the kinds of information that should be gathered, and (3) describing the kinds of analyses that should be made.

STORMWATER MANAGEMENT PLAN: STRUCTURE AND CONTENT

At a minimum, a stormwater management and erosion control plan should:

- provide background information about the scope of the project.
- provide a statement of stormwater management objectives.
- compare post-development stormwater runoff conditions with pre-development conditions.
- describe proposed structural and vegetative stormwater measures to ensure that the quantity, temporal distribution and quality of stormwater runoff during and after development is not substantially altered from pre-development conditions.
- identify the type and frequency of maintenance required by the stormwater management and erosion control facilities utilized.

Within the above context, the following outline details the structure and content of a stormwater management and erosion control plan.

I. BACKGROUND INFORMATION

A. PROJECT DESCRIPTION

1. Describe what is being proposed (i.e., residential lot subdivision, planned unit development, commercial/retail development, or industrial development).

2. Describe project size (i.e., number of acres, number of dwelling units, other buildings, and density).

3. Describe other improvements which will be made on project site, including streets and roads, utilities (water, sewer, etc.), and give particular attention to acreage of land that will become paved and covered with buildings. Lawn acreage also should be specified.

*Appendix F is a reprint of Chapter 4 of the NYS DEC April, 1992 publication entitled, Reducing the Impacts of Stormwater Runoff from New Development

4. Provide a location map.* Include watersheds in the community that may be impacted by project. Also, show highways, roads, and proximity of project to nearest city, village or hamlet, and to the nearest waterbody, and other prominent features.

5. Provide a base map containing boundary lines of the project site, sub-catchments, and contributory watersheds at a scale agreed upon by the municipality and developer. **

6. Provide an analysis of site limitations and development constraints by including such factors as slope, soil erodibility, depth to bedrock, depth to seasonal high water, soil percolation, etc., to facilitate evaluation of site suitability for proposed stormwater and erosion control facilities in relation to the overall development proposal.

7. Provide a statement describing how this project will meet stormwater management objectives established by the municipality.

8. Provide a general description of the approaches which will be taken to control erosion and sedimentation and stormwater runoff.

9. Provide a statement indicating when project is to begin and the expected date of completion.

10. Provide a map and descripiton of all critical environmental areas, conservation areas, wildlife habitats, easements, etc., to be protected. (These areas should be marked in the field.)

11. Provide an analysis of potential impacts from the proposed development to natural resource features on-site and off-site such as streams, lakes, wetlands, water supplies, coastal estuaries, etc. A determination as to whether the proposed development will affect any designated primary or principal aquifer should also be included.

B. EXISTING (PRE-DEVELOPMENT) CONDITIONS

1. Provide map showing topography (contours) under existing conditions. On this same map, show drainage patterns, including ditches, culverts, permanent streams, intermittent/ephemeral streams or drainages, wetlands, or other waterbodies, and existing roads. Indicate sizes of existing culverts. Delineate watershed and sub-watershed boundaries on the map.

2. Provide a map showing existing land use, open space, public facilities, utility lines, water supply wells on site, and predominant vegetation cover types (forested, brushland, grassland, cropland, pasture, etc.).

3. Obtain soils survey information and, by sub-catchment, provide tabular information detailing the area in acres that are in each of the Soil Conservation Service (SCS) Hydrologic Soil Groups A, B, C or D in Table 10 in Chapter III. Soils information should be obtained by conducting a site-specific soil survey.

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* Include a north arrow on all maps.

** For subdivision review purposes, maps typically have a scale ranging from 1" = 50' to 1" = 200'. Map scales in the range of 1" = = 1' to 1" = 40' are not uncommon depending on project size and amount of detail required. Maps for stormwater management planning can adopt any of the above scales. The contour interval for the maps should be two feet or an appropriate interval selected on the basis of site conditions and agreed upon by the municipality and developer.

4. Where applicable, provide a map showing designated 100-year flood plain boundaries in affected drainage basins in the community including any available 100-year flood elevations and floodways. Show culverts downstream of project and culvert size. Show existing easements for storm drains, sewers, and other utilities. Show the extent of the drainage area served by a man-made stormwater drainage network if that network system is collecting runoff from outside of the natural drainage basin and is discharging into the basin of concern.

5. Provide hydrologic data describing rainfall characteristics. This should include:

   a. Precipitation data for several return periods (i.e., the 1-year, 2-year, 10-year, and 100-year storms for a 24-hour duration).

   b. Provide stream channel survey data by sub-catchment showing channel conditions including roughness and vegetation.

C. PROPOSED FUTURE (DEVELOPMENT) CONDITIONS

1. Provide a map showing by sub-catchment, the completed project, including lot layout, approximate location of buildings, streets, and other paved surfaces, final contours, utility lines, water supply wells, individual sewage disposal systems, and location and types of easements.

2. Provide tabular information, by sub-catchment, showing the acres of impervious area created in the proposed development as well as the extent of lawn and areas where the land has been made more impervious than pre-development conditions.

3. By sub-catchment, show on a map changes to land surface, including areas of cuts and fills, changes in vegetative cover types, and final contours. Indicate by sub-catchment, land-clearing and earth moving start-up and completion dates.

4. Indicate construction schedule including estimated completion date(s) and proposed winter shutdowns.

II. COMPARISON OF PRE-DEVELOPMENT WITH POST-DEVELOPMENT RUNOFF

A. METHODOLOGIES

1. Describe or identify the methodology used to compare and evaluate pre- with post-development runoff conditions in terms of volumes, peak rates of runoff, routing, and hydrographs. (Chapter III. describes several commonly used hydrologic models for computing runoff.)

   - Peak discharge rates and total runoff volumes from the project area for existing site conditions and post-development conditions for the 2-year and 10-year, 24 hour storm events should be calculated. The relevant variables used in this determination, such as curve number and time of concentration should be included.

   - Downstream analysis of the 100-year, 24 hour event, including peak discharge rates, total runoff volumes and evaluation of impacts to receiving waters and/or wetlands should be evaluated.

- Storage volume and surface area requirements necessary to provide flood control for runoff generated during 2-year, 10-year and 100-year, 24 hour storm events should be calculated.

- Discharge provisions for the proposed control measures, including peak discharge rates, outlet design, discharge capacity for each stage, outlet channel design, and a description of the point of discharge should be provided.

- Sufficient detail should be provided to show that the stormwater facility(ies) is/are capable of withstanding the discharge from the 100-year storm event.

2. Describe or identify the methodology used to compare and evaluate pre- with post-development pollutant loading. Contaminants to be compared include total suspended solids, total phosphorus, total nitrogen, and biological oxygen demand. Pollutant loading coefficients may be used. (Chapter III. describes several commonly used models for calculating pollutant loading.)

   - Water quality treatment facilities should be designed to control the first 1/2 inch of runoff or runoff from the 1-year, 24 hour storm event, or whichever is greater.

   - The necessary storage volumes should be calculated and the proposed stormwater measure(s) should be described in detail. The plans should provide sufficient detail of the water quality control measures to ensure that the relevant design criteria will be met.

   - Specific information may include surface area dimensions, depths, inlet designs, planting specifications for use of aquatic vegetation, percent solids removal expected, discharge rates and outlet design.

B. CALCULATIONS

1. State any assumptions used in making the calculations.

2. Provide assumptions and coefficient values used in the hydrologic calculations for making above comparisons. Evaluate the post-development effect of stormwater runoff on identified flood plains or designated flood hazard areas in the community.

3. Compare pollutant loading between before and after conditions. Provide computations.

III. <u>STORMWATER MANAGEMENT</u>

A. STORMWATER MANAGEMENT FACILITIES

1. Describe in a narrative and show on a map, by sub-catchment, proposed stormwater management facilities. A soil profile to at least one foot below the stormwater management facility should be provided.

2. Provide designs of proposed structural stormwater management facilities. Pursuant to the provisions in Chapter V. for peak flow attenuation and water quality management, indicate which facilities will be used to attenuate peak flows, which will be used to enhance stormwater runoff quality, and which facilities will serve a dual role. Identify the materials to be used in constructing these facilities.

3. Calculations for sizing stormwater facilities should be provided.

4. Provide designs and calculations for siting and sizing such specialized measures and devices as filter strips, water quality inlets (oil/grit separator) forebays, etc., which will be used to remove sediment, oil-based products, and other contaminants found in urban runoff.

5. Provide an evaluation of the amount of treatment or level of pollutant reduction that can be expected from the proposed stormwater management facility(ies). Contaminants to be considered in this evaluation include total suspended solids (TSS), total phosphorus (P), total nitrogen (N), biological oxygen demand (BOD) and thermal pollution. Evaluation of the effectiveness of stormwater management practices can be based on reports on the effectiveness of comparable stormwater facilities on similar sites. Pollutant loading coefficients for total P, total N and BOD, and models for making this evaluation are identified and briefly discussed in Chapter III.

   Guidance for evaluating the level of reduction of TSS (and other pollutants attached thereto) that can be expected from selected stormwater management facilities can be found in the publication entitled "Methodology for Analysis of Detention Basins for Control of Urban Runoff Quality".[1] Also, the BMPSOFT model and P8 Urban Catchment Model referred to in Table 14 in Chapter VI may be used to calculate the level of reduction of TSS (and other pollutants) that can be expected from selected stormwater management facilities.

6. Provide information on the design provisions that address safety considerations (e.g., gentle slopes and benches in ponds) and accommodate maintenance needs (including access to conduct maintenance operations).

B. STORMWATER CONVEYANCE SYSTEM

1. Describe in a narrative and map by sub-catchment the stormwater conveyance (drainage) system. Indicate which segments of the drainage system are open channels and which segments are piped (culverts). Provide rationale and justification for installing piped segments.

2. Provide plan view and cross-sectional designs of stormwater conveyance systems. Hydrologic calculations for siting and sizing the stormwater conveyance system should be provided. Identify materials to be used.

3. Provide plans, designs and identify materials to be used for preventing erosion in channel sections of stormwater conveyance systems. Show how erosion at culvert inlets and outfalls will be prevented.

C. RECREATIONAL AND/OR LANDSCAPE FEATURES (Optional)

1. Describe and illustrate any recreational or landscape features which are to be factored into the stormwater management system to enhance the aesthetics of the facility(ies) and provide multiple use options.

2. On the map prepared under Section I.C.1., show the location of recreational facilities.

3. Provide landscaping sketches and designs for the stormwater management facilities.

IV. EROSION AND SEDIMENT CONTROL

A. TEMPORARY EROSION AND SEDIMENT CONTROL FACILITIES
(to be used during land clearing, land grading and the construction phases)

1. Describe temporary structural facilities and vegetative measures which will be used to control erosion and sedimentation.

2. Provide a map showing, by sub-catchment, the location of temporary vegetative and structural erosion and sediment control facilities.

3. Provide dimensional details of proposed erosion and sediment control facilities and identify the materials that will be used in developing these facilities. Calculations used in siting and sizing sediment basins should be provided (see New York Guidelines for Urban Erosion and Sediment Control).

4. Identify temporary erosion and sediment control facilities which will be converted to permanent stormwater management facilities.

5. Provide an implementation schedule for the staging of temporary erosion and sediment control facilities.

6. Provide a maintenance schedule for soil erosion and sediment control facilities.

B. PERMANENT EROSION AND SEDIMENT CONTROL FACILITIES

1. Describe permanent structural and vegetative practices which will be used to provide long-term control of erosion and sedimentation when construction activities are completed and the project site is restored.

2. Provide a map showing, by catchment, the location of permanent erosion control facilities, including both structural and vegetative.

3. By sub-catchment, provide an implementation schedule for restoring the project site with permanent erosion and sediment control facilities.

V. IMPLEMENTATION SCHEDULE AND MAINTENANCE

A. Provide an implementation schedule for staging of all stormwater management facilities. Describe how this schedule will be coordinated with the staging of erosion and sediment control facilities and construction activities.

B. Provide a description of the arrangements which will be made for ensuring long-term maintenance of stormwater management and erosion control facilities. Back-up contingency plans should be provided and described. Those responsible for performing maintenance should be identified.

ACCOUNTABILITY DURING PLAN IMPLEMENTATION

Significant progress has been made in preparing improved development plans that address stormwater and erosion control concerns. Quite often, however, there is a breakdown between what is called for in the plan and what is actually delivered during the plan implementation phase. Frequently erosion and sediment controls during construction tend to fail because they are either not properly installed or properly maintained. Deposition of sediment in a stream, lake, or other receiving waterbody is the end result.

There are two things that a municipality can do to ensure that stormwater management and erosion and sediment control practices are being properly installed and maintained during the construction phase of the project:

1. If the municipality has an inadequate inspection and enforcement staff, it can extract a fee from the developer(s) to retain staff to do the inspections and provide enforcement.

2. The municipality also can require the developer(s) to establish a dedicated fund, such as a surety bond or irrevocable letter of credit. In the event the developer fails to properly install and maintain required stormwater management and erosion control practices, the municipality can draw upon the fund to do the necessary work itself or to have it done by another firm. In such case, the municipality should require an easement for the purpose of entering onto the property to install, maintain or repair stormwater and erosion control practices.

ATTACHMENT A2-2

EROSION CONTROL DETAILS

1. Silt Fence
2. Straw Bale Dike
3. Perimeter Dike/Swale
4. Temporary Swale
5. Sediment Trap for Drop Inlet

STANDARD AND SPECIFICATIONS FOR STRAW BALE DIKE

Definition

A temporary barrier of straw or similar material used to intercept sediment laden runoff from small drainage areas of disturbed soil.

Purpose

The purpose of a bale dike is to reduce runoff velocity and effect deposition of the transported sediment load. Straw bale dikes are to be used for no more than three (3) months.

Conditions Where Practice Applies

The straw bale dike is used where:

1. No other practice is feasible.
2. There is no concentration of water in a channel or other drainage way above the barrier.
3. Erosion would occur in the form of sheet erosion.
4. Length of slope above the straw bale dike does not exceed these limits:

Constructed Slope	Percent Slope	Slope Length (feet)
2:1	50	25
2-1/2:1	40	50
3:1	33	75
3-1/2:1	30	100
4:1	25	125

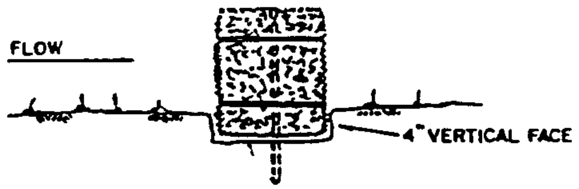
Where slope gradient changes through the drainage area, steepness refers to the steepest slope section contributing to the straw bale dike.

The practice may also be used for a single family lot if the slope is less than 15 percent. The contributing drainage area in this instance shall be less than one acre and the length of slope above the dike shall be less than 200 feet.

Design Criteria

A design is not required. All bales shall be placed on the contour with cut edge of bale adhering to the ground. See Figure 4.3 on page 4.10 or details.

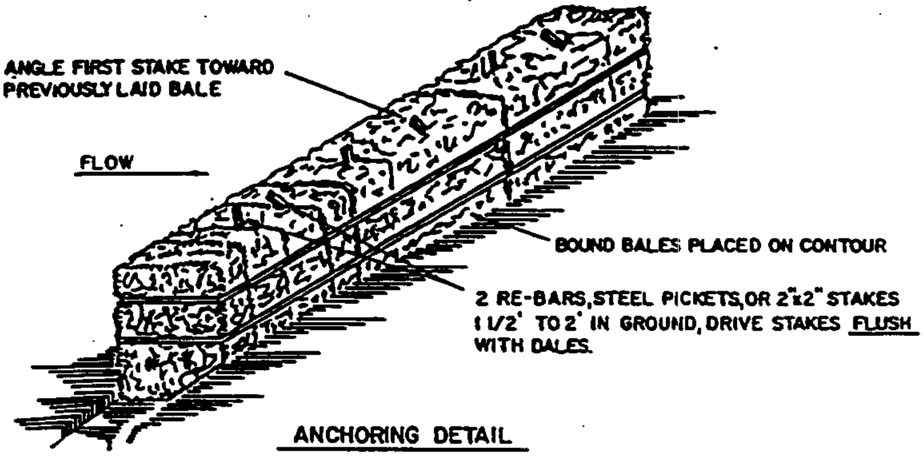
Figure 4.3
Straw Bale Dike Details



BEDDING DETAIL

STANDARD SYMBOL

DRAINAGE AREA NO MORE THAN 1/4 ac. PER 100 FEET OF STRAW BALE DIKE FOR SLOPES LESS THAN 25%



ANCHORING DETAIL

CONSTRUCTION SPECIFICATIONS

1. BALES SHALL BE PLACED AT THE TOE OF A SLOPE OR ON THE CONTOUR AND IN A ROW WITH ENDS TIGHTLY ABUTTING THE ADJACENT BALES.
2. EACH BALE SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF (4) INCHES, AND PLACED SO THE BINDINGS ARE HORIZONTAL.
3. BALES SHALL BE SECURELY ANCHORED IN PLACE BY EITHER TWO STAKES OR RE-BARS DRIVEN THROUGH THE BALE. THE FIRST STAKE IN EACH BALE SHALL BE DRIVEN TOWARD THE PREVIOUSLY LAID BALE AT AN ANGLE TO FORCE THE BALES TOGETHER. STAKES SHALL BE DRIVEN FLUSH WITH THE BALE.
4. INSPECTION SHALL BE FREQUENT AND REPAIR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
5. BALES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFULNESS SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.

U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE	STRAW BALE DIKE	STANDARD DRAWING SBD-1

STANDARD AND SPECIFICATIONS FOR SILT FENCE

Definition

A temporary barrier of geotextile fabric (filter cloth) used to intercept sediment laden runoff from small drainage areas of disturbed soil.

Purpose

The purpose of a silt fence is to reduce runoff velocity and effect deposition of transported sediment load. Limits imposed by ultraviolet stability of the fabric will dictate the maximum period the silt fence may be used.

Conditions Where Practice Applies

A silt fence may be used subject to the following conditions:

1. Maximum allowable slope lengths contributing runoff to a silt fence are:

Slope Steepness	Maximum Slope Length (Ft)
2:1	50
3:1	75
4:1	125
5:1	175
Flatter than 5:1	200

2. Maximum drainage area for overland flow to a silt fence shall not exceed 1/2 acre per 100 feet of fence; and
3. Erosion would occur in the form of sheet erosion; and
4. There is no concentration of water flowing to the barrier.

Design Criteria

Design computations are not required. All silt fences shall be placed as close to the area as possible, and the area below the fence must be undisturbed or stabilized.

A detail of the silt fence shall be shown on the plan, and contain the following minimum requirements:

1. The type, size, and spacing of fence posts.
2. The size of woven wire support fences. (OPTIONAL)
3. The type of filter cloth used.
4. The method of anchoring the filter cloth.
5. The method of fastening the filter cloth to the fencing support.

Where ends of filter cloth come together, they shall be overlapped, folded and stapled to prevent sediment bypass. See Figure 4.4 on page 4.12 for details.

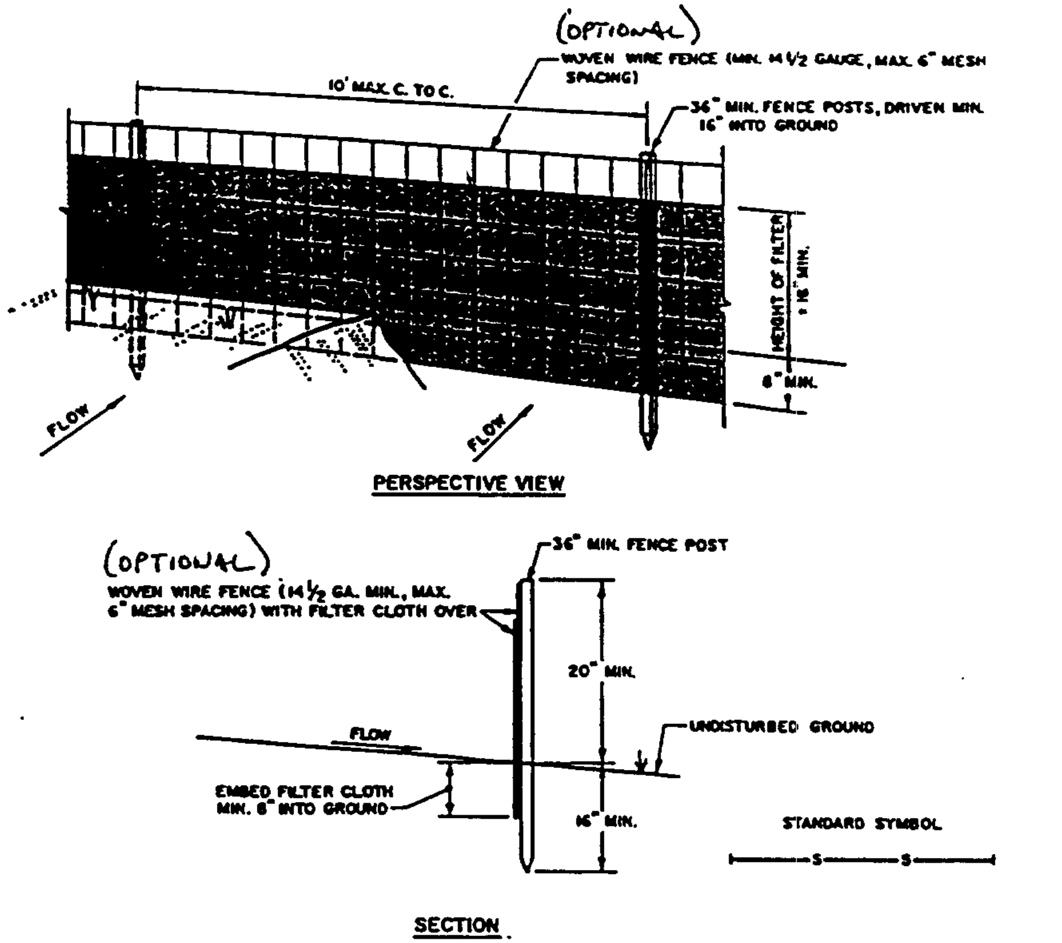
Criteria for Silt Fence Materials

1. Silt Fence Fabric: The fabric shall meet the following specifications unless otherwise approved by the appropriate erosion and sediment control plan approval authority. Such approval shall not constitute statewide acceptance. Statewide acceptability shall depend on in field and/or laboratory observations and evaluations.

Fabric Properties	Minimum Acceptable Value	Test Method
Grab Tensile Strength (lbs)	90	ASTM D1682
Elongation at Failure (%)	50	ASTM D1682
Mullen Burst Strength (PSI)	190	ASTM D3786
Puncture Strength (lbs)	40	ASTM D751 (modified)
Slurry Flow Rate (gal/min/sf)	0.3	
Equivalent Opening Sizw	40-80	US Std Sieve CW-02215
Ultraviolet Radiation Stability (%)	90	ASTM G-26

2. Fence Posts (for fabricated units): The length shall be a minimum of 36 inches long. Wood posts will be of sound quality hardwood with a minimum cross sectional area of 3.0 square inches. Steel posts will be standard T and U section weighing not less than 1.00 pound per linear foot.
3. Wire Fence (for fabricated units): Wire fencing shall be a minimum 14-1/2 gage with a maximum 6 in. mesh opening, or as approved. (OPTIONAL)
4. Prefabricated Units: Envirofence or approved equal may be used in lieu of the above method providing the unit is installed per manufacturer's instructions.

Figure 4.4
Silt Fence Details



CONSTRUCTION NOTES FOR FABRICATED SILT FENCE

1. (OPTIONAL) WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES.
2. FILTER CLOTH TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVER-LAPPED BY SIX INCHES AND FOLDED.
4. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.

POSTS: STEEL EITHER T OR U TYPE OR 2" HARDWOOD

FENCE: WOVEN WIRE, 14 1/2 GA. 6" MAX. MESH OPENING (OPTIONAL)

FILTER CLOTH: FILTER X, MIRAFI 100X, STABILINKA T140N OR APPROVED EQUAL

PREFABRICATED UNIT: GEOFAB, ENVIROFENCE, OR APPROVED EQUAL.

U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE	SILT FENCE	STANDARD DRAWING SF-1

STANDARD AND SPECIFICATION FOR TEMPORARY SWALE

Definition

A temporary excavated drainage way.

Purpose

The purpose of a temporary swale is to prevent runoff from entering disturbed areas by intercepting and diverting it to a stabilized outlet or to intercept sediment laden water and divert it to a sediment trapping device.

Conditions Where Practice Applies

Temporary Swales are constructed:

1. To divert flows from a disturbed area.
2. Intermittently across disturbed areas to shorten overland flow distances.
3. To direct sediment laden water along the base of slopes to a trapping device.
4. To transport offsite flows across disturbed areas such as rights-of-way.

Swales collecting runoff from disturbed areas shall remain in place until the disturbed areas are permanently stabilized.

Design Criteria

See Figure 4.5 on page 4.14 for details.

	Swale A	Swale B
Drainage Area	<5 Ac	5-10 Ac
Bottom Width of Flow Channel	4 ft	6 ft
Depth of Flow Channel	1 ft	1 ft
Side Slopes	2:1 or Flatter	2:1 or Flatter
Grade	0.5% Min. 20% Max.	0.5% Min. 20% Max.

For drainage areas larger than 10 acres, refer to the Standard and Specifications for Waterways on page 4.91.

Stabilization

Stabilization of the swale shall be completed within 10 days of installation in accordance with the appropriate standard and specifications for vegetative stabilization or stabilization with mulch as determined by the time of year. The flow channel shall be stabilized as per the following criteria:

Type of Treatment	Channel Grade	FLOW CHANNEL A ≤5 Ac	FLOW CHANNEL B 5-10 Ac
1	0.5-3.0%	Seed & Straw Mulch	Seed & Straw Mulch
2	3.1-5.0%	Seed & Straw Mulch	Seed and cover with Jute or Excelsior; Sod, or lined with 2 in. stone
3	5.1-8.0%	Seed and cover with Jute or Excelsior, Sod line with 2 in. stone	Line with 4-8 in. stone or Recycled Concrete Equivalent
4	8.1-20%	Line with 4-8 in. stone or Recycled Concrete Equivalent[1]	Engineering Design

In highly erodible soils, as defined by local approving agency, refer to the next higher slope grade for type of stabilization.

[1] Recycled Concrete Equivalent shall be concrete broken into the required size, and shall contain no steel reinforcement.

Outlet

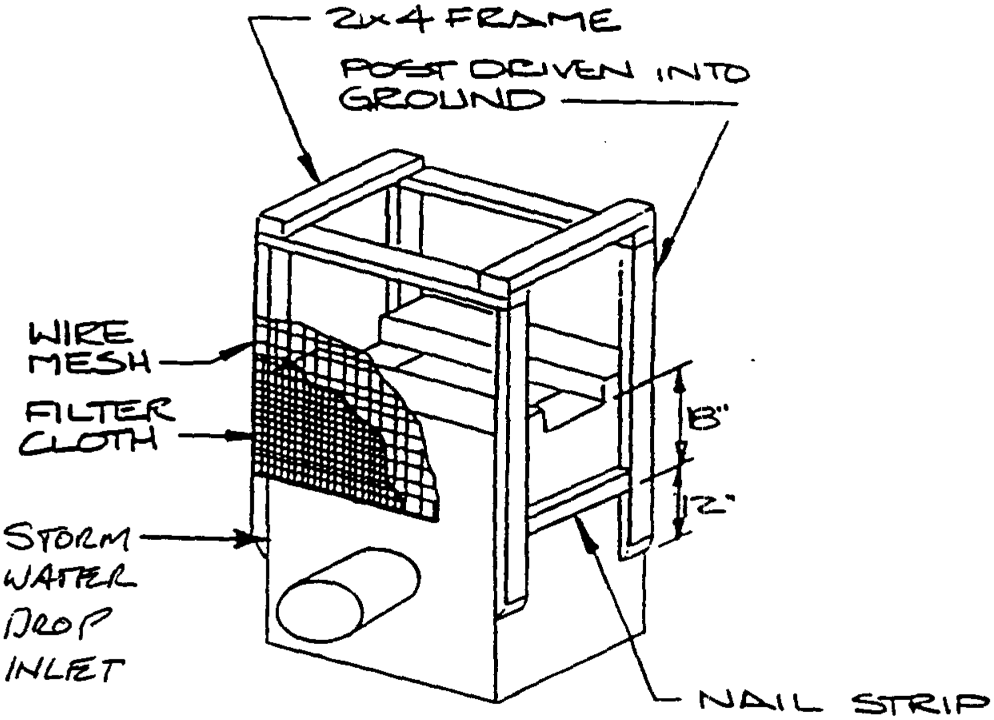
Swale shall have an outlet that functions with a minimum of erosion, and dissipates runoff velocity prior to discharge off the site.

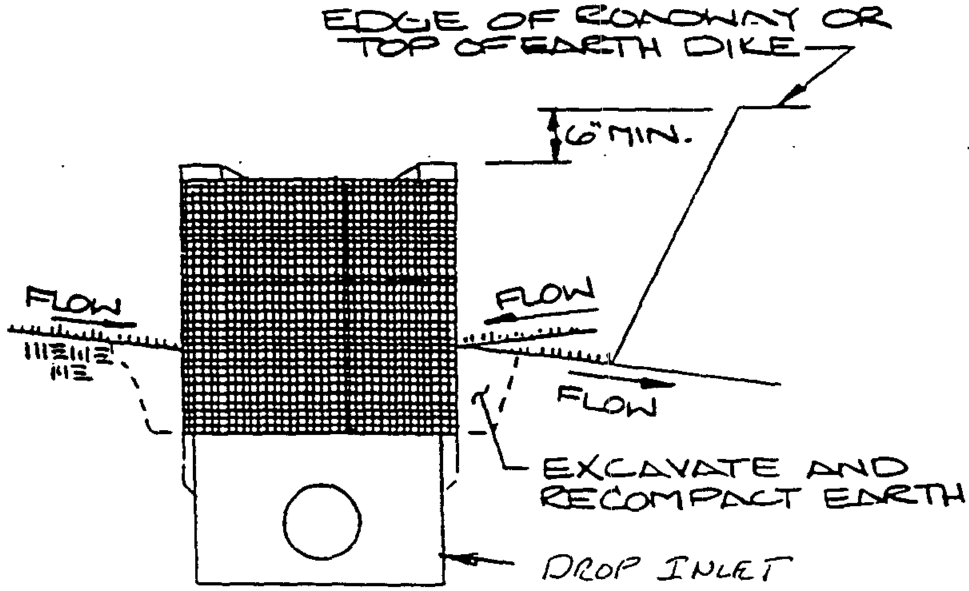
Runoff shall be conveyed to a sediment trapping device such as a sediment trap or sediment basin until the drainage area above the swale is adequately stabilized.

The on-site location may need to be adjusted to meet field conditions in order to utilize the most suitable outlet condition.

If swale is used to divert flows from entering a disturbed area, a sediment trapping device may not be needed.

SEDIMENT TRAP FOR DROP INLETS





STANDARD AND SPECIFICATIONS FOR PERIMETER DIKE/SWALE

Definition

A temporary ridge of soil excavated from an adjoining swale located along the perimeter of the site or disturbed area.

Purpose

The purpose of a perimeter dike/swale is to prevent off site storm runoff from entering a disturbed area and to prevent sediment laden storm runoff from leaving the construction site or disturbed area.

Conditions Where Practice Applies

Perimeter dike/swale is constructed to divert flows from entering a disturbed area, or along tops of slopes to prevent flows from eroding the slope, or along base of slopes to direct sediment laden flows to a trapping device.

The perimeter dike/swale shall remain in place until the disturbed areas are permanently stabilized.

Design Criteria

See Figure 4.16 on page 4.34 for details.

The perimeter dike/swale shall not be constructed outside the property lines without obtaining legal easements from effected adjacent property owners. A design is not required for perimeter dike/swale. The following criteria shall be used:

Drainage area - Less than 2 acres (for drainage areas larger than 2 acres but less than 10 acres see earth dike; for drainage areas larger than 10 acres, see standard and specifications for diversion).

Height - 18 inches minimum from bottom of swale to top of dike evenly divided between dike height and swale depth.

Bottom width of dike - 2 feet minimum.

Width of swale - 2 feet minimum.

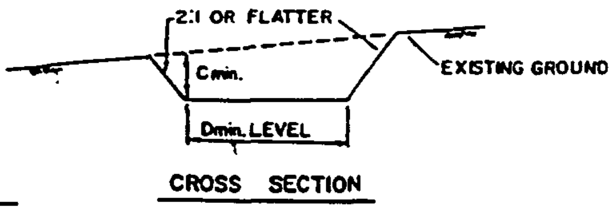
Grade - Dependent upon topography, but shall have positive drainage (sufficient grade to drain) to an adequate outlet. Maximum allowable grade not to exceed 20 percent.

Stabilization - The disturbed area of the dike and swale shall be stabilized within 10 days of installation, in accordance with the standard and specifications for seed and straw mulch or straw mulch only if not in the seeding season.

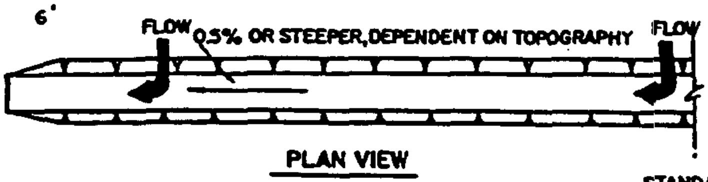
Outlet

1. Perimeter dike/swale shall have an outlet that functions with a minimum of erosion.
2. Diverted runoff from a protected or stabilized upland area shall outlet directly onto an undisturbed stabilized area.
3. Diverted runoff from a disturbed or exposed upland area shall be conveyed to a sediment trapping device such as a sediment trap, sediment basin, or to an area protected by any of these practices.
4. The on-site location may need to be adjusted to meet field conditions in order to utilize the most suitable outlet.

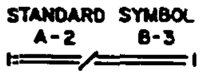
Figure 4.5
Temporary Swale Detail



	SWALE A	SWALE B
C	1'	1'
D	4'	6'



OUTLET AS REQUIRED
SEE ITEM 8 BELOW



CONSTRUCTION SPECIFICATIONS

1. ALL TEMPORARY SWALES SHALL HAVE UNINTERRUPTED POSITIVE GRADE TO AN OUTLET.
2. DIVERTED RUNOFF FROM A DISTURBED AREA SHALL BE CONVEYED TO A SEDIMENT TRAPPING DEVICE.
3. DIVERTED RUNOFF FROM AN UNDISTURBED AREA SHALL OUTLET DIRECTLY INTO AN UNDISTURBED STABILIZED AREA AT NON-EROSIVE VELOCITY.
4. ALL TREES, BRUSH, STUMPS, OBSTRUCTIONS, AND OTHER OBJECTIONABLE MATERIAL SHALL BE REMOVED AND DISPOSED OF SO AS NOT TO INTERFERE WITH THE PROPER FUNCTIONING OF THE SWALE.
5. THE SWALE SHALL BE EXCAVATED OR SHAPED TO LINE, GRADE, AND CROSS SECTION AS REQUIRED TO MEET THE CRITERIA SPECIFIED HEREIN AND BE FREE OF BANK PROJECTIONS OR OTHER IRREGULARITIES WHICH WILL IMPEDE NORMAL FLOW.
6. FILLS SHALL BE COMPACTED BY EARTH MOVING EQUIPMENT.
7. ALL EARTH REMOVED AND NOT NEEDED ON CONSTRUCTION SHALL BE PLACED SO THAT IT WILL NOT INTERFERE WITH THE FUNCTIONING OF THE SWALE.
8. STABILIZATION SHALL BE AS PER THE CHART BELOW:

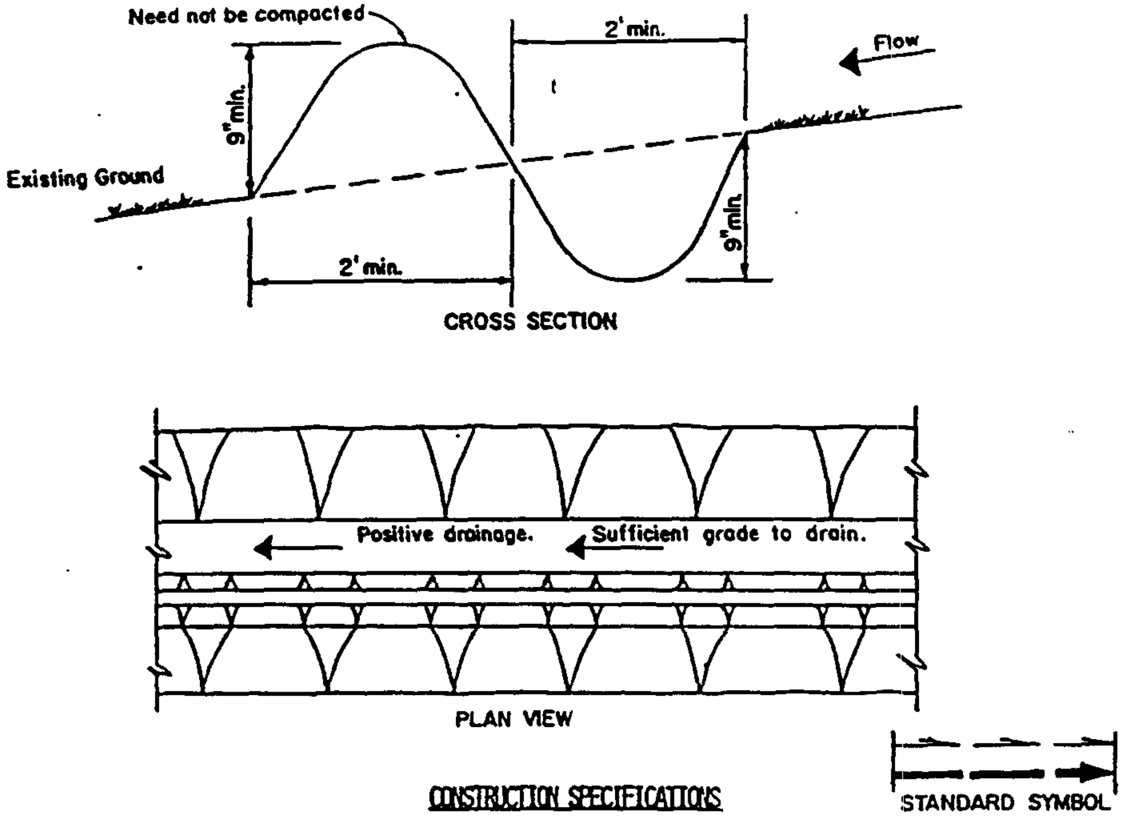
FLOW CHANNEL STABILIZATION

TYPE OF TREATMENT	CHANNEL GRADE	A (5 AC OR LESS)	B (5 AC - 10 AC)
1	0.5-3.0%	SEED AND STRAW MULCH	SEED AND STRAW MULCH
2	3.1-5.0%	SEED AND STRAW MULCH	SEED USING JUTE OR EXCELSIOR
3	5.1-8.0%	SEED WITH JUTE OR EXCELSIOR; SOD	LINED RIP-RAP 4-8" RECYCLED CONCRETE EQUIVALENT
4	8.1-20%	LINED 4-8" RIP-RAP	ENGINEERED DESIGN

9. PERIODIC INSPECTION AND REQUIRED MAINTENANCE MUST BE PROVIDED AFTER EACH RAIN EVENT.

U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE	TEMPORARY SWALE	STANDARD DRAWING TS-1

Figure 4.16
Perimeter Swale Dike Detail



CONSTRUCTION SPECIFICATIONS

1. ALL PERIMETER DIKE/SWALE SHALL HAVE UNINTERRUPTED POSITIVE GRADE TO AN OUTLET.
2. DIVERTED RUNOFF FROM A DISTRUBED AREA SHALL BE CONVEYED TO A SEDIMENT TRAPPING DEVICE.
3. DIVERTED RUNOFF FROM AN UNDISTURBED AREA SHALL OUTLET INTO AN UNDISTURBED STABILIZED AREA AT NON-EROSION VELOCITY.
4. THE SWALE SHALL BE EXCAVATED OR SHAPED TO LINE, GRADE, AND CROSS SECTION AS REQUIRED TO MEET THE CRITERIA SPECIFIED IN THE STANDARD.
5. STABILIZATION OF THE AREA DISTURBED BY THE DIKE AND SWALE SHALL BE DONE IN ACCORDANCE WITH THE STANDARD AND SPECIFICATION FOR SEED AND STRAW MULCH, AND SHALL BE DONE WITHIN 10 DAYS.
6. PERIODIC INSPECTION AND REQUIRED MAINTENANCE MUST BE PROVIDED AFTER EACH RAIN EVENT.

Max. Drainage Area Limit: 2 Acres

U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE	PERIMETER DIKE/SWALE	Standard Drawing PDS-1

ATTACHMENT A2-3

MONITORING, INSPECTION AND MAINTENANCE PLAN

MONITORING, INSPECTION, AND MAINTENANCE PLAN

IMPLEMENTATION

A. The Contractor at this site shall at all times, properly construct, operate and maintain all erosion controls and features, as part of the closure construction activities, in accordance with regulatory requirements, and with good engineering and construction practices. Erosion control measures and activities will be in accordance with currently accepted Best Management Practices (BMPs).

B. This erosion control monitoring, inspection, and maintenance plan has been developed to achieve compliance with the requirements of this construction site storm water and erosion control plan. The key elements of the monitoring effort include the following:

- Site Inspections and Maintenance;
- BMPs Monitoring;
- Recordkeeping;
- Review and Modifications; and
- Certification of Compliance.

SITE INSPECTIONS AND MAINTENANCE PRACTICES

A. The temporary erosion control features installed by the Contractor will be maintained by the contractor until no longer needed or permanent erosion control methods are installed.

Site inspections are required every seven days or within 24 hours of a rainfall of 0.5 inches or greater. All disturbed areas, areas for material storage, locations where vehicles enter or exit the site, and all of the erosion and sediment controls that are identified as part of this site's construction storm water and erosion control plan must be inspected. Controls must be in good operating condition until the affected area they protect has been completely stabilized and the construction activity is complete. If a repair is necessary, it must be completed within seven (7) days of receipt of a report or notice, if practical. Inspection for specific erosion and sediment controls will include the following:

- Silt fence will be inspected to determine the following:

  1) depth;

  2) condition of fabric;

  3) that the fabric is attached to the posts; and

  4) that the fence posts are firmly in the ground.

- The silt fences will be inspected weekly and within 24 hours of a 0.5 inch or greater storm event.

- Diversion berms, if used, will be inspected and any breaches promptly repaired.

- Temporary and permanent seeding and planting will be inspected for bare spots, washouts, and other potential erosion control problems.

- The Contractor shall designate individual(s) that will be responsible for erosion control, maintenance, and repair activities. The designated individual will also be responsible for inspecting the site and filling out the inspection and maintenance report.

- Personnel selected for inspection and maintenance responsibilities will receive training as directed by the Engineer. They will be trained in all the inspection and maintenance practices necessary for keeping the erosion and sediment controls used onsite in good working order.

B. The individual inspecting the site must record any damages or deficiencies on an inspection form (attached). These forms can be used to request maintenance and repair and to document inspection and maintenance activities. Damages or deficiencies must be corrected as soon as possible after the inspection. Any changes that may be required to correct deficiencies in the Erosion Control Plan should also be made as soon as possible, but in no case later than seven days after the inspection.

C. An Inspection and Maintenance Report Form is attached to record the inspection and assessment.

D. The Contractor's erosion control inspection records must be presented to the Engineer at the site.

RECORDKEEPING

A. Records Retention

A copy of the Storm Water Management and Erosion Control Plan and inspection and maintenance records must be kept at the construction site from the time construction begins until the site is stabilized.

The Plan and related records will be made available upon request to any regulatory agency representatives or members of the public.

MODIFICATIONS TO THE STORM WATER MANAGEMENT AND EROSION CONTROL PLAN

A. During the course of construction, unanticipated changes may occur which affect this plan such as schedule changes, phasing changes, staging area modifications, offsite drainage impacts and repeated failures of designed controls. Any changes to the activities and controls identified in this plan must be documented and the Plan revised accordingly.

B. Certification of revisions to this plan shall be included at the end of the document.

CONSTRUCTION SITE STORM WATER CONTROL PLAN
INSPECTION AND MAINTENANCE REPORT FORM

To be completed every 7 days and within 24 hours of a rainfall event of 0.5 inches or more

Regular Inspector:_____________Rainfall Event Inspector:___________Rainfall (inches):_____

Contractor Activities	OK	NO	N/A	Notes
Are construction onsite traffic routes, parking, and storage of equipment and supplies restricted to areas specifically designated for those uses?				
Are locations of temporary soil stock piles of construction materials in approved areas?				
Is there any evidence of spills and resulting cleanup procedures?				
General Erosion & Sediment Controls				
Are sediment and erosion BMPs installed in the proper location and according to the specifications set out in the SWM & ECP? Are all operational storm drain inlets protected from sediment inflow? Do any seeded or landscaped areas require maintenance, irrigation, fertilization, seeding or mulching? Is there any evidence that sediment is leaving the site? Is there any evidence of erosion or cut fill slopes?				
Perimeter Road Use				
Does much sediment get tracked on to the perimeter road? Is the gravel clean or is it filled with sediment? Does all traffic use the perimeter road to leave the site? Is maintenance or repair required for the perimeter road?				

Inspected by (Signature) ______________________ Date ______________________

CONSTRUCTION SITE STORM WATER CONTROL PLAN
INSPECTION AND MAINTENANCE REPORT FORM

To be completed every 7 days and within 24 hours of a rainfall event of 0.5 inches or more

Inspector: ______________________________

STABILIZATION MEASURES					
Area	Date Since Last Disturbed	Date of Next Disturbance	Stabilized? Yes/No	Stabilized with	Condition

Stabilization Required: ____

____

____

____

____

____

To be performed by: ____________________ On or before: ____________________

ATTACHMENT A3

New York State Department of Environmental Conservation Certification Form

Annual Certification of Institutional/Engineering Controls
LTV Voluntary Clean-up Program Site

Property Name:
Property Address:

County: Erie
City/Town: Buffalo
Property ID: (Tax Assessment Map)
Section:_______ Block:________ Lot(s):__________

I (name), residing at (address), as owner of the property(ies) listed above which are located wholly or partially within the boundaries of the Voluntary Cleanup Site named above; do certify that the engineering and/or institutional controls, as specified in the Declaration of Covenants and Restrictions for the Voluntary Cleanup Site are in-place and functioning as designed within the property(ies) listed above.

Signature:______________________

(This area for notary public)

ATTACHMENT A4

New York State Department of Environmental Conservation
TAGM 4031

TECHNICAL AND ADMINISTRATIVE GUIDANCE MEMORANDUM #4031

FUGITIVE DUST SUPPRESSION AND PARTICULATE MONITORING PROGRAM AT INACTIVE HAZARDOUS WASTE SITES

TO: Regional Hazardous Waste Remediation Engrs., Bur. Directors & Section Chiefs

FROM: Michael J. O'Toole, Jr., Director, Division of Hazardous Waste Remediation

SUBJECT: DIVISION TECHNICAL AND ADMINISTRATIVE GUIDANCE MEMORANDUM -- FUGITIVE DUST SUPRESSION AND PARTICULATE MONITORING PROGRAM AT INACTIVE HAZARDOUS WASTE SITES

DATE: Oct 27, 1989

Michael J. O'Toole, Jr. (signed)

1. Introduction

Fugitive dust suppression, particulate monitoring, and subsequent action levels for such must be used and applied consistently during remedial activities at hazardous waste sites. This guidance provides a basis for developing and implementing a fugitive dust suppression and particulate monitoring program as an element of a hazardous waste site's health and safety program.

2. Background

Fugitive dust is particulate matter--a generic term for a broad class of chemically and physically diverse substances that exist as discrete particles, liquid droplets or solids, over a wide range of sizes--which becomes airborne and contributes to air quality as a nuisance and threat to human health and the environment.

On July 1, 1987, the United States Environmental Protection Agency (USEPA) revised the ambient air quality standard for particulates so as to reflect direct impact on human health by setting the standard for particulate matter less than ten microns in diameter (PM_{10}); this involves fugitive dust whether contaminated or not. Based upon an examination of air quality composition, respiratory tract deposition, and health effects, PM_{10} is considered conservative for the primary standard--that requisite to protect public health with an adequate margin of safety. The primary standards are 150 ug/m^3 over a 24-hour averaging time and 50 ug/m^3 over an annual averaging time. Both of these standards are to be averaged arithmetically.

There exists real-time monitoring equipment available to measure PM_{10} and capable of integrating over a period of six seconds to ten hours. Combined with an adequate fugitive dust suppression program, such equipment will aid in preventing the off-site migration of contaminated soil. It will also protect both on-site personnel from exposure to high levels of dust and the public around the site from any exposure to any dust. While specifically intended for the protection of on-site personnel as well as the public, this program is not meant to replace long-term monitoring which may be required given the contaminants inherent to the site and its air quality.

3. Guidance

A program for suppressing fugitive dust and monitoring particulate matter at hazardous waste sites can be developed without placing an undue burden on remedial activities while still being protective of health and environment. Since the responsibility for implementing this program ultimately will fall on the party performing the work, these procedures must be incorporated into appropriate work plans. The following fugitive dust suppression and particulate monitoring program will be employed at hazardous waste sites during construction and other activities which warrant its use:

1. Reasonable fugitive dust suppression techniques must be employed during all site activities which may generate fugitive dust.

2. Particulate monitoring must be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Such activities shall also include the excavation, grading, or placement of clean fill, and control measures therefore should be considered.

3. Particulate monitoring must be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM_{10}) with the following minimum performance standards:

   Object to be measured: Dust, Mists, Aerosols
   Size range: <0.1 to 10 microns
   Sensitivity: 0.001 mg/m^3
   Range: 0.001 to 10 mg/m^3
   Overall Accuracy: ±10% as compared to gravimetric analysis of stearic acid or reference dust

   Operating Conditions:
      Temperature: 0 to 40°C
      Humidity: 10 to 99% Relative Humidity

   Power: Battery operated with a minimum capacity of eight hours continuous operation

   Automatic alarms are suggested.

   Particulate levels will be monitored immediately downwind at the working site and integrated over a period not to exceed 15 minutes. Consequently, instrumentation shall require necessary averaging hardware to accomplish this task; the P-5 Digital Dust Indicator as manufactured by MDA Scientific, Inc. or similar is appropriate.

4. In order to ensure the validity of the fugitive dust measurements performed, there must be appropriate Quality Assurance/Quality Control (QA/QC). It is the responsibility of the entity operating the equipment to adequately supplement QA/QC Plans to include the following critical features: periodic instrument calibration, operator training, daily instrument performance (span) checks, and a record keeping plan.

5. The action level will be established at 150 ug/m^3 over the integrated period not to exceed 15 minutes. While conservative, this short-term interval will provide a real-time assessment of on-site air quality to assure both health and safety. If particulate levels are detected in excess of 150 ug/m^3, the upwind background level must be measured immediately using the same portable monitor. If the working site particulate measurement is greater than 100 ug/m^3 above the background level, additional dust suppression techniques must be implemented to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection for on-site personnel and implementing additional dust suppression techniques (see Paragraph 7). Should the action level of 150 ug/m^3 be exceeded, the Division of Air Resources must be notified in writing within five working days; the notification shall include a description of the control measures implemented to prevent further exceedences.

6. It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM_{10} at or above the action level. Since this situation has the potential to migrate contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potential--such as solidification and treatment involving materials like kiln dust and lime--will require the need for special measures to be considered.

7. The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:

   1. Applying water on haul roads.
   2. Wetting equipment and excavation faces.
   3. Spraying water on buckets during excavation and dumping.
   4. Hauling materials in properly tarped or watertight containers.
   5. Restricting vehicle speeds to 10 mph.
   6. Covering excavated areas and material after excavation activity ceases.
   7. Reducing the excavation size and/or number of excavations.

   Experience has shown that utilizing the above-mentioned dust suppression techniques, within reason as not to create excess water which would result in unacceptable wet conditions, the chance of exceeding the 150 ug/m^3 action level at hazardous waste site remediations is remote. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

8. If the dust suppression techniques being utilized at the site do not lower particulates to an acceptable level (that is, below 150 ug/m^3 and no visible dust), work must be suspended until appropriate corrective measures are approved to remedy the situation. Also, the evaluation of weather conditions will be necessary for proper fugitive dust control--when extreme wind conditions make dust control ineffective, as a last resort remedial actions may need to be suspended.

There may be situations that require fugitive dust suppression and particulate monitoring requirements with action levels more stringent than those provided above. Under some circumstances, the contaminant concentration and/or toxicity may require appropriate toxics monitoring to protect site personnel and the public. Additional integrated sampling and chemical analysis of the dust may also be in order. This must be evaluated when a health and safety plan is developed and when appropriate suppression and monitoring requirements are established for protection of health and the environment.

PART III

ENVIRONMENTAL EASEMENTS

APPENDIX A

APPENDIX A

Technology Enhanced Naturally Occurring Radioactive Material

This Appendix has been prepared to provide supplemental information on technologically enhanced naturally occurring radioactive material (TENORM) identified at the RiverBend, LLC Area I. This appendix shall be considered a part of the SMP, all future SMP revisions, and may not be revised without the approval of the New York State Department of Environmental Conservation (NYSDEC).

A-1 INTRODUCTION

TENORM consists of materials or by-products enriched with radioactive elements found in the natural environment (e.g., uranium, thorium and potassium) and their decay products (e.g., radium and radon). These natural radioactive elements are present in very low concentrations in earth's crust and are brought to the surface through human activities such as oil and gas exploration or mining and through natural processes like leakage of radon gas to the atmosphere or through dissolution in groundwater.

Radium (chemical symbol Ra) is a naturally-occurring radioactive metal. Its most common isotopes are Radium-224, Radium-226, and Radium-228 and occurs at low levels in virtually all rock, soil, water, plants, and animals. Radium 226 is the primary isotope identified at Area I.

A-1.1 Site Background

RiverBend LLC, Area I is approximate 87-acres in size was historically owned and operated by Republic Steel and its successor, LTV Steel Company. Area I was used for steel production from 1906 through the late 1980s. During the majority of the active steel manufacturing operations, the plant employed two (2) blast furnaces where molten iron was produced. The molten iron was subsequently converted to steel in two (2) basic oxygen furnaces.

A byproduct of the production of iron and steel is slag. Blast furnace slag (i.e., iron slag) is generally comprised of the non-metallic components separated from mined iron ore during smelting in a blast furnace. Steel furnace slag is the product that is developed simultaneously with steel, where lime and oxygen are added to remove impurities. It consists of calcium silicates and combined oxides of iron, calcium and other metals. The slag material present in the subsurface at Area I is the source of the low-level TENORM, which resulted from the processing and co-processing of the NORM-containing ores and mined materials incorporated into the iron and steel manufacturing processes.

In March 2015 during the redevelopment activities within RiverBend, LLC Area I, TENORM was identified in materials being excavated for the building foundations. A truck load of material slated for recycling contained material with radiologic isotopes identified by the recycling facilities radiological monitors. The truck and its contents were returned to Area I and staged. During the previous remedial actions completed under the Voluntary Cleanup Program (VCP) within Area I, the presence of TENORM was unknown and this incident was the first time TENORM was identified as a concern at Area I.

A-2 TENORM GENERATION

TENORM was generated through excavation activities for building foundations and installation of subsurface infrastructure. Once the TENORM was identified to be present, a New York State Department of Health (NYSDOH) licensed radiological testing contractor was hired to assist with evaluating subsurface materials generated during excavation activities.

During excavation activities, a radiation technician provided oversight of the subsurface soil/fill materials generated within Area I. Materials generated were field screened within the excavator bucket using a Ludlum Model 2221 Ratemeter/Scaler with a sodium iodide scintillator (2x2 meter) to detect gamma radiation in counts per minute (cpm). For purposes of gamma-screening, a radiological activity threshold of 12,000 cpm (approximately two (2) times measured background) was established, to assess the excavated materials. Materials excavated and screened at levels below the 12,000 cpm threshold were deemed reusable as backfill. Materials excavated and screened at levels greater than 12,000 cpm were stockpiled in a TENORM staging area in the southwestern portion of Area I (see Figure A-1).

In addition to field screening excavation activities, gamma radiation and isotopic reading surveys of TENORM staged material and open excavations were conducted. Background surveys and collection of dose rate data was also performed in addition to Site-Specific Radiation Awareness Training for the site workers.

A-3 TENORM REUSE

TENORM encountered during redevelopment, as discussed in Section A-2 within Area I will be handled in accordance with the TENORM Reuse Work Plan[1] (TRWP, Attachment 1), under a variance to the 6 NYCRR Part 380: Rules and Regulations for the Prevention and Control of Environmental Pollution by Radioactive Materials[2]. This will allow the reuse of TENORM containing less than 15 picocuries per gram (pCi/g) as sub-grade fill material in a controlled manner.

As outlined in the TRWP, TENORM exhibiting field screening measurements greater than 12,000 cpm or analytical results greater than 15 pCi/g Ra-226 are deemed unacceptable for reuse and will be disposed off-site, as discussed in Section A-4.

TENORM exhibiting field measurements less than 12,000 cpm or analytical results less than 15 pCi/g Ra-226 are acceptable for reuse and will be placed, compacted, covered with a demarcation layer and 1 foot of acceptable soil/fill in the portion of Area I shown on Figure A-1. This reuse/placement area has been identified on the Environmental Easement (see Part III of SMP) as an Area of Exception. This Area of Exception, in addition to being subject to the institutional and engineering controls identified in the SMP and Environmental Easement is prohibited from development without prior written approval from NYSDEC.

A-4 TENORM DISPOSAL

A small stockpile of TENORM (approximately 5,000 CY) and a co-mingled material stockpile (approximately 1,000 CY containing TENORM and evidence of petroleum impacts) were generated during the redevelopment activities within Area I. Laboratory sample results from the small TENORM stockpile indicated that the Ra-226 concentrations were above 15 pCi/g and therefore could not remain on-site as outline in Section A-3. The small stockpile of TENORM and co-mingled material stockpile were disposed of at an acceptable out-of-state landfill (Waste Management in Mahoning, Ohio) in January and February 2016. The volume disposed was 9,159 tons. These materials or TENORM generated by future activities which are unacceptable for reuse will be disposed of in accordance with the Radiation Protection Plan, Waste Management Plan, and Transportation and Disposal Plan included in Attachment 2.

---

[1] TENORM Reuse Work Plan for Area I, High Tech Manufacturing Hub at RiverBend, NYSDEC Site No. V00619-9, 1339 South Park Avenue, Buffalo, New York 14220". Prepared for Fort Schuyler Management Corporation. Prepared by Benchmark Environmental Engineering and Science, PLLC. May 2016.

[2] 6NYCRR Part 380: Rules and Regulations for the Prevention and control of Environmental Pollution by Radioactive Material. Prepared by NYSDEC.

ATTACHMENT I

TENORM REUSE WORK PLAN

for

AREA I

High Tech Manufacturing Hub at RiverBend

NYSDEC SITE No. V00619-9

1339 SOUTH PARK AVENUE, BUFFALO, NY 14220

May 2016 0330-015-002

Prepared for:

FORT SCHUYLER MANAGEMENT CORPORATION

Prepared by:

Benchmark Environmental Engineering & Science, PLLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716)856-0599

CERTIFICATION

I, Thomas H. Forbes, P.E., certify that I am currently a NYS registered professional engineer and that this TENORM Reuse Work Plan (TRWP) was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the 6NYCRR Part 380 Variance prepared by NYSDEC for Area I, High Tech Manufacturing Hub at RiverBend property (Area I Site).

License No.: 070950-1 **Date:** 5-2-2016

Registration State: New York **SEAL:**

TENORM REUSE WORK PLAN
AREA I
High Tech Manufacturing Hub at RiverBend
NYSDEC SITE NO. V00619-9
Buffalo, New York

Table of Contents

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TENORM REUSE WORK PLAN

AREA I

High Tech Manufacturing Hub at RiverBend

NYSDEC SITE NO. V00619-9

Buffalo, New York

Table of Contents

LIST OF FIGURES

APPENDICES

1.0 INTRODUCTION

This work plan presents the details for the reuse of technology-enhanced naturally occurring radioactive material (TENORM) at the portion of the property known as Area I for the High Tech Manufacturing Hub at RiverBend property (to be referred to as "Area I" or "Site"). This TENORM Reuse Work Plan (TRWP) has been prepared on behalf of Fort Schuyler Management Corporation (FSMC), the Site owner, in conformance with the 6NYCRR Part 380 Variance (Variance) prepared by New York State Department of Environmental Conservation (NYSDEC) for the Site.

FSMC prepared and submitted a 6 NYCRR Part 380 Variance Request[1] (Variance Request) to NYSDEC. As discussed in the Variance Request, there are locations at the Site that fill placement will be required to bring the Site to design grade. FSMC would like to use low-level TENORM material stockpile at the Site with concentrations less than 15 picocuries per gram (pCi/g) Ra-226 as fill. The work discussed in this TRWP will be conducted in accordance with the NYSDEC Voluntary Cleanup Program (VCP, Site No. V00619-9) and Variance issued by NYSDEC.

The Site, also referred to as Area I (Former Republic (LTV) Steel Plant parcel), is approximately 87 acres in size and is currently being redeveloped with a 1.2 million square foot solar panel manufacturing facility (Solar City) scheduled to open in 2017. Area I is a parcel associated with a larger VCP Site known as Steelfields Ltd (aka RiverBend LLC). This RiverBend LLC property also consists of Area II (Former Donner-Hanna Coke Plant parcel) and Area III (Former Republic (LTV) Warehouse parcel). The work discussed in this TRWP is for Area I only.

1.1 Background

The Area I Site is approximate 87-acres in size and currently undergoing redevelopment was historically owned and operated by Republic Steel and its successor, LTV Steel Company. Area I was used for steel production from 1906 through the late 1980s. During the majority of the active steel manufacturing operations, the plant employed two (2) blast furnaces where molten iron was produced. The molten iron was subsequently converted to steel in two (2) basic oxygen furnaces.

[1] 6 NYCRR Part 380 Variance Request Letter, High Tech Manufacturing Hub at RiverBend, 1339 South Park Avenue, Buffalo, NY 14220. Prepared by Benchmark Environmental Engineering & Science, PLLC for NYSDEC.

A byproduct of the production of iron and steel is slag. Blast furnace slag (i.e., iron slag) is generally comprised of the non-metallic components separated from mined iron ore during smelting in a blast furnace. Steel furnace slag is the product that is developed simultaneously with steel, where lime and oxygen are added to remove impurities. It consists of calcium silicates and combined oxides of iron, calcium and other metals. The slag material present in the subsurface at Area I is the source of the low-level TENORM, which resulted from the processing and co-processing of the NORM-containing ores and mined materials incorporated into the iron and steel manufacturing processes.

Radium (chemical symbol Ra) is a naturally-occurring radioactive metal. Its most common isotopes are Radium-224, Radium-226, and Radium-228. It occurs at low levels in virtually all rock, soil, water, plants, and animals. The primary isotope identified at the Site is Radium-226.

FSMC, a subset of the College of Nanoscale Science and Engineering (CNSE) a NYS Agency, is the RiverBend LLC property owner which includes the Area I Site. LPCiminelli Inc. (LPC) working for FSMC is the project developer and construction manager responsible for construction activities at the Site. Site redevelopment activities began in June 2014 and have been on-going since that time. Site activities have included: excavation and installation of foundations and site utilities; building pad construction; installation of structural steel, installation of the building shell and interior building components. The subsurface soil/fill excavation and soil/fill generation activities were overseen by NYSDEC and environmental consultants working for LPC since the start of the project (CHA: June 2014 through July 2015, and TurnKey Environmental Restoration, LLC: August 2015 through current).

In March 2015, LPC was notified that a truck load of material slated for recycling potentially contained material with radiologic isotopes as identified by the recycling facilities radiological monitors. The truck and its contents were returned to the Site and staged. This incident was the first time LPC became aware of any radiologic information for the Site to date. LPC notified the NYSDEC of the incident and met with NYSDEC at the Site to conduct initial testing and to discuss a path forward. LPC contracted a New York State Department of Health (NYSDOH) licensed radiological testing subcontractor, Greater Radiological Dimensions (GRD), to assist with evaluating the potential concern.

GRD conducted gamma radiation and isotopic readings survey of staged material and open excavation areas throughout the Site, background surveys, collected dose rate data, and provided Site Specific Radiation Awareness Training for the site workers.

Subsurface activities completed during redevelopment were subject to the Site Management Plan[2] (SMP), specifically the Soil/Fill Management Plan within the SMP, as required by the VCP. During the redevelopment activities, various materials (topsoil, soil/fill, concrete, slag, petroleum impacted soil/fill, and metal recyclable materials) have been generated and managed in accordance with the SMP, which has included off-site landfill disposal, recycling of appropriate materials and on-site reuse of acceptable soils/fill material. At the time the initial SMP was developed, there was no indication that TENORM was present at the Site. This TRWP will address TENORM reuse requirements. Additionally, as a requirement of the Variance, the existing SMP will be revised using the NYSDEC latest template and include TENORM.

Once the TENORM was identified, subsurface soil/fill materials generated at the Site by redevelopment activities were field screened within the excavator bucket using a Ludlum Model 2221 Ratemeter/Scaler with a sodium iodide scintillator (2x2 meter) to detect gamma radiation in counts per minute (cpm). For purposes of gamma-screening, a radiological activity threshold of 12,000 cpm (approximately two (2) times measured background) was established, to assess the excavated materials. Materials excavated and screened at levels below the 12,000 cpm threshold were deemed reusable as backfill at the Site. Materials excavated and screened at levels greater than 12,000 cpm were stockpiled in a TENORM staging area in the southwestern portion of the Site. The volume of stockpile is approximately 50,000 cubic yards (CY) and is the material subject to this TRWP.

In general, the subsurface conditions at the Area I Site and areas proposed for reuse of the TENORM consist of fill characterized by slag, brick, iron ore, limestone, gravel and soil as well as former concrete building foundations and slabs.

In addition to the 50,000 CY currently stockpiled, a small stockpile of TENORM (approximately 5,000 CY) and co-mingled material stockpile (approximately 1,000 CY containing TENORM and evidence of petroleum impacts) were also generated during the redevelopment project. Initial laboratory sample results from the small TENORM stockpile indicated that the Ra-226 concentrations were above 15 pCi/g and could not remain on-site. Therefore, the small stockpile of TENORM and co-mingled material stockpile were disposed of at an acceptable out-of-state landfill (Waste Management in Mahoning, Ohio). LPC's subcontractor Austin Masters Services (AMS) was responsible for the waste profiling and

[2] "Site Management Plan for Area I (Former Republic (LTV) Steel Parcel, Steelfields Site, Buffalo, NY (NYSDEC Site V00619-9)". Prepared for Steelfields LTD by TurnKey Environmental Restoration, LLC. April 2007.

landfill disposal of the small TENORM pile and co-mingled material. This work was completed in January and February 2016.

In order to determine if the TENORM material generated at the Site could be reused, NYSDEC requested FSMC prepare a Variance Request. The request was for a variance from 6 New York Codes, Rules and Regulation (NYCRR) Part 380-4.1(b) which states:

There shall be no land disposal of radiological material subject to this Part except as authorized pursuant to this Part and any other applicable provisions of this Title.

The NYSDEC also requested that a Residual Radioactive Material (RESRAD) Model be completed as submitted. The RESRAD is designed to estimate radiation doses and risks from Residual Radioactive materials and used to support development of a Radiological Impact Assessment (RIA).

RESRAD uses a pathway analysis method in which the relation between radionuclide concentrations in soil and the dose to a member of a critical population group is expressed as a pathway sum, which is the sum of the products of "pathway factors." Pathways are determined by the specified exposure scenario.

The RESRAD was used to evaluate the following five (5) potential exposure scenarios:

1. Industrial Worker – No Building Occupancy.
2. Groundskeeper
3. Recreational User
4. Future Industrial Worker – Building Occupancy
5. Future Construction Worker & Inadvertent Intruder

Two (2) potentially applicable comparative criteria were identified and used to compare the results of the RESRAD models:

- United State Nuclear Regulatory Commission (NRC) 10 CFR 20.1402- Radiological Criteria for Unrestricted Use.
- United States Environmental Protection Agency (EPA) issued OWER No. 9200.4-18[3].

The NRC 10 CFR Part 20 is the Standard for Protection Against Radiation. Part 20.1402 is the Radiological Criteria for Unrestricted Use, which states that a site will be

[3] USEPA. Office of Solid Waste and Emergency Response. OSWER No. 9200.4-18. Memorandum, Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination. August 22, 1997.

considered acceptable for unrestricted use if the residual radioactivity that is distinguishable from background radiation results in a total effective dose equivalent (TEDE) to an average member of the critical group[4] that does not exceed 25 millirem (mrem) per year, including that from groundwater sources of drinking water, and that the residual radioactivity has been reduced to levels that are as low as reasonably achievable (ALARA). The 25 mrem per year was considered to be an applicable or relevant and appropriate requirement (ARAR).

OSWER No. 9200.4-18 indicates that if a dose assessment is conducted at a site, which has been completed for the Area I Site via the RESRAD models, then 15 millirem per year (mrem/yr) effective dose equivalent should generally be the maximum dose limit for humans. This level is consistent with levels generally considered protective in other governmental actions, particularly regulations and guidance developed by EPA in other radiation control programs.

Both criteria were considered Applicable or Relevant and Appropriate Requirements (ARAR) and "to-be-considered" comparative value (TBC) for comparison against the RESRAD model outputs in the absence of TENORM regulatory criteria or guidance in New York State and used in the RIA.

Based on the RESRAD models, the potential maximum dose levels range from 0.3 mrem/yr (Recreational User) to 7.8 mrem/yr (Future Construction Worker & Inadvertent Intruder in the placement area). The dose assessment conducted for the five (5) scenarios indicate that the proposed use of the low-level radiological material as fill material are below the proposed 15 mrem/yr (EPA) and 25 mrem/yr (NRC) levels that have been identified as TBC/ARAR.

Therefore it was proposed to re-use the low-level TENORM material based upon the modeled and demonstrated absence of significant adverse impact on the public health and safety and the environment. Specifically, low-level TENORM with concentrations less than 15 pCi/g as fill at specific locations of the Area I Site (see Figure 3), which will be placed under a 1 foot approved cover system and/or hardscape cover system (i.e., asphalt or other).

[4] Critical group is defined by the NRC as the group of individuals reasonably expected to receive the greatest exposure to residual radioactivity for any applicable set of circumstances.

1.1.1 Reuse Approach

As further described later in this TRWP, the TENORM will be relocated on-site to the proposed reuse fill areas, placed in 6-inch uncompact lifts, field screened to determine if material is acceptable for reuse (field measurements less than 12,000 cpm and analytical laboratory results less than 15 pCi/g). If acceptable, it will be compacted and subsequent TENORM placed. In areas of reuse, the TENORM thickness will not exceed 3 feet.

If unacceptable (field measurements greater that 12,000 cpm or analytical laboratory results greater than 15 pCi/g) the material will be evaluated, removed, and stage for out-of-state disposal.

After the designated grades are achieved in the proposed reuse areas, a demarcation layer will be placed over the top of the TENORM and the areas covered with 1 foot of acceptable soil/fill or covered with suitable hardscape as required under the VCP and SMP.

Any future subsurface activities at the Site would be subject to the updated SMP, which will be developed using NYSDEC latest template (August 2015).

1.2 Purpose and Scope

This TRWP presents the scope of work and planned approach for the TENORM reuse which includes the placement methods, field screening methods, remedial measures, confirmation analytical sampling, installation of a cover system, establishment of an Environmental Easement (EE), and implementation of the updated SMP during redevelopment and/or future activities to be conducted.

The scope of TRWP activities includes:

- Providing drawings for the Site that will show the proposed location(s) of the TENORM reuse areas, thicknesses and cover system information.
- Provide field screening methods and protocols to be used to evaluate the reuse of the TENORM after placement.
- Provide the confirmation analytical sampling methods and procedures.
- Cover system placement.
- Radiation.
- Establish and provide components of an Environmental Easement for the Site.
- Preparation of an updated SMP for the Site.

1.3 Project Organization and Responsibilities

Benchmark-TurnKey will provide oversight, community air monitoring, documentation of the TENORM reuse. Benchmark will prepare the updated SMP. LPC will be responsible for TENORM relocation, placement, compaction, and constructing the cover system. LPC subcontractor's Foit Albert Associates (FAA) will be responsible for survey controls for the placement area and to verify lift thicknesses; and GRD will be responsible for field screening the TENORM against acceptance criteria after placement. LPC will subcontract with a consultant that will be responsible for off-site disposal of TENORM identified above 15 pCi/g at an out-of-state facility that can accept the material based on the concentrations identified.

FSMC's environmental counsel will be responsible for providing the information needed to DEC for preparation of the Environmental Easement and filing the signed document with Erie County. The NYSDEC Division of Environmental Remediation (DER), will monitor the TENORM reuse actions to verify that the work is performed in accordance with the approved TRWP and the 6 NYCRR Part 380 Variance that was issued.

2.0 TENORM REUSE AND PLACEMENT AREA

The 50,000 CY TENORM stockpile is located along the southwestern portion of Area I (see Figure 3) in an area known as the "Toe of the Site". The estimated volume of material in the TENORM stockpile is based on a survey completed on February 3, 2016 by FAA. The TENORM, as discussed in Section 1.1, is present in the slag at the Site as a byproduct of the former production of iron and steel. As the Area I Site redevelopment activities where occurring (building foundation and utility excavations) both slag and other subsurface soil/fill were excavated simultaneously as subsurface conditions were not uniform. Therefore, the TENORM stockpile is a mix of slag and other subsurface soil/fill materials generated during excavation activities.

There are two (2) proposed TENORM reuse areas at the Site, as shown on Figure 2. These areas are:

1. Toe of the Site – This approximate 10 acres area is located in the southwestern portion of Area I and is proposed to be used as ancillary parking or greenspace. It is estimated that 49,000 CY of fill is needed to raise the grades in this area.
2. Field Trailer Area – This approximate 4.3 acres area is located in the eastern portion of Area I where the construction field trailers are currently located. This area will be used as access roadways and a parking lot. It is estimated that 20,000 CY of fill is needed to raise the grades in this area.

FSMC would also like to evaluate the site development plan and determine if there are other areas of the Area I Site that could be suitable for TENORM reuse, if necessary. These location(s) would be provided and discussed with NYSDEC prior to material placement.

The reuse placement thickness will not exceed 3 feet, which was used as the maximum placement thickness in the RESRAD model. The placement thickness of acceptable TENORM (field screening results of less than 12,000 cpm) will be 1 foot less than the required fill grade requirement to allow for the installation of 1 foot of acceptable cover material or hardscape cover system with associated subbase. Once the required TENORM placement elevation is reached and the required confirmatory samples have been collected, the demarcation layer (i.e., orange mesh or equivalent) will be placed prior to the cover system installation.

3.0 TENORM REUSE TECHNICAL APPROACH

3.1 TENORM Reuse Construction Tasks

3.1.1 Project Coordination/Kickoff Construction Meeting

A project coordination/kickoff meeting will be held with key representatives of the Project Team before the reuse activities begin. Attendees at the meeting will include a representative from FSMC, LPC, FAA, Benchmark/TurnKey, and GRD that will be used during the project. The NYSDEC Project Manager will be notified of the meeting date and time and requested to invite those individuals from the Department they would like have present at the meeting or via teleconference. Agenda items will include:

- Project schedule
- Work sequencing
- Designation of responsibilities, contact personnel, and phone numbers
- TENORM Reuse Work Plan review
- Confirmatory sampling
- Project documentation requirements
- Import Materials/Cover System Installation
- Health and safety requirements
- Community air monitoring
- Temporary controls (dust suppression, storm water management)

Benchmark will prepare meeting minutes for distribution to attendees following the meeting.

3.1.2 Progress Meetings/Calls

Progress meetings/calls will be conducted, as necessary, throughout the TENORM reuse and cover system installation construction period. NYSDEC will be provided the agenda prior to the meetings and have the opportunity to participate in meetings that will discuss substantial technical issues relative to reuse of TENORM. Progress meetings/calls will be attended by FSMC, LPC, Benchmark/TurnKey, FAA and GRD, as necessary. NYSDEC will have access to progress meetings notes.

3.1.3 Health and Safety Plan

The existing Project Safety Plan (PSP)[5] dated February 4, 2015 will be used for the TENORM Reuse activities described herein. Attached to the PSP is the Health and Safety Plan (HASP)[6], for the RiverBend Site – Area I Redevelopment, dated May 22, 2014.

The PSP addresses health and safety with respect to general construction safety and the HASP provides guidance to workers performing intrusive activities where exposure to contaminated soil and/or fill material is possible. Collectively these documents will be the HASPs for TENORM reuse activities.

As required, LPC and/or consultant/contractor employees involved with the TENORM Reuse project are required to attend a Site health and safety orientation and Site Specific Radiation Awareness Training (provided by GRD), if they had not already received the training.

LPC will be responsible for site control and LPC has hired US Security to provide Site security.

TurnKey will perform of community air monitoring as required by the existing SMP during TENORM reuse placement, screening, sampling and cover system installation in addition to other ongoing Site redevelopment activities that may require air monitoring.

3.2 Temporary Facilities and Controls

3.2.1 Mobilization and Site Preparation

The field equipment necessary for the implementation of this project is already present at the Site. LPC will mobilize the equipment to the work area for completion of the TENORM reuse project. The area will also be cleared of materials, equipment and other items, as necessary that would interfere with the placement of the TENORM.

As discussed in Section 3.2.4, the existing Site construction storm water controls will remain in effect during the TENORM reuse project.

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[5] "Buffalo High-Tech Manufacturing Innovation Hub @ RiverBend, 1339 South Park Avenue, Buffalo, NY 14220, Project Safety Plan". Prepared by LPCiminelli, Inc. February 4, 2015.

[6] "Health & Safety Plan, RiverBend Site – Area I Redevelopment, 1339-1341 South Park Avenue, Buffalo, New York, NYSDEC Site No. V00619-9. Prepared by CHA for LPCiminelli, Inc. May 20, 2014.

3.2.2 Construction Facilities

The personnel involved in the TENORM Reuse work will utilize the existing project field trailers located on the eastern portion of the Area I Site.

3.2.3 Dust Suppression

Dust suppression will be utilized, if necessary, during the TENORM reuse activities. Community air monitoring, as required by the SMP, will be completed. If the community air monitoring program (CAMP) thresholds are exceeded, dust suppression will be required on the surface of the work area to mitigate airborne dust formation and migration. Water can be sprayed across the surface of the work area as necessary to mitigate airborne dust formation and migration. Other dust suppression techniques that may be used to supplement the water spray include:

- Applying water on haul roads.
- Applying water prior to compaction.
- Restricting vehicle speeds on-site.

Reasonable attempts will be made to keep visible and/or fugitive dust to a minimum and adhere to particulate emissions limits identified in the Community Air Monitoring Plan (see Section 5.0).

3.2.4 Storm Water Management

A Notice of Intent (NOI) was submitted for the redevelopment project on September 16, 2014 by LPC. A stormwater pollution prevention plan[7] (SWPPP) was also prepared for the Area I Site. The NOI was deemed accurate and complete, and the SWPPP was identified to be in substantive conformance with the requirements in the SPDES General Permit for Stormwater discharges from MS4 in a letter from NYSDEC to LPC dated September 17, 2014. The permit issued for the Site is NYR 10Y480.

Due to the permeable nature of the soil/fill material at the Site and its relatively flat topography, storm water ponding/runoff is not expected to pose a significant concern. Silt

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[7] "Stormwater Pollution Prevention Plan (SWPPP) CNSE Buffalo High Tech Manufacturing Hub at RiverBend and Buffalo River Area of Concern, Habitat Restoration – RiverBend Phase II, City of Buffalo, Erie County, New York". Prepared by CHA for LPCiminelli Inc. August 2014.

fencing has been previously installed around the perimeter of the Site and will be maintained in accordance with the SWPPP, in addition to the required inspections. Therefore, storm water ponding/runoff is not expected to pose a significant soil particulate or contaminant transport pathway during TENORM reuse activities.

3.3 TENORM Stockpile Excavation, Transportation, & Placement

Material present in the stockpile will be excavated and placed into dump trucks for transportation to the reuse area at the Site. The materials will be placed on the ground and spread out to an approximate 6-inch uncompact lift using a bull dozer. The material will be spread out in approximate 15 foot wide windrows within the placement area. Each windrow will be divided into 50 foot long sections with stakes identifying the placement area. See Figure 4 for proposed TENORM layout and field screening plan.

During the TENORM placement, FAA will utilize the site survey controls elevations to verify and document the 6-inch uncompact lift thickness at three (3) locations within each 15 foot wide by 50 foot long windrow section: starting point of the placement area, 25 foot mark (midpoint), and 50 foot mark (end) as shown on Figure 4. Once the uncompact lift thickness is verified, it will be field screened/sampled (as discussed in Section 3.4).

In general, the majority of the TENORM reuse placement area will be covered with a 6-inch uncompact lift prior to placing the subsequent lifts. This will allow for the field screening and confirmatory sample results to be obtained prior to placing the next lift over the material. Once deemed acceptable, LPC will place two (2) consecutive 6-inch uncompact lifts prior to compacting the material, rather than compacting each individual 6-inch lift. After the compaction is complete, the elevation of the top of the compacted material will be measured and the next 6-inch uncompact lift will be placed. This process will continue until the required TENORM grades are achieved allowing for a minimum of 1 foot of acceptable cover material (as outlined in the SMP) or hardscape cover to be placed.

3.4 Field Screening & Analytical Confirmation Sampling

To verify that the TENORM placed is acceptable for reuse, the placed and uncompact material will be field screened by GRD and confirmatory samples for laboratory analysis will also be collected.

Field Screening

The field screening will be completed by GRD's radiation technician using a 2x2 meter (Ludlum Model 2221 Ratemeter/Scaler with a sodium iodide scintillator or equivalent) to measure the gamma radiation being emitted from the placed material in cpm. Personnel performing field screening measurements will either have one year's experience performing measurements where the radionuclides and nature/level of contaminants are similar to those of the Area I Site or will be under the direct supervision of an individual who has greater than five years of such experience.

After the TENORM is placed in a 6-inch uncompact lift, it will be field screened to determine if the material is under the accepted correlation for material reuse. The field screening will consist of collecting 1 minute measurements with the 2x2 meter at three (3) locations within each 50 foot by 15 foot windrow section (3 measurements every approximately 5 CY of placed material, see Figure 4). Locations for the 1-minute measurements will be selected based on a walkover scan of the windrow area and selected based on highest three (3) readings. As outlined in the Variance, placed material that is measured must be less than 12,000 cpm (accepted correlation: 12,000 cpm equates to 15 pCi/g) in order to be deemed acceptable for use as fill in approved placement areas.

If the 1 minute measurements are less than 12,000 cpm, the placed material is acceptable for reuse as placed. If placed material is measured to be greater than 12,000 cpm, it will be further evaluated, removed and staged for out-of-state disposal as discussed in Section 3.4.1.

Confirmation Sampling

In addition to field screening the placed material with the 2x2 meter, ten (10) confirmatory samples will be collected from the placed material to confirm the field correlation is accurate. Each composite sample will be made up of a five (5) point composite. The confirmation sampling locations will be based on the walkover survey/1-minute measurements collected previously and the sample composite locations will be based on the five (5) highest readings associated with the sample area. A minimum of four (4) of the composites will be collected from the top lift. The composite samples will be sent to Pace Analytical laboratory for Ra-226 analysis via EPA Method 901.1M. The results of the confirmatory samples from the top lift will be inserted in to the RESRAD model to demonstrate that exposure at the surface of the cover is protective of public health and discussed in a section of a final construction completion detailing work completed under the variance.

To allow material placement to continue in a timely manner, the laboratory will use 6-day in-growth curves to estimate the concentration of Ra-226 after 6 days, rather than waiting the typical 21 days. This will allow the confirmatory analytical results to be received and reviewed prior to covering with the subsequent lifts. If the analytical results of the composite sample contains less than 15 pCi/g Ra-226, the next lift will be placed. If the analytical results are greater than 15 pCi/g, the material representative of the composite sample will be removed and staged for out-of-state disposal.

3.4.1 Unacceptable Field Screening & Confirmation Sampling

If the results of the 1-minute field screening measurement(s) are greater than 12,000 cpm, the material represented by the measurement is deemed unacceptable and will need to be delineated, removed from the placement area, staged in an area north of the Toe of the Site placement area as shown on Figure 4. TENORM unacceptable for reuse will be disposed of out-of-state.

To assess the extent of the unacceptable material, four (4) additional 1-minute measurements will be collected (north, south, east and west) around the unacceptable measures at half the distance between the unacceptable measurement and next adjacent acceptable measurement. If the four (4) 1-minute measurements are acceptable, the location of these delineation measurements identify the limits of the unacceptable material to be removed. If there are additional unacceptable measurements during the delineation, the location of the previously measured adjacent acceptable measurement will be used to represent the limit of the unacceptable material to be removed. If all five (5) of the initial 1-minute measurements are unacceptable, the entire approximately 14 CY (50 foot by 15 foot by 6-inch) uncompact lift will be removed from the placement area.

If the results of the five (5) point composite confirmation sample are above 15 pCi/g for Ra-226, the material represented by the composite sample will be removed and staged for out-of-state disposal.

At this time, the formal staging area for the unacceptable material has not been defined due to on-going construction activities at the Site. However, material deemed unacceptable

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for reuse will likely be staged on the western portion of the Site, west of the current building location and the western Site property limits, and outside of the "Toe of the Site" reuse area.

3.5 Cover System Installation

After the TENORM has been deemed acceptable, compacted and achieved the required Site design grades, the demarcation layer and cover system will be installed as discussed in Section 4.0.

4.0 ENGINEERING & INSTITUTIONAL CONTROLS

The future use of the TENORM placement area(s) have not been finalized, therefore the final cover system is unknown, but will either be an acceptable 1 foot soil/fill cover or hardscape as outlined in the SMP.

4.1 Engineering Controls

4.1.1 Demarcation Layer

A demarcation layer will be placed over the TENORM after the design grades have been achieved in the placement areas of the Site and prior to placement of cover system material. Demarcation will be placed so to easily identify the underlying TENORM sub-grade fill from the cover system material, and prevent the potential for inadvertent removal of TENORM during potential future Site work. The demarcation material will be comprised of an orange plastic industrial netting material that will be rolled across the TENORM and overlapped by approximately 1 foot at the seams.

4.1.2 Cover System

If a soil/fill cover system is to be utilized over the TENORM, it will consist of a minimum of 1 foot of acceptable material meeting the criteria of the SMP.

If the cover system is a hardscape (i.e., asphalt cover for parking lot) it will be composed of the materials required to properly construct the hardscape for it end-use (i.e., asphalt parking lot with required sub-base for proper construction).

Cover system material(s) brought onto the Site, it will be done in accordance with the requirements of the SMP. The materials will be documented in the Construction Completion Report, further discussed in Section 6.3.

If excavation activities are required after construction of the cover system, they will be completed in accordance with the Excavation Work Plan appendix of the SMP.

4.1.3 Import Criteria

4.1.3.1 General

All materials proposed for import onto the Site must be approved by Benchmark and the NYSDEC. The criteria under which off-site material may be used as cover or backfill are presented in SMP.

4.1.3.2 Quality Assurance Requirements

In the event that the Site will have a 1 foot soil cover are part of the final cover system design, all imported soil sources, including general backfill soil and topsoil, will be subject to third-party testing to verify that they meet the quality assurance requirements specified below. The required specified number of samples will be submitted to an independent, NYSDOH ELAP-certified laboratory for analysis. Benchmark will be notified of the sampling and provided an opportunity to observe the sample collection work.

All analyses will be in accordance with USEPA SW-846 methodology. The laboratory data package will be a Category A deliverable; however, the NYSDEC may request, at any time, to upgrade the deliverable to Category B.

Discrete grab samples will be collected for VOC analysis. For all other required analyses, a minimum of four (4) grab samples will be collected to form a single composite sample.

Target import criteria are the Site-Specific Action Levels (SSALs) established in the Site Management Plan.

4.2 Institutional Controls

The imposition of an Institutional Control in the form of an Environmental Easement will be granted to NYSDEC and recorded with the Erie County Clerk for the Site. The environmental easement will require compliance with the SMP, the IC/ECs placed on the Site, identify use restrictions (e.g., commercial and/or industrial) and restrict the use of groundwater as a source of potable and/or process water without New York State Department of Health approval.

5.0 COMMUNITY AIR MONITORING

Real-time community air monitoring will be performed by Benchmark-TurnKey during TENORM reuse activities at the Site, including excavation, grading, and cover system activities. Particulate and vapor monitoring will be performed downwind of the work area as outlined in the SMP. The CAMP is consistent with the requirements for community air monitoring at remediation sites as established by the NYSDOH and NYSDEC and follows procedures and practices outlined under DER-10 Appendix 1A (NYSDOH's Generic Community Air Monitoring Plan) and Appendix 1B (Fugitive Dust and Particulate Monitoring) which have been included in Appendix A of this document.

6.0 RADIATION SAFETY MONITORING

Radiation safety monitoring will be performed by GRD during TENORM reuse activities at the Site, including excavation, grading, field screening, and cover system activities.

6.1 Personnel Monitoring

The dose rates and total dose from exposure to radiation and radioactive materials is expected to be significantly less than 1 milli-Sievert (100 mrem). Because of this anticipated low total dose, no individual personnel monitoring (either external or internal) will be completed. Personnel monitoring is required under NYCRR Code 16 specifications when radiation doses are expected to exceed 500 mrem.

6.2 Personal Protection Equipment

No specific personal protection equipment (PPE) will be required for radiological protection as part of this TENORM reuse project. PPE for construction safety purposes will be worn in accordance with the HASPs discussed in Section 3.1.3.

6.3 Equipment Monitoring

Surface measurements (before and after) will be made of construction equipment and personnel during the day to ensure TENORM levels are acceptable. Direct surface measurements of TENORM requiring restriction and decontamination of equipment are as follows (listed in Appendix A of NYSDOH Code 16):

- Alpha 20 dpm/100 cm2 removable
- Alpha 500/100 cm2 total
- Beta 1000 dpm/100 cm2 removable
- Beta 5000 dpm/100 cm2 total

6.4 Radiation Particulate Monitoring

In addition to the CAMP discussed in Section 5.0, radiation particulate monitoring will be conducted at the Site. Three (3) particulate air sample locations will be used to collect particulate with low-flow air pumps (F&J low volume pump or equivalent) from one (1) upwind and two (2) downwind locations of the TENORM reuse placement area. Particulate in the air will be collected onto filter cassettes within the low-flow pumps that collect particulate as air is drawn in and passed through the cassettes. At the completion of the each work day, a Ludlum Model 2929 scaler (or equivalent) will be used to measure the alpha, beta/gamma radiation in counts per minute (cpm) associated with the particulate collected on the filters at the Site. The results of the particulate screening will be compared to the Occupational Values provided for Radium-226 on Table 1 of 10 CFR 20, Standard for Protection Against Radiation, Appendix B.

Based on the radiation particulate monitoring completed by GRD as part of the Area I Site redevelopment activities, the radiation particulate monitoring data has not exceeded background measurements, which are as follows.

- Alpha: less than 1 cpm
- Beta/Gamma: 40-50 cpm

7.0 DOCUMENTATION AND REPORTING

Benchmark-TurnKey will be on-site to document the TENORM reuse activities at the Site. Such documentation will include, at minimum, reports of construction activities, community air monitoring results, gamma radiation measurements, photographs and sketches, as necessary.

7.1 Construction Monitoring

Standard reporting procedures for Site activities will include preparation of a field activity reports and, when appropriate, problem identification and corrective measures reports. Appendix B contains sample project documentation forms. Information that may be included on the field activity report form includes:

- Activities and locations of construction work under way.
- Equipment and personnel working in the area, including subcontractors.
- A description of subsurface soil/fill encountered, CAMP results, placement of cover materials, including verification (certification) documentation.

The NYSDEC will be notified of problems requiring modifications to this TRWP or completing the construction item(s). Problem identification and corrective measures reports will provided to NYSDEC whenever major field problems are encountered and corrective measures are necessary and will be included as part of the Construction Completion Report (CCR). Changes or additions to the TRWP will also be noted in the CCR.

Photographic documentation of TENORM reuse activities will be prepared by Benchmark-TurnKey throughout the duration of the project as necessary to convey typical work activities and whenever changed conditions or special circumstances arise. Photographs will be provided in digital format.

7.2 Progress Reports

Benchmark-TurnKey will prepare and submit to NYSDEC monthly progress reports that include:

- Activities performed during reporting period.
- Results of tests or other pertinent data.
- Work scheduled for the upcoming reporting period.

- Other actions/information pertinent to the project.
- Percentage of completion, delays encountered or anticipated that may affect the schedule, and a description of efforts made to mitigate those delays or anticipated delays.

7.3 Construction Completion Report

A Construction Completion Report (CCR) will be prepared and submitted to the NYSDEC as part of the documenting the TENORM reuse activities. The report will be submitted within 60 days of completion of the work and will also be required to be submitted with the Periodic Review Report (PRR) which documents Site activities under for the VCP for the corresponding time period.

The CCR will be prepared to document that activities were completed in accordance with the TRWP and consistent with the requirements of Section 5.8 of DER-10 and include:

- Text describing the TENORM placement, field screening, confirmation sampling, and cover system installation activities performed.
- A description of any problems encountered, deviations from the TRWP, and associated corrective measures taken; and other pertinent information necessary to document that the Site activities were carried out in accordance with this TRWP.
- A Site map showing the extent of TENORM reuse activities, lift placement thicknesses, confirmatory sample locations, and type of cover system installed.
- Field Screening and laboratory analytical data.
- Copies of field activity reports and, if applicable, problem identification and corrective measure reports.
- A certification by a licensed NYS Professional Engineer in accordance with Section 1.5 of DER-10.

7.4 Site Management Plan

An updated Site Management Plan (SMP) will be prepared for the Site. It will be developed using the most recent NYSDEC SMP template (August 2015) to provide protocols and procedures to address soil/fill that may be excavated at the Site during future redevelopment and the maintenance of the cover system. The SMP will be developed to replace the current SMP which is currently being implemented as part of the Site redevelopment activities. This SMP was remain in effect until the Environmental Easement is extinguished in accordance with ECL Article 71, Title 36.

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7.5 Corrective Measures Plan

If any component of the remedy is found to have failed, or if the periodic certification cannot be provided due to the failure of an institutional or engineering control, a Corrective Measures Plan will be submitted to the NYSDEC for approval. This Plan will explain the failure and provide the details and schedule for performing work necessary to correct the failure. Unless an emergency condition exists, no work will be performed pursuant to the Corrective Measures Plan until it is approved by the NYSDEC.

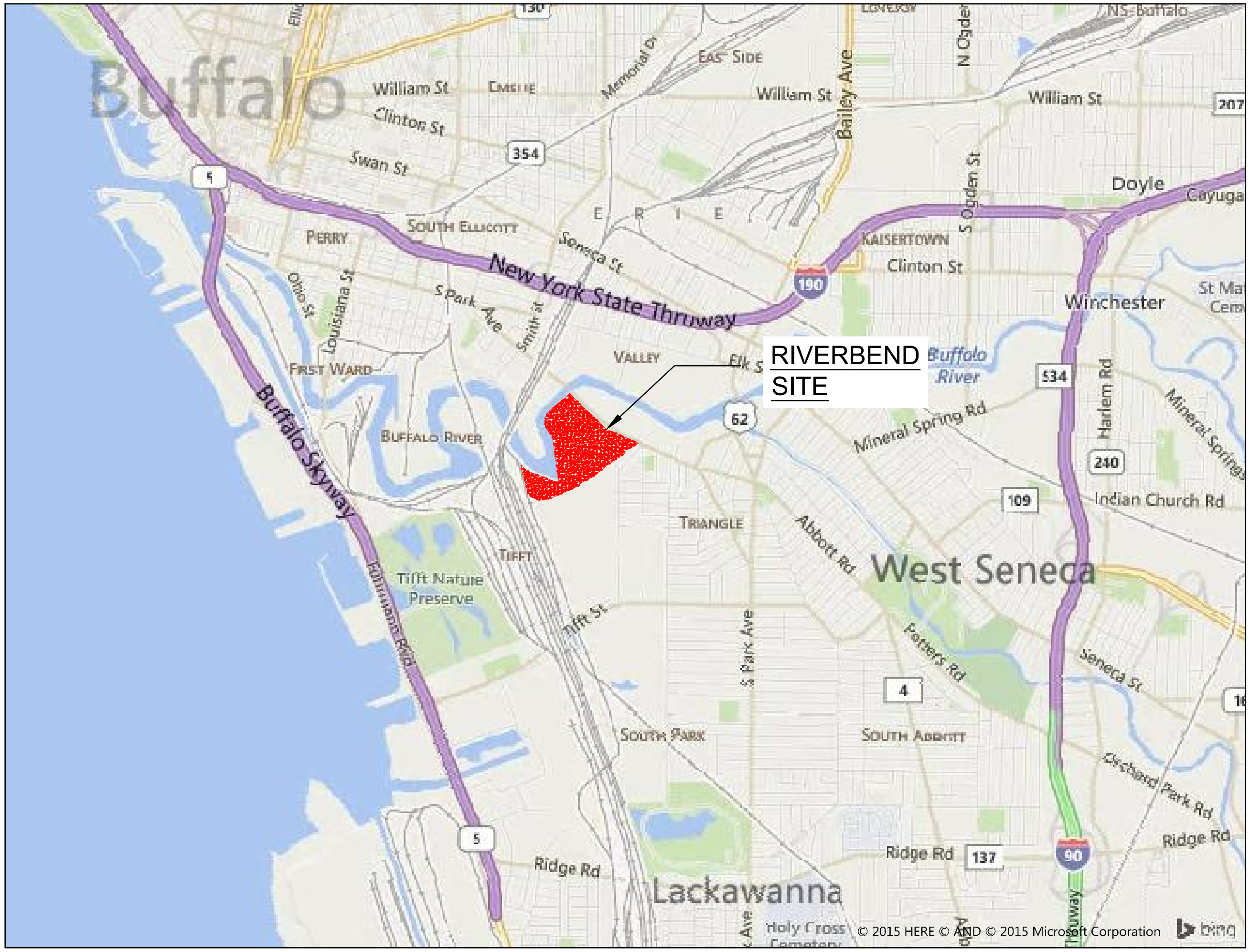
8.0 PROJECT SCHEDULE

TENORM reuse activities at the Site are expected to begin in late May 2016, with NYSDEC approval of the TRWP. The equipment and labor force to implement the TRWP is already on-site. The NYSDEC Project Manager will be notified seven (7) days in advance of the start of field activities related to the TENORM placement activities.

FIGURES

F:\CAD\TurnKey\LPCiminelli Construction\TENORM Work Plan\Figure 1; Site Locus.dwg

NTS



APPROXIMATE SCALE 1" = 5,000 FEET

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

2558 HAMBURG TURNPIKE
SUITE 300
BUFFALO, NY 14218
(716) 856-0599

PROJECT NO.: 0330-015-002

DATE: FEBRUARY 2016

DRAFTED BY: RFL

LOCUS PLAN

TENORM REUSE WORK PLAN

HIGH TECH MANUFACTURING HUB AT RIVERBEND
1339 SOUTH PARK AVENUE BUFFALO, NEW YORK 14220

PREPARED FOR

FORT SCHUYLER MANAGEMENT CORPORATION

FIGURE 1

F:\CAD\TurnKey\LPCiminelli Construction\TENORM Work Plan\Figure 2; Aerial Riverbend.dwg

LEGEND:

PROPERTY BOUNDARY

PLANNED BUILDING

PLANNED ASPHALT (PARKING/ROADWAY)

N

400' 0' 400' 800'

SCALE: 1 INCH = 400 FEET
SCALE IN FEET
(approximate)

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC
2558 HAMBURG TURNPIKE
SUITE 300
BUFFALO, NY 14218
(716) 856-0599

JOB NO.: 0330-015-002

AERIAL SITE PLAN

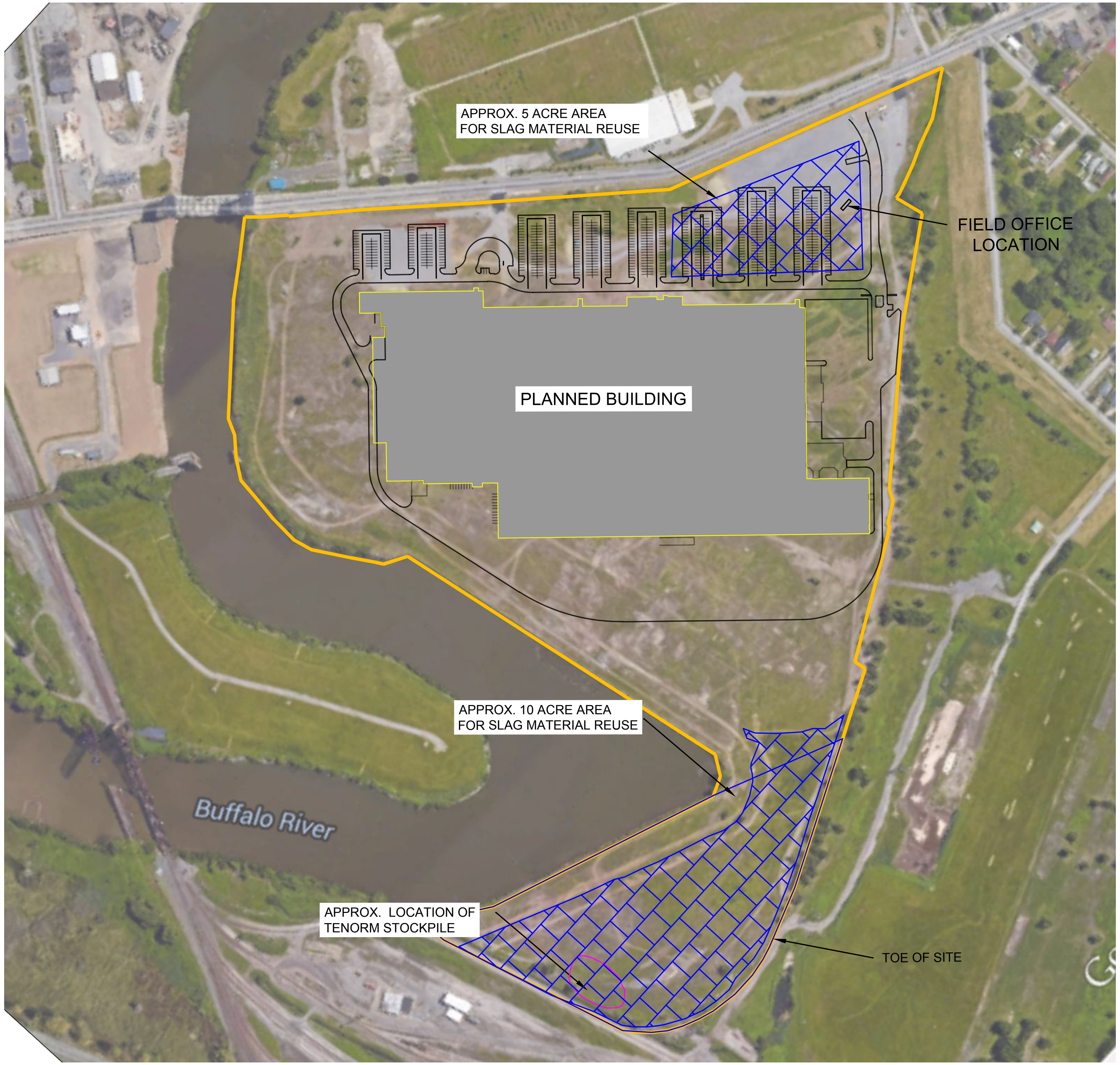
TENORM REUSE WORK PLAN

HIGH TECH MANUFACTURING HUB AT RIVERBEND
1339 SOUTH PARK AVENUE, BUFFALO, NEW YORK 14220

PREPARED FOR
FORT SCHUYLER MANAGEMENT CORPORATION

FIGURE 2

DATE: FEBRUARY 2016
DRAFTED BY: RFL



LEGEND:

- PROPERTY BOUNDARY
- PLANNED BUILDING
- PLANNED ASPHALT (PARKING/ROADWAY)
- PLANNED SLAG MATERIAL REUSE AREA AND COVER SYSTEM

N

400' 0' 400' 800'

SCALE: 1 INCH = 400 FEET
SCALE IN FEET
(approximate)

PROPOSED TENORM REUSE LOCATION PLAN

TENORM REUSE WORK PLAN

HIGH TECH MANUFACTURING HUB AT RIVERBEND
1339 SOUTH PARK AVENUE, BUFFALO, NEW YORK 14220

PREPARED FOR
FORT SCHUYLER MANAGEMENT CORPORATION

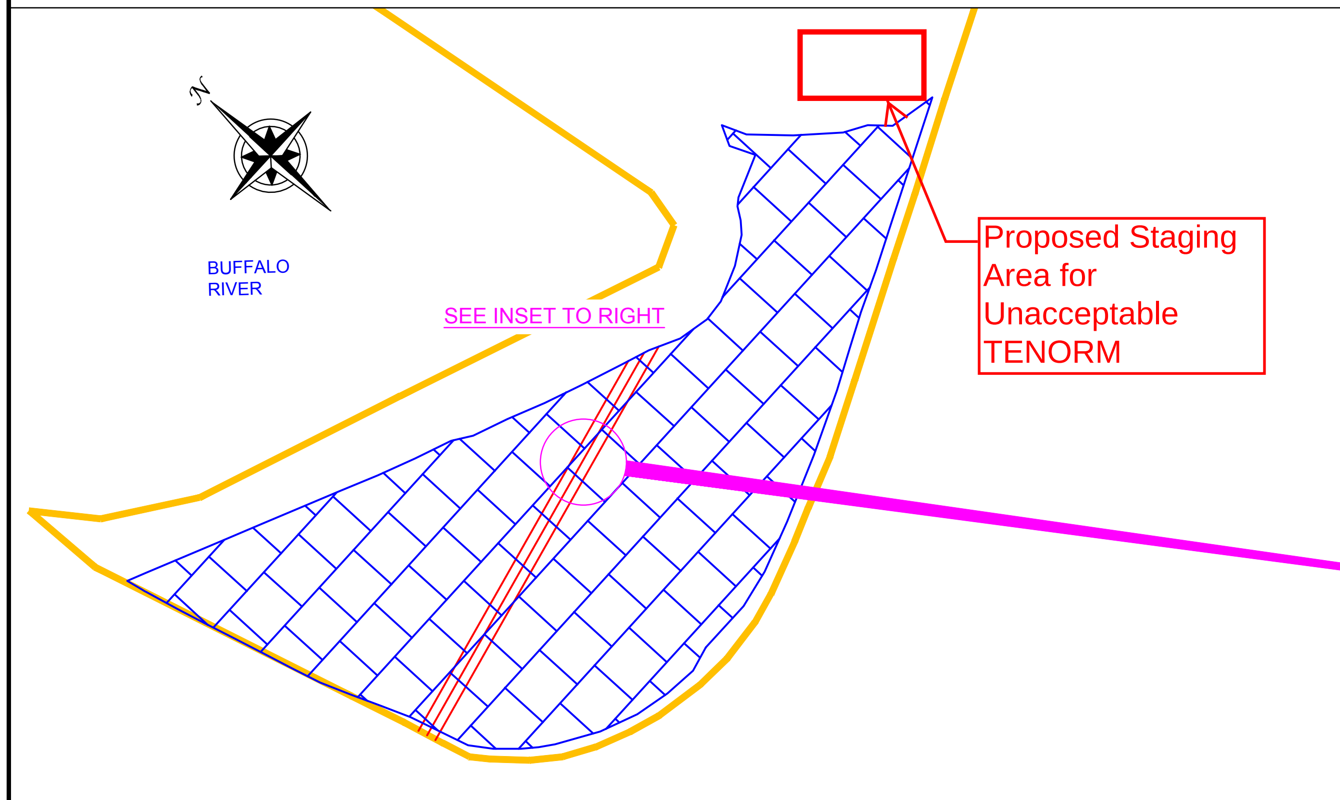
BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC
2558 HAMBURG TURNPIKE
SUITE 300
BUFFALO, NY 14218
(716) 856-0599

JOB NO.: 0330-015-002

FIGURE 3

DATE: FEBRUARY 2016
DRAFTED BY: RFL

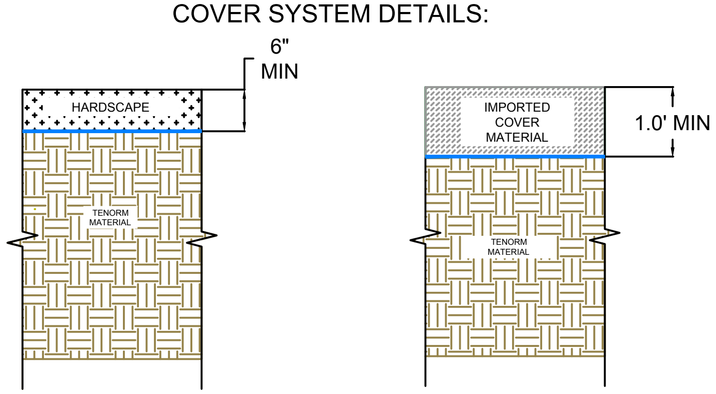
F:\CAD\TurnKey\LPCiminelli Construction\TENORM Work Plan\Figure 3; Site Layout Rev.dwg



TENORM REUSE LOCATION AREA

APPROX. SCALE 1" = 300'

COVER SYSTEM DETAILS:



LEGEND:

DEMARCATION LAYER

NOTES:
HARDSCAPE MEANS BUILDING, PAVING, SIDEWALK, ETC

LEGEND:

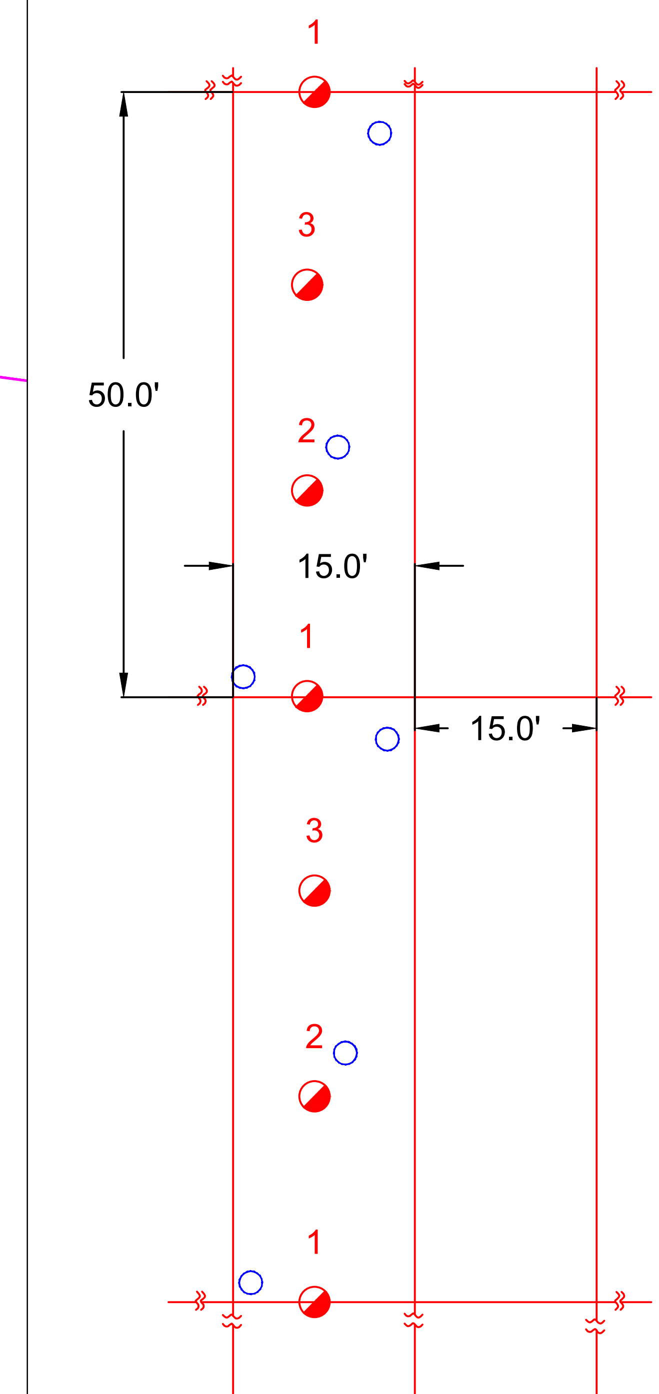
PROPERTY BOUNDARY

SURVEY LOCATION TO VERIFY LIFT THICKNESS

2 1-MINUTE FIELD MEASUREMENT LOCATION

PLANNED TENORM SLAG MATERIAL REUSE AREA AND COVER SYSTEM

EXAMPLE WINDROW



INSET

NTS

DATE: FEBRUARY 2016
DRAFTED BY: RFL

2558 HAMBURG TURNPIKE
SUITE 300
BUFFALO, NY 14218
(716) 856-0599

BENCHMARK
ENVIRONMENTAL
ENGINEERING &
SCIENCE, PLLC

JOB NO.: 0330-015-002

PROPOSED TENORM LAYOUT AND FIELD SCREENING PLAN

TENORM REUSE WORK PLAN

HIGH TECH MANUFACTURING HUB AT RIVERBEND
1339 SOUTH PARK AVENUE, BUFFALO, NEW YORK 14220

PREPARED FOR
FORT SCHUYLER MANAGEMENT CORPORATION

FIGURE 4

APPENDIX A

COMMUNITY AIR MONITORING PLAN

Appendix 1A
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

December 2009

Appendix 1B
Fugitive Dust and Particulate Monitoring

A program for suppressing fugitive dust and particulate matter monitoring at hazardous waste sites is a responsibility on the remedial party performing the work. These procedures must be incorporated into appropriate intrusive work plans. The following fugitive dust suppression and particulate monitoring program should be employed at sites during construction and other intrusive activities which warrant its use:

1. Reasonable fugitive dust suppression techniques must be employed during all site activities which may generate fugitive dust.

2. Particulate monitoring must be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Remedial activities may also include the excavation, grading, or placement of clean fill. These control measures should not be considered necessary for these activities.

3. Particulate monitoring must be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM10) with the following minimum performance standards:

(a) Objects to be measured: Dust, mists or aerosols;
(b) Measurement Ranges: 0.001 to 400 mg/m3 (1 to 400,000 :ug/m3);
(c) Precision (2-sigma) at constant temperature: +/- 10 :g/m3 for one second averaging; and +/- 1.5 g/m3 for sixty second averaging;
(d) Accuracy: +/- 5% of reading +/- precision (Referred to gravimetric calibration with SAE fine test dust (mmd= 2 to 3 :m, g= 2.5, as aerosolized);
(e) Resolution: 0.1% of reading or 1g/m3, whichever is larger;
(f) Particle Size Range of Maximum Response: 0.1-10;
(g) Total Number of Data Points in Memory: 10,000;
(h) Logged Data: Each data point with average concentration, time/date and data point number
(i) Run Summary: overall average, maximum concentrations, time/date of maximum, total number of logged points, start time/date, total elapsed time (run duration), STEL concentration and time/date occurrence, averaging (logging) period, calibration factor, and tag number;
(j) Alarm Averaging Time (user selectable): real-time (1-60 seconds) or STEL (15 minutes), alarms required;
(k) Operating Time: 48 hours (fully charged NiCd battery); continuously with charger;
(l) Operating Temperature: -10 to 50^{o} C (14 to 122^{o} F);
(m) Particulate levels will be monitored upwind and immediately downwind at the working site and integrated over a period not to exceed 15 minutes.

4. In order to ensure the validity of the fugitive dust measurements performed, there must be appropriate Quality Assurance/Quality Control (QA/QC). It is the responsibility of the remedial party to adequately supplement QA/QC Plans to include the following critical features: periodic instrument calibration, operator training, daily instrument performance (span) checks, and a record keeping plan.

5. The action level will be established at 150 ug/m3 (15 minutes average). While conservative,

this short-term interval will provide a real-time assessment of on-site air quality to assure both health and safety. If particulate levels are detected in excess of 150 ug/m3, the upwind background level must be confirmed immediately. If the working site particulate measurement is greater than 100 ug/m3 above the background level, additional dust suppression techniques must be implemented to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection for on-site personnel and implementing additional dust suppression techniques (see paragraph 7). Should the action level of 150 ug/m3 continue to be exceeded work must stop and DER must be notified as provided in the site design or remedial work plan. The notification shall include a description of the control measures implemented to prevent further exceedances.

6. It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM10 at or above the action level. Since this situation has the potential to allow for the migration of contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potential--such as solidification and treatment involving materials like kiln dust and lime--will require the need for special measures to be considered.

7. The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:

(a) Applying water on haul roads;
(b) Wetting equipment and excavation faces;
(c) Spraying water on buckets during excavation and dumping;
(d) Hauling materials in properly tarped or watertight containers;
(e) Restricting vehicle speeds to 10 mph;
(f) Covering excavated areas and material after excavation activity ceases; and
(g) Reducing the excavation size and/or number of excavations.

Experience has shown that the chance of exceeding the 150ug/m3 action level is remote when the above-mentioned techniques are used. When techniques involving water application are used, care must be taken not to use excess water, which can result in unacceptably wet conditions. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

8. The evaluation of weather conditions is necessary for proper fugitive dust control. When extreme wind conditions make dust control ineffective, as a last resort remedial actions may need to be suspended. There may be situations that require fugitive dust suppression and particulate monitoring requirements with action levels more stringent than those provided above. Under some circumstances, the contaminant concentration and/or toxicity may require additional monitoring to protect site personnel and the public. Additional integrated sampling and chemical analysis of the dust may also be in order. This must be evaluated when a health and safety plan is developed and when appropriate suppression and monitoring requirements are established for protection of health and the environment.

APPENDIX B

PROJECT DOCUMENTATION FORMS

BENCHMARK
Environmental
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Science, PLLC

INSPECTOR'S DAILY REPORT

Page ___ of ___

CONTRACTOR:	JOB NO.:
CLIENT:	DATE:

LOCATION:		DAY: Su M Tu W Th F Sa	
WEATHER:	TEMP: °F	START:	END:

WORK PERFORMED:

TEST PERFORMED:	QA PERSONNEL:
	SIGNATURE:

Benchmark Environmental Engineering & Science, PLLC

INSPECTOR'S DAILY REPORT

(CONTINUED) Page ____ of ____

CONTRACTOR:	JOB NO.:
CLIENT:	DATE:

MEETINGS HELD & RESULTS:

CONTRACTOR'S WORK FORCE AND EQUIPMENT

DESCRIPTION	H	#	DESCRIPTION	H	#	DESCRIPTION	H	#
Field Engineer						Front Loader Ton		
Superintendent						Bulldozer		
Laborer-Foreman						DJ Dump Truck		
Laborer						Water Truck		
Operating Engineer			Equipment			Backhoe		
Carpenter			Generators			Excavator		
Ironworker			Welding Equipment			Pad foot roller		
Concrete Finisher			Roller					
			Paving Equipment					
			Air Compressor					

REMARKS:

REFERENCES TO OTHER FORMS:

SAMPLES COLLECTED:

Sample Number:

Approx. Location of Stockpile:

No. of Stockpile

Date of Collection:

Weather:

Field Observations:

BENCHMARK Environmental Engineering & Science, PLLC

DAILY LOG				
	DATE			
	REPORT NO.			
	PAGE	OF		

CORRECTIVE MEASURES REPORT

Date:

Project:

Job No:

Location:

CQA Monitor(s):

Client:

Contractor:

Contractor's Supervisor:

WEATHER CONDITIONS:

Ambient Air Temp. - A.M.:

Ambient Air Temp. - P.M.:

Wind Direction:

Wind Speed:

Precipitation:

Corrective Measures Undertaken (reference Problem Identification Report No.)

Retesing Location:

Suggested Method of Minimizing Re-Occurrence:

Approvals (initial):

CQA Engineer:

Project Manager:

Signed:

CQA Representative

DAILY LOG				
	DATE			
	REPORT NO.			
	PAGE		OF	

PROBLEM IDENTIFICATION REPORT

Date:

Project:

Job No:

Location:

CQA Monitor(s):

Client:

Contractor:

Contractor's Supervisor:

WEATHER CONDITIONS:

Ambient Air Temp. - A.M.:

Ambient Air Temp. - P.M.:

Wind Direction:

Wind Speed:

Precipitation:

Problem Description:

Problem Location (reference test location, sketch on back of form as appropriate):

Problem Causes:

Suggested Corrective Measures or Variances:

Linked to Corrective Measures Report No. *or Variance Log No.*

Approvals (initial):

CQA Engineer:

Project Manager:

Signed:

CQA Representative

ATTACHMENT 2

Austin Master Services, LLC

RADIATION PROTECTION PLAN - RIVERBEND TENORM DISPOSAL PROJECT

VERSION 1.0

January 9, 2016

PC

Prepared by:

Peter Collopy, CHP, CIH, CSP

Austin Master Services, LLC

Radiation Safety Officer

Introduction and Purpose

This plan provides the radiological protection requirements for personnel and activities associated with the loading and surveillance of technologically enhanced naturally occurring radiological material (TENORM) slag and comingled materials generated during redevelopment activities at the High Tech Manufacturing Hub at RiverBend site located at 1339 South Park Avenue, Buffalo, New York, 14220 (Site). The protection plan is designed based upon the following:

- The activities associated with TENORM include: loading, analysis and transport from the site.
- Characterization and surveillance data gathered by the incumbent radiological services group, Greater Radiological Dimensions, Inc. (GRD), during performance of excavation and construction tasks during redevelopment at the Site.
- New York State Department of Health (NYSDOH) NYCRR Code 16 radiation protection requirements.

AMS currently operates within NYS under a reciprocity agreement with NYSDOH, using our existing State of Ohio RML. AMS has applied for a NYS RML and as such as been granted approval to continue operations, without duration limitations, under the AMS State of Ohio RML until the NYSDOH RML is approved. Copies of AMS Radiation Protection Procedures applicable to the activities being performed will be available onsite. The AMS ODH RML is shown in Attachment 1 to this Plan.

Background

The Site is the location of the former Republic Steel and Donner Hanna Coke facilities and is a New York State Department of Environmental Conservation (NYSDEC) Voluntary Clean-up Project (VCP) site. LPCiminelli Inc. (LPC) was selected through a competitive bidding process by Fort Schuyler Management Corporation (FSMC), a New York State (NYS) not-for-profit corporation which is the owner of the Site, as the project developer and construction manager for the Site. LPC is currently engaged in the construction of a 1.2 million square foot manufacturing facility for solar panel manufacturer Solar City. Redevelopment activities at the Site have included excavation in preparation for foundations and site utilities, building pad construction, the installation of foundations systems and structural steel erection.

On March 20, 2015, a single truck of material slated for recycling potentially contained material with radiologic isotopes as identified by the recycling facilities radiological monitors. The truck and its contents were returned to the Site and staged. This incident was the first time that FSMC/LPC was notified about any radiologic information for the Site to date.

The low-level radiological activity that is present at the Site is defined as TENORM. In general, TENORM is material containing radionuclides that are present naturally in rocks, soils, water, and minerals and that have become concentrated and/or exposed to the accessible environment as a result of human activities such as manufacturing, water treatment, or mining operations. The slag material present at the Site is a byproduct of the former iron and steel manufacturing operations and is the likely source of the TENORM.

The approximate 91-acre portion of the RiverBend Site currently undergoing redevelopment was historically owned and operated by Republic Steel and its successor, LTV Steel Company, and is also referred to as Area I. Area I was used for steel production from 1906 through the late 1980s. During the majority of the active steel manufacturing operations, the plant employed two (2) blast furnaces where molten iron was produced. The molten iron was subsequently converted to steel in two (2) basic oxygen furnaces. A byproduct of the production of iron and steel is slag. Blast furnace slag (i.e., iron slag) is generally comprised of the non-metallic components separated from mined iron ore during smelting in a blast furnace. Steel furnace slag is the product that is developed simultaneously with steel, where lime and oxygen are added to remove impurities. It consists of calcium silicates and combined oxides of iron, calcium and other metals. The slag material present in the subsurface at the RiverBend Site (Area I) is the likely the cause of the low-level TENORM, which resulted from the processing and co-processing of the NORM-containing ores and mined materials incorporated into the manufacturing processes. The primary isotope identified at the Site is Radium-226.

Radium (chemical symbol Ra) is a naturally-occurring radioactive metal. Its most common isotopes are Radium-226, Radium 224, and Radium-228. Radium is a radionuclide formed by the decay of uranium and thorium in the environment. Radium is considered a chain radionuclide. In nuclear science, the decay chain refers to the radioactive decay of different discrete radioactive decay products as a chained series of transformations. Most radioisotopes do not decay directly to a stable state, but rather undergo a series of decays until eventually a stable isotope is reached. See Attachment 2 to this Plan for additional information on decay chain radionuclides

Radium-226, Ra-228 and their respective progeny emit alpha and beta particles as well as gamma rays when undergoing radioactive decay. Radium occurs at low levels, 1 to 5 pCi/g in virtually all rock, soil, water, plants, and animals. In a concentrated form, such as use in medical applications, the gamma ray emissions present an external hazard due to the large number of gamma ray emissions from the concentrated form of Ra-226. Depending on the concentration in more diluted forms of radium such as with TENORM materials, radium is potentially an internal hazard from ingestion or inhalation of re-suspended dusts. Typically, concentrations of several hundred pCi/g of radium must be present for radiation doses from ingestion or inhalation of radium bearing materials to approach public or worker regulatory limits.

At the Riverbend site the concentrations of radium are below 30 pCi/g and as such standard industrial hygiene controls will limit radiation doses to virtually zero during the TENORM disposal project. These controls include periodic monitoring to ensure no build-up of radium contaminated dusts is occurring on equipment, vehicles or personnel, standing upwind during excavation operations, and limiting time where direct contact of materials may occur.

Scope of Work

AMS's role in this project is principally to determine the concentrations of radium in outgoing shipping of slag and comingled materials. This determination is done by use of an In-Situ gamma spectroscopy system known as ISOCS. In-situ spectroscopy uses sophisticated modeling of material characteristics (e.g.'s density, chemical composition) and container geometry to both identify the radionuclides present and the radioactivity within the container based on the radionuclides. The system used is similar to those in fixed radiochemistry laboratories but offers the advantage of real time measurements without the need for extensive sample preparation and hold times.

AMS's specific scope of work for the Riverbend TENORM Removal Project consists of:

- Coordination and oversight of the TENORM off-site disposal, including the approved landfill facilities, transportation companies, LPC provided-equipment, and analytical laboratory.
- Advising and assisting LPC on which vehicles to load and the limits of loading with TENORM.
- Performing on-site in-situ analysis of TENORM loaded vehicles to determine the total radium activity to determine disposition location for the TENORM materials.
- The collection of quality assurance (QA) samples during TENORM loading activities.
- Completing Non-Hazardous Waste Manifests for transporting the TENORM materials to the appropriate facilities.
- Providing transportation and disposal documentation to LPC.

Training and Qualifications

AMS Project Personnel

1. The following complement is the expected number and type of personnel assigned to the project.

    a. A Site Supervisor responsible for managing the project, directing AMS personnel in their work activities and serving as the AMS project liaison with LPC.

    b. Three Health Physics Technicians (HPTs) responsible for performing monitoring and positioning the ISOCS unit when analyzing slag/comingled material loads in trucks.

    c. One ISOCS Analyst responsible for performing the in-situ analysis of the loaded trucks. The ISOCS Analysts may also serve as a Health Physics Technician

    d. A Site Radiation Safety Officer (SRSO) will be assigned as the AMS individual designated to determine radiological surveys and protective controls required for TENORM disposal operations.
        - The SRSO must meet the training and experience requirements in AMS RML procedures. In this case the SRSO will require a minimum of five years' experience supervising radiation protection programs where TENORM is the principal contaminant.
        - The AMS Project Supervisor can will serve as the SRSO.

2. AMS personnel assigned to the project will attend the RiverBend Site orientation training required for contractors/consultants working at the Site.

3. AMS personnel assigned to the project will have received, as a minimum, basic radiological safety awareness training that meets the requirements of the AMS RML.
4. Personnel assigned to perform in-situ analysis of "loaded" TENORM trucks will have received certification from the in-situ analysis system vendor (Canberra, Inc.) to operate the equipment.
5. Personnel performing dose rate, gross gamma count rate or surface measurements will either have one year's experience performing measurements where the radionuclides and nature/level of contaminants are similar to those of the Riverbend Site or will be under the direct supervision of an individual who has greater than five years of such experience.
6. All AMS personnel will have received the OSHA 10-hour Construction Safety training or an equivalent approved by LPC's safety management representative.

Ancillary Support Personnel and Subcontractors

1. Non-AMS personnel responsible for loading TENORM and supporting the lining of the end-dump trailers will be provided by LPC. It is assumed the personnel provided by LPC will have already received the safety and radiological training requirements for the Riverbend Site.
2. The training and qualification for the waste transport drivers are provided in the Waste Management and Transport Plan.

Task Specific Safety and Radiological Requirements

Occupational Safety

1. The overall Riverbend Project Health and Safety Plan (HASP) safety requirements will be adhered to throughout all AMS on-site operations.
2. In addition to the HASP requirements, the AMS Activity Hazard Analysis (AHA) for ISOCS In-Situ Waste Analysis will be followed (see Attachment 3).

Radiological Safety

1. Personnel Monitoring
    a. The dose rates and total dose from exposure to radiation and radioactive materials is expected to be significantly less than 1 milli-Sievert (100 mrem).
    b. Because of this anticipated low total dose, no individual personnel monitoring (either external or internal) is required because monitoring is only required under the AMS and NYS NYCRR Code 16 specifications when radiation doses are expected to exceed 500 mrem.
2. TENORM Monitoring
    a. Radiological surveillance data indicate there is no total or transferrable contamination exceeding the AMS RML surface contamination limits and formal surface contamination measurements will not be required.
    b. As a monitoring precaution, surface measurements will be made of AMS equipment, LPC provided equipment and personnel during the day to ensure TENORM levels are below the AMS RML limits.
    c. Direct surface measurements of waste transport vehicle truck tires will be performed prior to their departure from the site to ensure total surface contamination is below AMS RML Limits.
    d. TENORM Levels requiring restriction and decontamination of equipment are as follows:
        - Alpha 20 dpm/100 cm^2 removable
        - Alpha 500/100 cm^2 total
        - Beta 1000 dpm/100 cm^2 removable
        - Beat 5000 dpm/100 cm^2 total

    Note: These limits are those listed in Appendix A of NYSDOH Code 16.
3. Dose/Exposure Rate Surveys
    a. Each loaded TENORM truck will be scanned using a Ludlum Model 19micro-Rmeter or meter with equivalent exposure rate detection capabilities.
    b. If exposure rates exceed 100 uR/hr at 0.5 meters or greater from the surface of the truck, then workers and/or drivers in the exposed area will be instructed to leave area or minimize time in the area to maintain exposures As Low As Reasonably Achievable (ALARA).
4. Source Control
    a. AMS possesses exempt check and calibration sources that when not under direct control of AMS personnel will be secured in a locked container or room.
5. Instrumentation
    a. The instrument operation and calibration procedures that are part of AMS's RML will be used for this project.
    b. All instruments will be calibrated annually at a minimum and will be functionally checked daily prior to use.
    c. The procedures and calibration/functional check logs will be maintained in hard copy form at the Site and available for review by regulatory authorities upon request.
6. Personal Protection Equipment (PPE)
    a. No specific PPE will be required for radiological protection as part of this project.
    b. PPE for occupational safety purposes will be worn in accordance with the Riverbend HASP and any applicable AMS AHAs.

7. Records
   a. Records of surveys and in-situ analysis will be maintained for the duration of the project at the Site. Records will be available for review by regulatory authorities upon request.
   b. Upon completion of project, copies of the records will be provided to LPC and the originals will be transferred to the AMS Martins Ferry waste processing facility until deemed appropriate for disposal by the AMS RSO.

Attachments to Radiation Protection Plan

Attachment 1 – AMS ODH RML

Attachment 2 – Argonne National Laboratory Fact Sheet, *Natural Decay Series: Uranium, Radium and Thorium* (August 2005)

Attachment 3 – ISOCS Activity Hazard Analysis (AHA)

Attachment 1

AMS ODH RML

OHIO DEPARTMENT OF HEALTH
LICENSE FOR RADIOACTIVE MATERIAL

Pursuant to Chapter 3748 of the Ohio Revised Code, and in reliance on statements and representations made by the licensee, a license is hereby issued authorizing the licensee named herein to receive, acquire, possess and transfer radioactive material as designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the applications of Chapter 3748 of the Ohio Revised Code and all applicable rules promulgated thereunder. This license is subject to all applicable rules, regulations and orders of the Ohio Department of Health now or hereinafter in effect and to any conditions specified below.

LICENSEE	LICENSE NUMBER
1. **Austin Master Services, LLC**	2. **03219 070000**
	EXPIRATION DATE 3. **February 1, 2019**
2. **355 Circle of Progress** **Pottstown, PA 19464**	FILE/ID NUMBER 4. **501482/10284**

6. RADIOACTIVE MATERIAL	7. CHEMICAL AND/OR PHYSICAL FORM	8. MAXIMUM QUANTITY THAT LICENSEE MAY PROCESS AT ANY ONE TIME UNDER THIS LICENSE
A. Uranium – Depleted and Natural	**A. Any**	**A. As necessary for the uses authorized in item no. 9. Total not to exceed 370 GBq (10 Ci)**
B. Any radioactive material with atomic numbers 1 to 103, except Special Nuclear Material	**B. Any**	**B. No single isotope to exceed 37 GBq (1Ci). Total not to exceed 370 GBq (10Ci)**
C. U-233	**C. Any**	**C. 200 grams as specified in condition no. 11**
D. Uranium enriched in the U-235 isotope	**D. Any**	**D. 350 grams of contained U-235 as specified in condition no.11**
E. Plutonium	**E. Any**	**E. 200 grams as specified in condition no. 11**
F. Ra-226	**F. Contaminant in TENORM solid waste**	**F. As necessary for the uses authorized in item no. 9. Total not to exceed 74 GBq (2 Ci)**
G. Ra-228	**G. Contaminant in TENORM solid waste**	**G. As necessary for the uses authorized in item no. 9. Total not to exceed 74 GBq (2 Ci)**

9. AUTHORIZED USE

A to E **Processing, storage, packaging, and shipment of radioactive material incident to the surface decontamination of structures, components and items for the purpose of unrestricted release. This license also authorizes surveys, characterizations and remediation of radioactively contaminated structures, materials, soils and soil-like materials.**

B ***Receipt, decay in storage and/or trans-loading of solid wastes containing Sc-46, Sb-124, Ir-192 or Au-198 tracer units in any combination.***

F to G **Receipt, shipment and radiological analysis of containerized TENORM solid waste.**

OHIO DEPARTMENT OF HEALTH LICENSE FOR RADIOACTIVE MATERIALS SUPPLEMENTARY SHEET	Page 2 of 4
	License Number: 03219070000
	File/ID Number: 501482/10284
	Amendment No. *3*

CONDITIONS

10. **Licensed materials shall be used only at 801 North 1st Street, Martins Ferry, Ohio 43935; and temporary job sites of the licensee anywhere in the State of Ohio. Except for calibration sources, reference standards and contaminated equipment owned by the licensee, processing of licensed material at each temporary job site shall be limited to material originating from each site. This material must either be transferred to an authorized recipient or remain at the temporary job site after licensee activities are complete.**

11 **For each kind of Special Nuclear Material, determine the ratio between the quantity of that Special Nuclear Material and the quantity specified in 8C, 8D, or 8E for the same kind of special nuclear material. The sums of such ratios for all kinds of Special Nuclear Material in combination shall not exceed "1" (i.e. unity).**

12. **Licensed material shall be used by those individuals receiving the training described in the license application dated 12/6/2013.**

13. The Radiation Safety Officer (RSO) for this license is: **Peter Collopy, CHP, CIH,CSP**

14 **The licensee shall notify the Ohio Department of Health in writing at least 14 days before initiating activities at a temporary job site. This notification shall include:**

A. The estimated type, quantity, and physical/chemical forms of licensed material to be used;

B. The specific site location;

C. A description of planned activities including waste management and disposition;

D. The estimated start date and completion date for the job; and

E. The name and title of a point of contact for the job, including information on how to contact the individual.

F. Written agreements between the licensee and customer pursuant to condition no. 15

15. **If a customer also holds a license issued by the Ohio Department of Health or the Nuclear Regulatory Commission, the licensee shall establish a written agreement between the licensee and the customer specifying which licensee activities will be performed under the customer's license and supervision and which licensee activities will be performed under the licensee's supervision pursuant to this license. The agreement shall include a commitment by the licensee and the customer to ensure safety, plus any commitments by the licensee to help the customer clean up the temporary job site if there is an accident. A copy of this agreement shall be included in the notification required by license condition 14.**

16. **The licensee shall maintain records of information important to decommissioning each temporary job site at the applicable job site pursuant to the applicable regulations. The records shall be made available to the customer upon request. At the completion of activities at a temporary job site, the licensee shall transfer these records to the customer for retention.**

17. **Before processing any licensed material at a temporary job site in quantities requiring an emergency plan the licensee shall either:**

A. Obtain Ohio Department of Health approval of an evaluation demonstrating that an emergency plan is not required pursuant to rules 3701:1-40-14 and 3701:1-44-14 of the Administrative Code.

B. Submit written confirmation to the Director, Ohio Department of Health, that licensee personnel have been trained and will follow the provisions of an existing emergency plan approved by the Ohio Department of Health or the Nuclear Regulatory Commission for the temporary job site.

18. **If approved by a Radiation Safety Officer specifically identified in this license, the licensee may take reasonable action in an emergency that departs from conditions in this license when the action is immediately needed to protect public health and safety, and no action consistent with all license conditions that can provide adequate or equivalent protection is immediately apparent. The licensee shall notify the Ohio Department of Health before, if practicable, and in any case, immediately after taking such emergency using the reporting procedure as specified in rule 3701:1-40-20 of the Administrative Code.**

19. **The licensee shall maintain complete and accurate records of the receipt and disposal of radioactive material. The licensee shall, for radioactive material no longer useful for any purpose and for any equipment or supplies contaminated with such material for which further use and decontamination is not planned, define those materials as radioactive waste and treat them as such in accordance with the following provisions:**

    A. **Radioactive waste material shall not be stored with non-radioactive waste.**

    B. **A written record of all radioactive waste material shall be maintained until it has been shipped to an authorized recipient in accordance with all applicable regulations. Accountability of radioactive waste material prepared for shipment but not yet shipped shall be maintained by the licensee by an internal record system such that the licensee is constantly aware of the material's location and the proposed time of shipment. Individuals who are involved in the shipping of such material and/or the storage of such material prior to shipment, shall be trained in the precautions necessary for such handling and storage.**

    C. **Shipment records of radioactive waste material shall be maintained and the licensee shall require written confirmation from the authorized recipient of such material that the material has been received.**

    D. **All records and written confirmations required by this condition shall be maintained by the licensee for inspection by the Ohio Department of Health.**

20. **Except for plutonium contained in a medical device designed for individual human application, no plutonium, regardless of form, shall be delivered to a carrier for shipment by air transport or transported in an aircraft by the licensee except in packages the design of which the U.S. NRC has specifically approved for transport of plutonium by air.**

21. **Sealed sources shall be tested for leakage and/or contamination in accordance with rule 3701:1-38-24 of the Ohio Administrative Code.**

22. **All sealed sources that are used or obtained shall have been evaluated and approved under the provision of rule 3701:1-46-49 of the Administrative Code or by equivalent NRC or Agreement State regulation.**

23. **Sealed sources or detector cells containing licensed material shall not be opened or sources removed from source holders by the licensee.**

24. **The licensee is authorized to transport licensed material only in accordance with the provisions of Chapter 3701:1-50 of the Ohio Administrative Code.**

25. **Within 30 days of completing activities at each temporary job site location, the licensee shall notify the Ohio Department of Health in writing of the temporary job site status and the disposition of any licensed material used.**

26. **The licensee is authorized to conduct radiological analysis of containerized TENORM solid waste in accordance with the Austin Master - Ohio TENORM Waste Acceptance Procedure, number RP-AMS-035 revision 4, dated 1/27/2014.**

27. ***The licensee is authorized to handle wastes containing Sc-46, Sb-124, Ir-192, or Au-198 tracer units in any combination, for decay in storage and/or trans-loading for shipment to an authorized disposal facility, in accordance with Austin Master – Handling and Disposition of Tracer Radionuclide Contaminated Hydro fracturing Sands procedure, number RP-AMS-036 revision 2, dated 4-10-2015.***

28. **Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents, including any enclosures, listed below. The Ohio Department of Health's statutes, rules, and orders shall govern unless statements, representations, and procedures in the licensee's application and correspondence are more restrictive than the regulations.**

A. Application dated 12/6/2013; and supplemental communications dated 12/13/2013; 1/6/2014; 1/26/2014; 1/27/2014; and 1/28/2014.

B. Letters dated 9/10 /2014 (Materials Disposition) and 9/5/2014 (Amendment # 2 Request).

C. Amendment request dated 1/2/2015; and supplemental communications dated 1/22/2015; 2/16/2015; 3/23/2015; and 4/10/2015.

For the Ohio Department of Health

DATE: 4/24/15

BY: [signature]

Michael J. Snee,
Bureau of Environmental Health and
Radiation Protection
on behalf of the Director of Health

Attachment 2

ANL Decay Chain Fact Sheet

Natural Decay Series:
Uranium, Radium, and Thorium

Uranium, radium, and thorium occur in three natural decay series, headed by uranium-238, thorium-232, and uranium-235, respectively. In nature, the radionuclides in these three series are approximately in a state of secular equilibrium, in which the activities of all radionuclides within each series are nearly equal.

Two conditions are necessary for secular equilibrium. First, the parent radionuclide must have a half-life much longer than that of any other radionuclide in the series. Second, a sufficiently long period of time must have elapsed, for example ten half-lives of the decay product having the longest half-life, to allow for ingrowth of the decay products *(see the companion fact sheet on Ionizing Radiation).* Under secular equilibrium, the activity of the parent radionuclide undergoes no appreciable changes during many half-lives of its decay products.

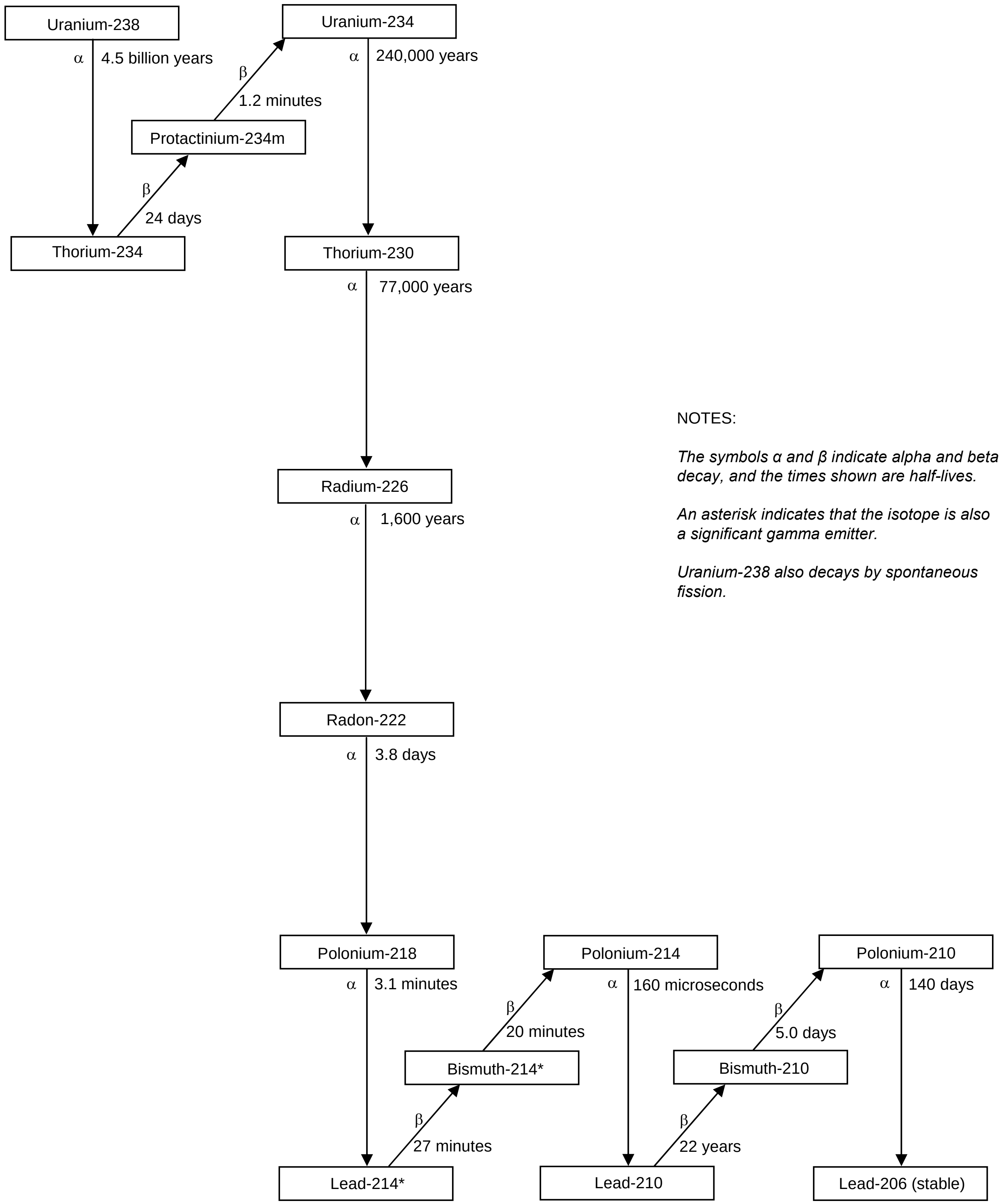
The radionuclides of the uranium-238, thorium-232, and uranium-235 decay series are shown in Figures N.1, N.2, and N.3, along with the major mode of radioactive decay for each. Radioactive decay occurs when an unstable (radioactive) isotope transforms to a more stable isotope, generally by emitting a subatomic particle such as an alpha or beta particle. Radionuclides that give rise to alpha and beta particles are shown in these figures, as are those that emit significant gamma radiation.

Gamma radiation is not a mode of radioactive decay (such as alpha and beta decay). Rather, it is a mechanism by which excess energy is emitted from certain radionuclides, i.e., as highly energetic electromagnetic radiation emitted from the nucleus of the atom. For simplicity, only significant gamma emissions associated with the major decay modes are shown in Figures N.1 through N.3; that is, radionuclides listed are those for which the radiation dose associated with gamma rays may pose a health concern. The gamma component is not shown for those radionuclides whose gamma emissions do not generally represent a concern.

Of the two conditions noted above for secular equilibrium, the first is generally met for the uranium-238, thorium-232 and uranium-235 decay series in naturally occurring ores. While the second condition may not be met for all ores or other deposits of uranium and thorium (given the extremely long half-lives for the radionuclides involved and the geological changes that occur over similar time scales), it is reasonable to assume secular equilibrium for naturally occurring ores to estimate the concentrations of the various daughter radionuclides that accompany the parent. The state of secular equilibrium in natural uranium and thorium ores is significantly altered when they are processed to extract specific radionuclides.

After processing, radionuclides with half-lives less than one year will reestablish equilibrium conditions with their longer-lived parent radionuclides within several years. For this reason, at processing sites what was once a single, long decay series (for example the series for uranium-238) may be present as several smaller decay series headed by the longer-lived decay products of the original series (that is, headed by uranium-238, uranium-234, thorium-230, radium-226, and lead-210 in the case of uranium-238). Each of these sub-series can be considered to represent a new, separate decay series. Understanding the physical and chemical processes associated with materials containing uranium, thorium, and radium is important when addressing associated radiological risks.

In the fact sheets developed for uranium, radium, and thorium, the contributions of radionuclides having half-lives less than one year were included in the risk coefficients. (Each fact sheet identifies which radionuclides are included in these coefficients.) In some situations, it may be necessary to add the radiological risk identified for a given radionuclide to that of its parent radionuclide to properly represent the total risk. For example, the radiological risk for thorium-232 is comprised of the risk for thorium-232 plus the risk for radium-228. Decay series information should be used together with the information in these fact sheets to ensure that the radiological risks associated with uranium, radium, and thorium are properly estimated and represented.



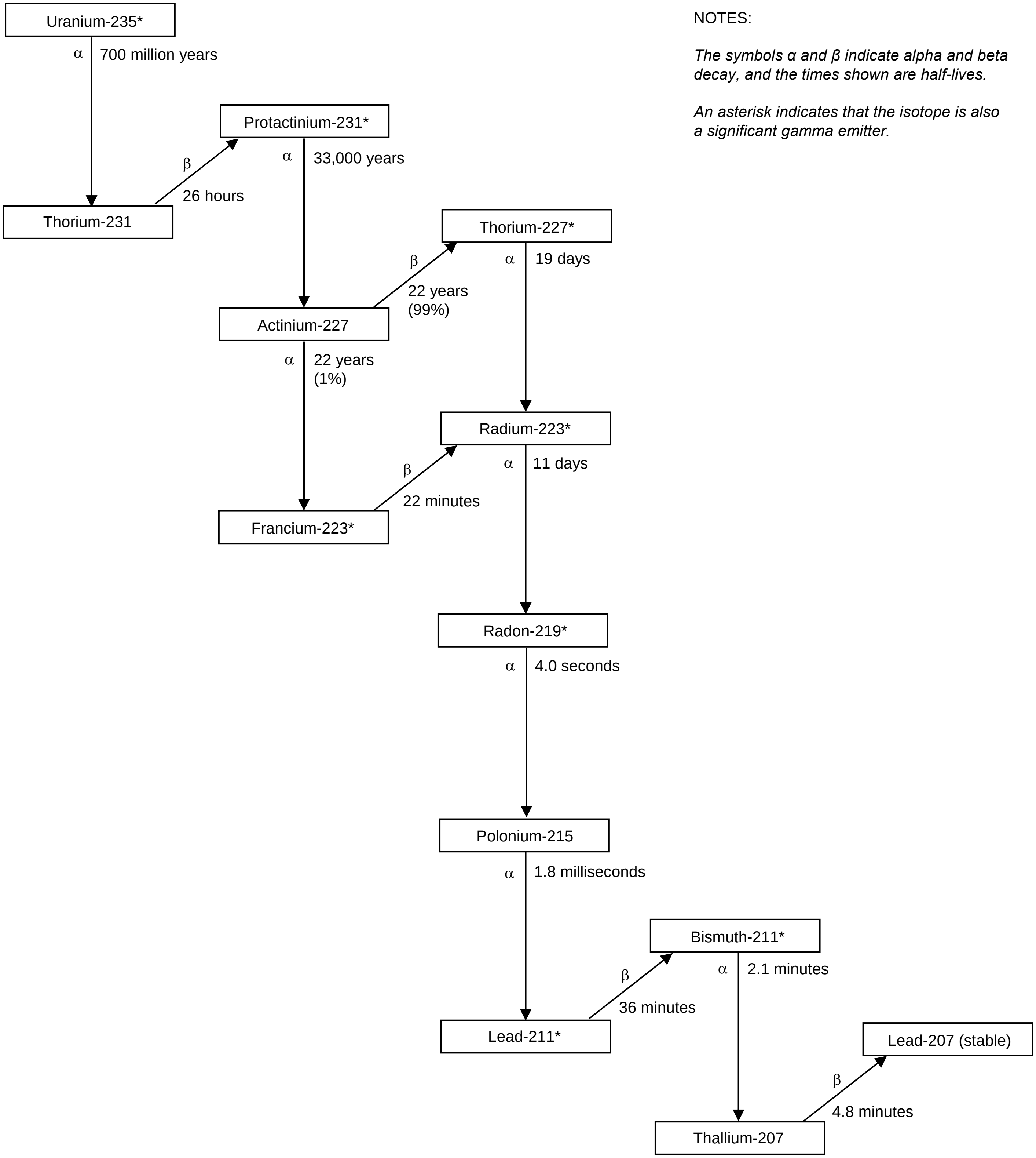
NOTES:

The symbols α and β indicate alpha and beta decay, and the times shown are half-lives.

An asterisk indicates that the isotope is also a significant gamma emitter.

Uranium-238 also decays by spontaneous fission.

FIGURE N.1 Natural Decay Series: Uranium-238

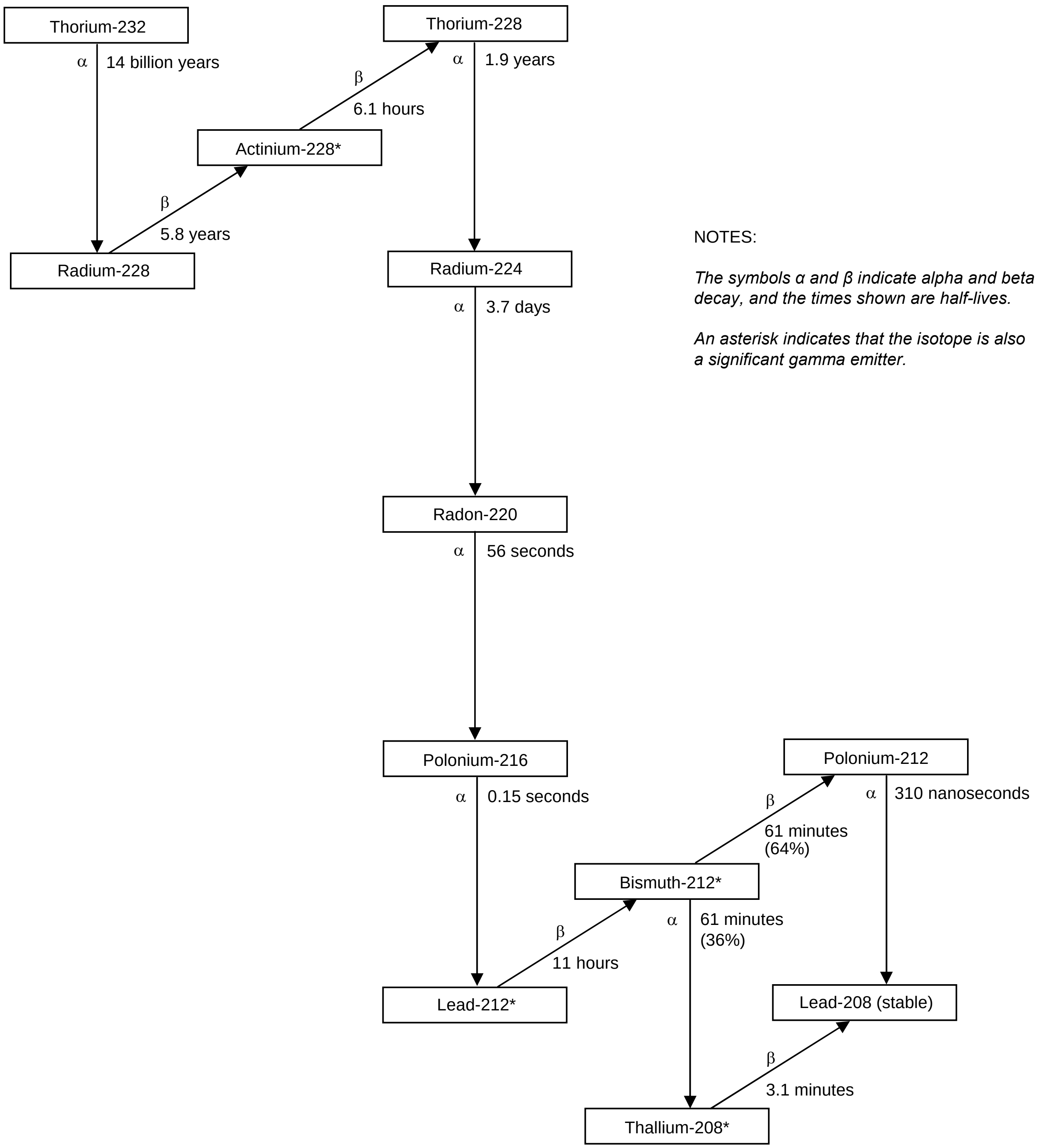


NOTES:

The symbols α and β indicate alpha and beta decay, and the times shown are half-lives.

An asterisk indicates that the isotope is also a significant gamma emitter.

FIGURE N.2 Natural Decay Series: Uranium-235



NOTES:

The symbols α and β indicate alpha and beta decay, and the times shown are half-lives.

An asterisk indicates that the isotope is also a significant gamma emitter.

FIGURE N.3 Natural Decay Series: Thorium-232

Attachment 3

ISOCS Operation AHA

Austin Master Services
Radiological • Remediation • Engineering

Activity/Work Task:	ISOCS Analysis			Overall Risk Assessment Code (RAC) (Use highest code)					M
Project Location:	Buffalo, New York			**Risk Assessment Code (RAC) Matrix**					
AHA Number:	2015-MFF-01			**Severity**	**Probability**				
Date Prepared:	10/22/2015	**Date Accepted:**			Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title):	Melissa Smalley, MFF Site RSO			Catastrophic	**E**	**E**	**H**	**H**	**M**
				Critical	**E**	**H**	**H**	**M**	**L**
Reviewed by (Name/Title):	Pete Collopy – RSO, CHP, CIH, EH&S Manager			Marginal	**H**	**M**	**M**	**L**	**L**
				Negligible	**M**	**L**	**L**	**L**	**L**

Notes: (Field Notes, Review Comments, etc.)

This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the LPC Riverbend HASP for additional requirements. Employees are to follow general site safety controls for Slips Trips and Falls, biological hazards, cuts/lacerations, pinch points, and emergency procedures.

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

	RAC Chart
"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.	
"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible	**E = Extremely High Risk**
	H = High Risk
Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.	**M = Moderate Risk**
	L = Low Risk

Job Steps	Hazards	Controls	RAC
1. Assemble ISOCS	a) Pinch point	• Wear leather or material handling work gloves • Avoid placing feet under collimator peg **NOTE:** Nitrile gloves should be worn when handling lead to protect against contamination	**L**
	b) Electrical Shock	• Inspect cords used for charging and use ground fault circuit interrupter	**L**
	c) Back/Arm strain, and injury	• Assemble according to manufacturer's instructions • Use ergonomic body positioning when lifting with head up and knees bent • Do not lift more than 50 lbs per individual without assistance • Use mechanical lifting devices when possible • When handling lead collimators, keep close to body	**L**

2. Fill ISOCS with Liquid Nitrogen	a) Skin Burns / Contact with hazardous substances	• Inspect valve alignment and pressure gauges and ensure set up meets manufacturers specifications • Wear thermal chemical work gloves and face shield when filling dewar with liquid Nitrogen • Stay out of re-fill area unless you are directly involved in the work • Keep all body parts clear of contact with liquid Nitrogen and/or filling hose	**L**
3. Place ISOCS Assembly on Forklift or Cart	a) Struck-by / Pinch point	• Ensure you are positioned so movement away from forklift is possible to avoid being caught between a solid, immovable object • Stand at position to avoid having feet under assembly during lift • Ensure forklift has lifting capacity for assembly weight • Prior to placement on forklift and directly after, inspect assembly to ensure all holds/screws are secure	**L**
4. Move ISOCS to Analysis Position	a) Vehicles traffic / contact	• High Visibility Vests must be worn at all times • Have a spotter for forklift operator • Have a spotter for all incoming trucks. • Ensure back-up alarms functioning • Determine and inform workers of vehicle travel path for work to be performed • Locate box/truck such that vehicle/pedestrian traffic ingress and egress does not come into path of work area • Continuous communication while moving equipment: All personal operating any equipment shall be equipped with handheld radio, and all other personal shall be equipped with a handheld radio or in near vicinity of someone with a radio, not greater than 10 meters • Use delineated travel pathway and ensure no other vehicle or pedestrian traffic in travel path	**M**
	b) Roll-over	• Establish travel path prior to movement • Avoid moving parallel along sloped hills and minimize movement up or down inclines > 10%	**M**
5. Perform analysis	a) Vehicle Traffic	• See 6 a)	**M**
	b) Struck by forklift	• Maintain visual contact with operator at all times • Ensure forklift wheels chocked or otherwise secured to prevent inadvertent movement	**M**
6. Return and disassembly	a) See job steps 3 - 6	• Perform steps 3 - 6 in reverse, above	**M**

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
1. Tools • Forklift • 20 yd^3 boxes • ISOCS Radiation Analyzer • Hand Held Tools • Hand Held Radios **2. PPE** • Material Handling/Nitrile Gloves • Thermal Chemical Gloves/Apron • Steel toed Boots • Hard Hat • Goggles/safety Glasses/Face shield • High Visibility Vests	**Competent / Qualified Personnel:** ISOCS Operator Training Radiation Safety – AMS site RSO or HP Technician assigned to process Certified Forklift Operator – Must meet OSHA 29CFR1910.178 training requirements **Training Requirements:** • HASP Orientation • Emergency Response Procedures • ISOCS Operator/SME Training • Radiation Awareness Training • AHAs/JHAs prior to start of each task • Daily Safety Tailgate • RWP	Daily inspection of equipment per manufacturer's instructions. Tag tools that are defective and remove from service. Daily inspection of work site for slip, trip and fall hazards and potential housekeeping deficiencies Power cord sets prior to use. Inspect all PPE prior to use

Print Name	Signature	Date
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Austin Master Services, LLC

TRANSPORTATION AND DISPOSAL PLAN - RIVERBEND TENORM DISPOSAL PROJECT

VERSION 1.0

January 9, 2016

Prepared by:

PC

Peter Collopy, CHP, CIH, CSP

Austin Master Services

Radiation Safety Officer

Introduction and Purpose

In support of the Riverbend technologically enhanced naturally occurring radiological material (TENORM) Disposal Project, Austin Master Services, LLC (AMS) shall ensure that all TENORM shipments are performed in compliance with Department of Transportation (DOT) regulations. Shipments under this plan will include TENORM originating from the High Tech Manufacturing Hub at RiverBend site located at 1339 South Park Avenue, Buffalo, New York, 14220 (Site). The implementation of this plan allows AMS to demonstrate full compliance with all applicable standards and contractual commitments. At a minimum, this plan addresses transportation of TENORM and disposal of those material at approved off-site locations.

This document defines the process for transport of TERNORM shipments, as well as incident response during transit. AMS personnel are responsible for the proper identification, classification, communication, containment, transportation and controls in accordance with the U.S. Department of Transportation (DOT), New York State Department of Environmental Conservation (NYSDEC), and U.S. Environmental Protection Agency (EPA) regulations.

A detailed description of the origin and materials to be transported is contained in the AMS Waste Management Plan for this project. The material is non-hazardous but possesses levels of total radium (Ra-226 and Ra-228) that exceed the New York State Department of Environmental Conservation (NYSDEC) has deemed unacceptable to remain on-Site. Consequently, the TENORM will be transported for disposal at approved out of state landfills.

Scope of Work

AMS's specific scope of work for the Riverbend TENORM Removal Project consists of:

- Coordination and oversight of the TENORM off-site disposal, including the approved landfill facilities, transportation companies, LPC provided-equipment, and analytical laboratory.
- Advising and assisting LPC on which vehicles to load and the limits of loading with TENORM.
- Performing on-site in-situ analysis of TENORM loaded vehicles to determine the total radium activity to determine disposition location for the waste materials. ADD
- The collection of quality assurance (QA) samples during waste loading activities.
- Completing Non-Hazardous Waste Manifests for transporting the TENORM waste materials to the appropriate facilities.
- Providing transportation and disposal documentation to LPC.

Training and Qualifications

AMS Project Personnel

1. The following complement is the expected number and type of personnel assigned to the project.

    a. A Site Supervisor responsible for managing the project, directing AMS personnel in their work activities and serving as the AMS project liaison with LPC.

    b. Three Health Physics Technicians (HPTs) responsible for performing monitoring and positioning the ISOCS unit when analyzing slag/comingled material loads in trucks.

    c. One ISOCS Analyst responsible for performing the in-situ analysis of the loaded trucks. The

ISOCS Analysts may also serve as a Health Physics Technician

d. A Site Radiation Safety Officer (SRSO) will be assigned as the AMS individual designated to determine radiological surveys and protective controls required for AMS operations.
   - The SRSO must meet the training and experience requirements in AMS RML procedures. In this case the SRSO will require a minimum of five years' experience supervising radiation protection programs where TENORM is the principal contaminant.
   - The AMS Project Supervisor can will serve as the SRSO.

2. AMS personnel assigned to the project will attend the RiverBend Site orientation training required for contractors/consultants working at the Site.

3. AMS personnel assigned to the project will have received, as a minimum, basic radiological safety awareness training that meets the requirements of the AMS RML.
4. Personnel assigned to perform in-situ analysis of "loaded" TENORM trucks will have received certification from the in-situ analysis system vendor (Canberra, Inc.) to operate the equipment
5. Personnel performing dose rate, gross gamma count rate or surface measurements will either have one year's experience performing measurements where the radionuclides and nature/level of contaminants are similar to those of the Riverbend Site or will be under the direct supervision of an individual who has greater than five years of such experience.
6. All AMS personnel will have received the OSHA 10-hour Construction Safety training or an equivalent approved by LPC's safety management representative.

Ancillary Support Personnel and Subcontractors

1. Non-AMS personnel responsible for loading TENORM and supporting the lining of the end-dump trailers will be provided by LPC. It is assumed the personnel provided by LPC will have already received the safety and radiological training requirements for the Riverbend Site.
2. The training and qualification for the waste transport drivers are provided in the Waste Management and Transport Plan.

Transporters Requirements

Note: The following requirements are principally for truck transport. Rail transport is controlled by the rail carrier once the conveyance is transferred to the carrier.

AMS is responsible for verifying the transporting requirements and subcontracting with the transporters. The specific Transporter requirements for shipments are as follows:

- A DOT transport identification number
- A New York State waste haulers permit
- A 49CFR385.1 safety rating of "Satisfactory."

For small companies such as those listed in Attachment1 to this Plan, DOT safety ratings are often not achieved due to limited inspections. In these cases, AMS will review what limited data there is available and if there are accidents on the record the information will be transmitted to LPC to obtain approval (or rejection) for their use.

TENORM Transport Process

Pre-Transport Checks

1. Each transportation vehicle and load of TENORM will be inspected (see Attachment 3 for inspection details) before leaving the site and documented.
2. The quantities of TENORM leaving the site will be estimated based on volume loaded within the truck and recorded on a waste tracking log.

3. The driver's commercial driver license (CDL) certification will be verified.
4. The routing (see Attachment 2 for proposed routes) of the vehicle and the disposal location will be reviewed with the driver to ensure its an agreed upon route.
5. The waste manifest is complete and signed.

In Transit Requirements

1. The transporter will be responsible for weighing bulk loads at a certified scale.
   a. If transported by truck to the landfill, the certified scale measurement is performed at the landfill.
   b. If transported by rail the certified scale measurement will be made at MFF
   c. Bulk disposal quantities will be based on the known empty truck or gondola and measured (at the disposal facility) truck weight after loading.
   d. Weights will be recorded on the weight ticket.
2. The transporter will observe the following practices when hauling and transporting TENORM offsite:
   a. Minimize impacts to general public traffic.
   b. Cover trucks and trailers used for hauling TENORM to prevent spills or releases.
   c. During stops, check truck to ensure no water accumulation is occurring in the load.
   d. Wastes or materials from other sites may not be combined with TENORM generated during the project.
   e. Observe road and weather conditions and drive accordingly.
   f. Notify dispatcher if a major change to route or duration is needed to complete transport.

Emergency/Incident Response

1. Each manifest will include an emergency telephone number for contact with AMS in the event of a truck accident, spill or other issue impeding transport to the disposal facility.
2. AMS will coordinate with the transportation company to determine actions needed, if any, to remedy the incident.
3. Spilled TENORM will be immediately cleaned up, including soils on the outside of the trucks, container, and/or road surface.
   a. Where appropriate, the spilled material will be returned to the original transportation truck and/or container.
   b. Upon cleanup, the spilled material will be properly contained and disposed at the approved landfill.
4. AMS will contact FSMC/LPC within a business day after notification of an incident and provide a status report on the incident and any follow-up actions.

TENORM Disposal Tracking and Records

1. AMS will track the TENORM load progress through transport to final unloading at the disposal site.
   a. In the event of a non-receipt, the AMS shall confirm receipt of shipment and send a written request for an acknowledgement letter.
   b. In the event that a shipment has not been received within 20 days from the date of the shipment AMS will investigate and determine actions, if needed, to be taken.
   c. Rail Shipments are tracked from the date of delivery at MFF until final disposition at Energy Solutions, which can normally include a two-week transport time.
2. Once a certificate of disposal is received from the disposal facility the following records will be compiled and provided to FSMC/LPC:
   - The Certificate of Disposal and manifest signed by the landfill agent,
   - The load weigh tickets from a certified scale; and
   - The Subject Matter Expert (SME) approved analytical report.

Attachments to Transportation Plan

Note: Waste Disposal Facility Permits and Licenses are contained in the AMS Waste Management Plan for this Project. The AMS ODH RML is attached to the Radiation Protection Plan for this project.

Attachment 1 – Proposed Waste Hauler Information and Permit Numbers

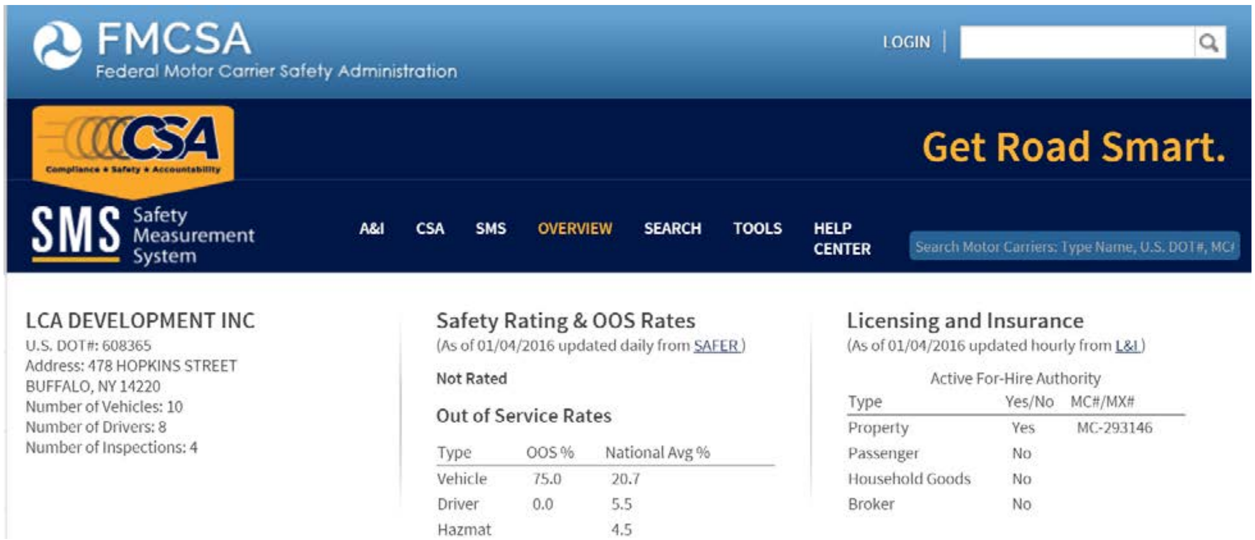
Attachment 2 – Projected Haul Routes

Attachment 3 - Truck Inspection Checklist

Attachment 1

Truck Transporter Information

LCA Development, Inc.
478 Hopkins Street
Buffalo, NY 14220
Valerie Janker
716 823 9645
U.S. DOT Number: 608365
NYS Non-Hazardous Waste Haul Permit Number 9A480


FMCSA
Federal Motor Carrier Safety Administration
LOGIN
CSA
Compliance • Safety • Accountability
Get Road Smart.
SMS Safety Measurement System
A&I CSA SMS OVERVIEW SEARCH TOOLS HELP CENTER
Search Motor Carriers: Type Name, U.S. DOT#, MC#

LCA DEVELOPMENT INC
U.S. DOT#: 608365
Address: 478 HOPKINS STREET
BUFFALO, NY 14220
Number of Vehicles: 10
Number of Drivers: 8
Number of Inspections: 4

Safety Rating & OOS Rates
(As of 01/04/2016 updated daily from SAFER)
Not Rated

Out of Service Rates

Type	OOS %	National Avg %
Vehicle	75.0	20.7
Driver	0.0	5.5
Hazmat		4.5

Licensing and Insurance
(As of 01/04/2016 updated hourly from L&I)

Active For-Hire Authority

Type	Yes/No	MC#/MX#
Property	Yes	MC-293146
Passenger	No	
Household Goods	No	
Broker	No	

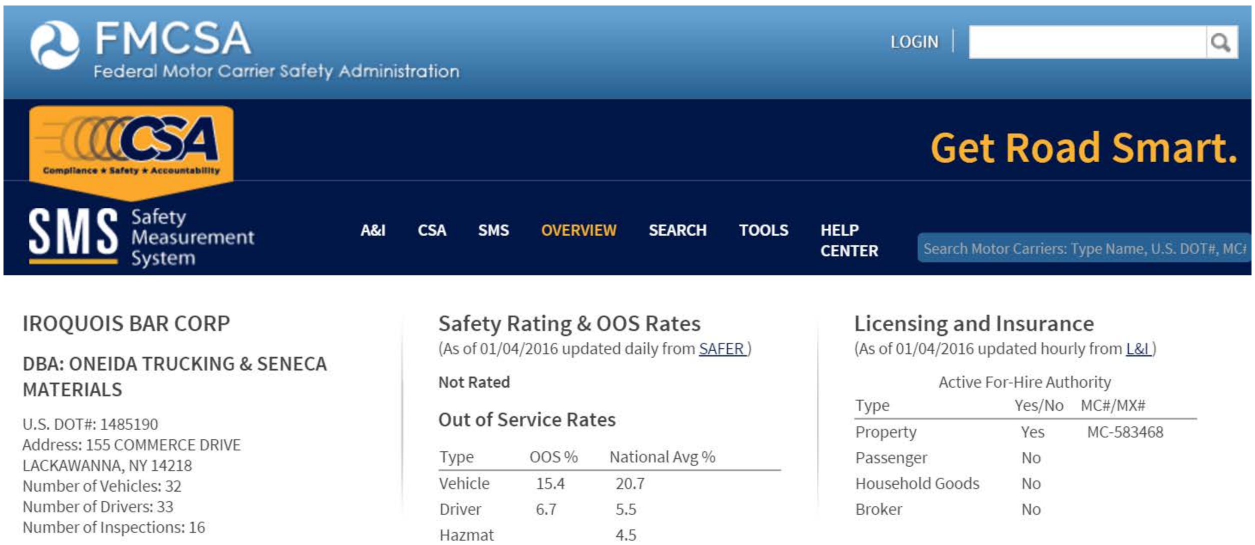
Summary of Activities

The summary includes information on the 5 most recent investigations and 24 months of inspections and crash history.

- Most Recent Investigation:
- Total Inspections:4
  - Total Inspections without Violations used in SMS:0
  - Total Inspections with Violations used in SMS:4
- Total Crashes*: 0

*Crashes listed represent a motor carrier's involvement in reportable crashes, regardless of the carrier's or driver's role in the crash.

Iroquois Bar Corp.
DBA - ONEIDA TRUCKING & SENECA MATERIALS
155 Commerce Drive
Lackawanna, NY 14218
Arnold Collier
716 583 1683
U.S. DOT Number: 1485190
NYS Non-Hazardous Waste Haul Permit Permit Number 9A759



IROQUOIS BAR CORP

DBA: ONEIDA TRUCKING & SENECA MATERIALS

U.S. DOT#: 1485190
Address: 155 COMMERCE DRIVE
LACKAWANNA, NY 14218
Number of Vehicles: 32
Number of Drivers: 33
Number of Inspections: 16

Safety Rating & OOS Rates
(As of 01/04/2016 updated daily from SAFER)

Not Rated

Out of Service Rates

Type	OOS %	National Avg %
Vehicle	15.4	20.7
Driver	6.7	5.5
Hazmat		4.5

Licensing and Insurance
(As of 01/04/2016 updated hourly from L&I)

Active For-Hire Authority

Type	Yes/No	MC#/MX#
Property	Yes	MC-583468
Passenger	No	
Household Goods	No	
Broker	No	

Summary of Activities

The summary includes information on the 5 most recent investigations and 24 months of inspections and crash history.

- Most Recent Investigation:
- Total Inspections:16
  - Total Inspections without Violations used in SMS:6
  - Total Inspections with Violations used in SMS:10
- Total Crashes*****: 2

*Crashes listed represent a motor carrier's involvement in reportable crashes, regardless of the carrier's or driver's role in the crash.

Attachment 2

Proposed Truck Haul Routes

To Waste Management's Mahoning Ohio landfill, 3510 Garfield Road, New Springfield, OH:

South Park Ave
To Smith St
To I 190 east
To I 90 west
To 11 south
To 711 south
To 680 south
To 164 south
To 626 south
To 165 east
To 617 east
To 3510 Garfield Road

To AMS, 801 N 1st Street, Martin's Ferry, OH

South Park Ave
To Smith Street
To I 190 east
To I 90 west
To 79 south
To 70 west
To 470 west
To 7 north
To Hanover Street
To N 1st Street
To 801 N 1st Street

Attachment 3

Truck Inspection Checklist

TRUCK DRIVERS' PRETRIP CHECK LIST

Office of Motor Carriers, US Department of Transportation & Federal Highway Administration

INSIDE

- ☐ Parking Brake (Apply)

START ENGINE

- ☐ Oil Pressure (Light or Gauge)
- ☐ Air pressure or Vacuum (Gauge)
- ☐ Low Air or Vacuum Warning Device
  (Air pressure below 40 psi check on pressure build-up. Air pressure above 60 psi deplete air until warning device works) (Vacuum below 8 inches Hg. check on build-up. Above 8 inches Hg. deplete vacuum until device works)
- ☐ Instrument Panel
  (Telltale lights or buzzers)
- ☐ Horn
- ☐ Windshield Wiper and Washer
- ☐ Heater - Defroster
- ☐ Mirrors
- ☐ Steering Wheel (Excess play)
- ☐ Apply Trailer Brakes in EMERGENCY
- ☐ Turn on all lights including 4-way flasher
- ☐ Fire Extinguisher and Warning Devices

OUTSIDE

FRONT

- ☐ Headlights
- ☐ Clearance Lights
- ☐ Identification Lights
- ☐ Turn Signals and 4-way flasher
- ☐ Tires and Wheels (Lugs)

LEFT SIDE

- ☐ Fuel Tank and Cap
- ☐ Sidemarker Lights
- ☐ Reflectors
- ☐ Tires and Wheels (Lugs)
- ☐ Cargo Tie-downs/or Doors

REAR

- ☐ Tail Lights
- ☐ Stop Lights
- ☐ Turn Signals and 4-way flasher
- ☐ Clearance Lights
- ☐ Identification Lights
- ☐ Reflectors
- ☐ Tires and Wheels (Lugs)
- ☐ Rear End Protection (Bumper)
- ☐ Cargo Tie-downs/or Doors

RIGHT SIDE

- ☐ Fuel Tank and Cap
- ☐ Sidemarker Lights
- ☐ Reflectors
- ☐ Tires and Wheels (Lugs)
- ☐ Cargo Tie-downs/or Doors

ON COMBINATIONS

- ☐ Hoses and Couplers
- ☐ Electrical Connector
- ☐ Couplings (Fifth wheel, tow bar, safety chains, locking devices)

ON VEHICLES TRANSPORTING HAZARDOUS MATERIALS

- ☐ Marking or Placards
- ☐ Proper Shipping Papers

INSIDE

STOP ENGINE

- ☐ Release Trailer Emergency Brakes
- ☐ Apply service Brakes-Air loss should not exceed—
  3 psi per minute on single vehicles
  4 psi per minute on combinations

FASTEN SEAT BELT

DRIVER'S NAME: ______________________________

DATE: ______________________

TRACTOR / TRAILER UNIT NO.S: ______________________

Austin Master Services, LLC

WASTE MANAGEMENT PLAN - RIVERBEND TENORM DISPOSAL PROJECT

VERSION 1.0

January 9, 2016

Prepared by:
Peter Collopy, CHP, CIH, CSP
Austin Master Services
Radiation Safety Officer

Purpose

This plan provides the requirements for the management and disposal of technologically enhanced naturally occurring radioactive material (TENORM) slag and co-mingled material for the High Tech Manufacturing Hub at RiverBend site located at 1339 South Park Avenue, Buffalo, New York, 14220 (Site).

Background

The Site is the location of the former Republic Steel and Donner Hanna Coke facilities and is a New York State Department of Environmental Conservation (NYSDEC) Voluntary Clean-up Project (VCP) site. LPCiminelli Inc. (LPC) was selected through a competitive bidding process by Fort Schuyler Management Corporation (FSMC), a New York State (NYS) not-for-profit corporation which is the owner of the Site, as the project developer and construction manager for the Site. LPC is currently engaged in the construction of a 1.2 million square foot manufacturing facility for solar panel manufacturer Solar City. Redevelopment activities at the Site have included excavation in preparation for foundations and site utilities, building pad construction, the installation of foundations systems and structural steel erection.

In early 2015 material slated for recycling was discovered to contain higher than background levels of Naturally Occurring Radioactive Materials (NORM). Because the cause of the enhanced concentrations was due to manmade activities, the steel manufacturing process, the material is classified as Technologically Enhanced Naturally Occurring Radioactive Material (TENORM). New York State Department of Environmental Conservation (NYSDEC) regulations prohibit the landfilling of any radioactive materials. Consequently, the slag and co-mingled materials must be identified and disposed of at an out of state landfill.

The slag and co-mingled material is considered non-hazardous and as such does not require disposal as a hazardous chemical waste. The concentrations and type of radioactive material within the slag and co-mingled materials are such that no New York State radioactive material regulations apply to the handling of these materials. In addition, the levels of radioactive material, the radium content, is well below the DOT requirements for declaration as a hazardous material. Consequently, the material can be transported as non-hazardous material and landfilled in locations where TENORM levels of radioactive material are accepted.

Austin Master Services (AMS) plans to use a landfill in the state of Ohio, for material with concentrations less than 7 pCi/g of total radium. For materials greater than 6.99 pCi/g of total radium, the Energy Solutions facility in Utah has been designated as the disposal facility. If material is to be transported to the Energy Solutions facility, the truck will be routed to AMS's Martins Ferry processing facility (MFF) in Martins Ferry, Ohio. At that location the material will be transloaded from the trucks into gondola cars and rail shipped to Energy Solutions Utah landfill.

Scope of Work

AMS's specific scope of work for the Riverbend TENORM Removal Project consists of:

- Coordination and oversight of the TENORM off-site disposal, including the approved landfill facilities, transportation companies, LPC provided-equipment, and analytical laboratory.
- Advising and assisting LPC on which vehicles to load and the limits of loading with TENORM.
- Performing on-site in-situ analysis of TENORM loaded vehicles to determine the total radium activity to determine disposition location for the waste materials. ADD
- The collection of quality assurance (QA) samples during waste loading activities.
- Completing Non-Hazardous Waste Manifests for transporting the TENORM waste materials to the appropriate facilities.
- Providing transportation and disposal documentation to LPC.

Training and Qualifications

AMS Project Personnel

1. The following complement is the expected number and type of personnel assigned to the project.

   a. A Site Supervisor responsible for managing the project, directing AMS personnel in their work activities and serving as the AMS project liaison with LPC.

   b. Three Health Physics Technicians (HPTs) responsible for performing monitoring and positioning the ISOCS unit when analyzing slag/comingled material loads in trucks.

   c. One ISOCS Analyst responsible for performing the in-situ analysis of the loaded trucks. The ISOCS Analysts may also serve as a Health Physics Technician

   d. A Site Radiation Safety Officer (SRSO) will be assigned as the AMS individual designated to determine radiological surveys and protective controls required for AMS operations.
      - The SRSO must meet the training and experience requirements in AMS RML procedures. In this case the SRSO will require a minimum of five years' experience supervising radiation protection programs where TENORM is the principal contaminant.
      - The AMS Project Supervisor can will serve as the SRSO.

2. AMS personnel assigned to the project will attend the RiverBend Site orientation training required for contractors/consultants working at the Site.

3. AMS personnel assigned to the project will have received, as a minimum, basic radiological safety awareness training that meets the requirements of the AMS RML.
4. Personnel assigned to perform in-situ analysis of "loaded" TENORM trucks will have received certification from the in-situ analysis system vendor (Canberra, Inc.) to operate the equipment
5. Personnel performing dose rate, gross gamma count rate or surface measurements will either have one year's experience performing measurements where the radionuclides and nature/level of contaminants are similar to those of the Riverbend Site or will be under the direct supervision of an individual who has greater than five years of such experience.
6. All AMS personnel will have received the OSHA 10-hour Construction Safety training or an equivalent approved by LPC's safety management representative.

Ancillary Support Personnel and Subcontractors

1. Non-AMS personnel responsible for loading TENORM and supporting the lining of the end-dump trailers will be provided by LPC. It is assumed the personnel provided by LPC will have already received the safety and radiological training requirements for the Riverbend Site.

2. The TENORM transport drivers must meet 49CFR Part 383 Commercial Driver's License requirements.

3. TENORM transport drivers will receive a process and safety review upon arrival to the Site.
   a. Because drivers will need to exit their vehicles (i.e., to assist with bed liner installation) they will be issued hard hats, safety glasses and reflective vests. Drivers are expected to have hard-toed safety shoes when on-site.

`

Waste Management Process

Prerequisites

1. Prior to start of on-site work, AMS will provide, to LPC with approved waste acceptance profiles (see Attachment 1 for disposal facility profiles currently expected to be used).
2. Any alternative facilities identified for use in landfilling the TENORM will be discussed with FSMC and LPC and approved by FSMC/LPC prior to shipping TENORM to an alternative facility.

Schedule

- Waste Profile(s) Approval: 1/6/2016
- Mobilization to Site: 1/7/2016 - 1/8/2016
- Loading and Shipping: 1/11/2016 – 2/5/2016
- Disposal documentation to FSMC/LPC 3/1/2016

It is expected that the operations will work Monday through Friday, ten (10) hours per day. AMS personnel will be on-site supporting the operation. AMS plans to load, analyze and manifest for transport approximately 25 trucks per day weather permitting. The average weight per truck is estimated to be22 tons.

Loading

1. AMS will direct the truck driver(s) as to the traffic pattern for entering the Site, liner installation area, accessing the work area to be loaded with TENORM, relocation to the staging area to be scanned and analyzed using the AMS IN-Site ISOCS analysis system, and provided the driver with the landfill destination prior to leaving the Site.
2. An equipment operator and laborer provided by LPC will direct the truck driver in the vicinity of the TENORM stockpile for direct loading.
3. If needed, prior to loading, LPC laborer(s) will place liners in the truck bed.
4. The operator, under the direction of the vehicle driver, will load approximately 22 tons of TENORM into the truck.
5. After loading, the truck will be directed, by AMS, to the designated staging area for analysis using the AMS In-Situ ISOCS analysis system.

TENORM Load Analysis

1. Using the In-Situ ISOCS analysis system each truck will undergo an analysis which will include four (4), 2-minute measurements from the side of the truck, for a total of 8 measures and 16 minutes for both sides of the truck.
2. The generated report is forwarded to an AMS Subject Matter Expert (SME[1]) who is responsible for a quality assurance verification that the analysis is accurate.
   a. Copies of the analysis reports will remain on-site and will be available for review by regulatory authorities upon request.
   b. The SME report will typically be completed within an hour after receipt so the truck will have been dispatched for routing to the landfill or MFF. In the event of a deficiency in the report the truck will be re-routed to MFF where another ISOCS In-situ analysis will be performed to determine the final disposition of the material.
3. If the total radium activity of the truckload is equal to or less than 6.99 pCi/g, the SME signed analysis report will be sent to the disposal facility for review and approval for waste load acceptance.
4. If the total radium activity of the truck load is greater than 6.99 pCi/g, the material will be transported to AMS's Martin Ferry, OH TENORM facility where the material will be transloaded into railcars and disposed of at Energy Solutions Clive, UT Low Level Radioactive Waste Disposal (LLRW) facility.
5. A quality assurance sample will be collected from each TENORM load prior to leaving the Site in accordance with the requirements in AMS's RPP-033, ISOCS Operation and Set-Up.

---

[1] The SME is separate from the on-site project organization and provides an independent review of analytical results to ensure the integrity of the analysis and calculations.

Manifesting

Note: The level of radium identified within the TENORM at the RiverBend Site has been less than the Department of Transportation (DOT) hazardous material concentration of 270 pCi/g for radium. Consequently, the material can be shipped as exempt from DOT hazardous material requirements.

1. An AMS technician will perform a dose rate scan of the sides of the loaded waste vehicle using a Ludlum Model 19 micro-R meter or meter with equivalent detection capability to determine the dose rates at 1 foot from the vehicle sides.
   a. If the dose rate scan shows external radiation exposure rates are less than 40 uR/hr and the vehicle load is less than or equal to 6.99 pCi/g, the TENORM will be considered ready for manifesting and transport to the WM Mahoning facility.
   b. If the scan shows the exposure rates are equal to or greater 40 uR/hr or the vehicle load is greater than 6.99 pCi/g, the load will be manifested for transport to AMS's Martins Ferry TENORM facility where it will be transloaded for disposal at Energy Solutions, Clive Utah facility.
2. AMS personnel will complete the manifest (see Attachment 3 for an example) and sign as FSMC authorized representative.
   a. The manifest in addition to a description for the TENORM load will contain emergency contact information for AMS to respond in case of an emergency involving the transport vehicle.
   b. The original manifest will be provided to the driver and copies retained by AMS at the Site.
3. Prior to release of the truck from site a scan of the vehicle tires will be performed to ensure contamination levels are less than the AMS RPP total surface contamination limits.

Final Records

1. AMS will track the TENORM load progress through transport to final unloading at the disposal facilities.
2. Once a certificate of disposal is received from the disposal facility the following records will be compiled and provided to FSMC/LPC:
   a. The Certificate of Waste Disposal (see Attachment 3 for waste disposal certification example)
   b. The load weigh tickets from a certified scale (see Attachment 4 for example certificate)
   c. The SME approved analytical report (see Attachment 5 for example certificate)

Attachments to Waste Plan

Attachment 1 – Waste Profiles and Approvals
Attachment 2 --Waste Manifest Example
Attachment 3 - Waste Disposal Certification Example
Attachment 4 – Weigh Ticket Example
Attachment 5 – SME Signed Analysis Certification Example

Attachment 1

Waste Profiles and Approvals

Waste Management and
Energy Solutions

Gmail by Google

Patrick Horkman <phorkman@austinmasterservices.com>

Fwd: [WMSolutions.com] Profile #498431OH has been approved

1 message

Jack Bement <jbement@austinmasterservices.com> Fri, Dec 18, 2015 at 10:35 AM
To: Patrick Horkman <phorkman@austinmasterservices.com>

WM approval

Jack Bement CEO
Austin Master Services LLC
801 North 1st St
Martin Ferry OH 43935
Office: 740-609-3804
Cell:(585) 704-2744
Fax: 484 624-5506
Austin Master Services Website

---------- Forwarded message ----------
From: **Midwest TSC** <TSCMidwest@wm.com>
Date: Fri, Dec 18, 2015 at 10:18 AM
Subject: [WMSolutions.com] Profile #498431OH has been approved
To: Jbement@austinmasterservices.com

WM WASTE MANAGEMENT

THINK GREEN.

DECEMBER, 18 2015

Notice of Profile Approval: #498431OH

Profile Number:	498431OH
Waste Stream:	Historical Fill

Generator Name:	Fort Schuyler Management Corp.
Disposal Site:	Mahoning Landfill
Comments:	A manifest is required for all shipments.
Expiration Date:	12/17/2016

Dear Jack Bement,

We are pleased to inform you that Profile 498431OH has been approved by our Midwest Technical Service Center. Your Waste Approval Terms and Conditions can be found on either your *Profile Form* or *Approval Form*. Both documents are available as a PDF in the *Approved Tab* in your WMSolutions.com account.

Please feel free to email us at TSCMidwest@wm.com or call 800-963-4776 with any questions.

Thank you for choosing Waste Management.

Midwest TSC
W132 N10487 Grant Drive
Germantown, WI 53022
Phone: (800) 963-4776
TSCMidwest@wm.com

WASTE MANAGEMENT

EZ Profile™

Requested Facility: Mahoning Landfill ☐ Unsure Profile Number: ____

☐ Check if there are multiple generator locations. Attach locations. ☐ COD ☐ Renewal? Original Profile Number: ____

A. GENERATOR INFORMATION (MATERIAL ORIGIN)

1. Generator Name: Fort Schuyler Management Corp.
2. Site Address: 1339 S Park Ave
   (City, State, ZIP) Buffalo NY, 14224
3. County: Erie
4. Contact Name: Danielle Zientek
5. Email: dzientek@lpciminelli.com
6. Phone: 716-574-4520 7. Fax: ____
8. Generator EPA ID: NYR000215517 ☐ N/A
9. State ID: ____ ☐ N/A

B. BILLING INFORMATION ☐ SAME AS GENERATOR

1. Billing Name: Austin Master Services LLC
2. Billing Address: 355 Circle of Progress Dr
   (City, State, ZIP) Pottstown PA, 19464
3. Contact Name: Neil Rivel
4. Email: nrivel@austinmasterservices.com
5. Phone: 4846245403 6. Fax: 4846245506
7. WM Hauled? ☐ Yes ☑ No
8. P.O. Number: ____

C. MATERIAL INFORMATION

1. Common Name: Historical Fill
   Describe Process Generating Material: ☐ See Attached
   This material is slag generated from steel production and used as backfill on site.
2. Material Composition and Contaminants: ☐ See Attached

1. Soil	50
2. Slag	40
3. Debris	10
4.	
	≥100%

3. State Waste Codes: ____ ☑ N/A
4. Color: Brown
5. Physical State at 70°F: ☑ Solid ☐ Liquid ☐ Other: ____
6. Free Liquid Range Percentage: ____ to ____ ☑ N/A (Solid)
7. pH: ____ to ____ ☑ N/A (Solid)
8. Strong Odor: ☐ Yes ☑ No Describe: ____
9. Flash Point: ☐ <140°F ☐ 140°–199°F ☐ ≥200° ☑ N/A (Solid)

D. REGULATORY INFORMATION

1. EPA Hazardous Waste? ☐ Yes* ☑ No
   Code: ____
2. State Hazardous Waste? ☐ Yes ☑ No
   Code: ____
3. Is this material non-hazardous due to Treatment, Delisting, or an Exclusion? ☐ Yes* ☑ No
4. Contains Underlying Hazardous Constituents? ☐ Yes* ☑ No
5. Contains benzene and subject to Benzene NESHAP? ☐ Yes* ☑ No
6. Facility remediation subject to 40 CFR 63 GGGGG? ☐ Yes* ☑ No
7. CERCLA or State-mandated clean-up? ☐ Yes* ☑ No
8. NRC or State-regulated radioactive or NORM waste? ☑ Yes* ☐ No

***If Yes, see Addendum (page 2) for additional questions and space.**

9. Contains PCBs? → If Yes, answer a, b and c. ☐ Yes ☑ No
   a. Regulated by 40 CFR 761? ☐ Yes ☑ No
   b. Remediation under 40 CFR 761.61 (a)? ☐ Yes ☑ No
   c. Were PCB imported into the US? ☐ Yes ☑ No
10. Regulated and/or Untreated Medical/Infectious Waste? ☐ Yes ☑ No
11. Contains Asbestos? ☐ Yes ☑ No
    → If Yes: ☐ Non-Friable ☐ Non-Friable – Regulated ☐ Friable

E. ANALYTICAL AND OTHER REPRESENTATIVE INFORMATION

1. Analytical attached ☑ Yes
   Please identify applicable samples and/or lab reports:
   Pace project No. 3014063
2. Other information attached (such as MSDS)? ☐ Yes

F. SHIPPING AND DOT INFORMATION

1. ☐ One-Time Event ☐ Repeat Event/Ongoing Business
2. Estimated Quantity/Unit of Measure: 40,000
   ☑ Tons ☐ Yards ☐ Drums ☐ Gallons ☐ Other: ____
3. Container Type and Size: End dumps
4. USDOT Proper Shipping Name: ☐ N/A

G. GENERATOR CERTIFICATION (PLEASE READ AND CERTIFY BY SIGNATURE)

By signing this EZ Profile™ form, I hereby certify that all information submitted in this and all attached documents contain true and accurate descriptions of this material, and that all relevant information necessary for proper material characterization and to identify known and suspected hazards has been provided. Any analytical data attached was derived from a sample that is representative as defined in 40 CFR 261 - Appendix 1 or by using an equivalent method. All changes occurring in the character of the material (i.e., changes in the process or new analytical) will be identified by the Generator and be disclosed to Waste Management prior to providing the material to Waste Management.

If I am an agent signing on behalf of the Generator, I have confirmed with the Generator that information contained in this Profile is accurate and complete.

Name (Print): Danielle Zientek Date: 12/17/15

Title: Sr. Environmental H & S Manager

Company: LP Ciminelli/Agent for Owner

Certification Signature

THINK GREEN.

QUESTIONS? CALL 800 963 4776 FOR ASSISTANCE

EZ Profile™ Addendum

WASTE MANAGEMENT

Only complete this Addendum if prompted by responses on EZ Profile™ (page 1) or to provide additional information. Sections and question numbers correspond to EZ Profile™.

Profile Number: ______________

C. MATERIAL INFORMATION

Describe Process Generating Material (Continued from page 1): If more space is needed, please attach additional pages.

Material Composition and Contaminants (Continued from page 1): If more space is needed, please attach additional pages.

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	≥100%

D. REGULATORY INFORMATION

Only questions with a "Yes" response in Section D on the EZ Profile™ form (page 1) need to be answered here.

1. EPA Hazardous Waste
   a. Please list all USEPA listed and characteristic waste code numbers:
   b. Is the material subject to the Alternative Debris standards (40 CFR 268.45)? ☐ Yes ☑ No
   c. Is the material subject to the Alternative Soil standards (40 CFR 268.49)? → If Yes, complete question 4. ☐ Yes ☑ No
   d. Is the material exempt from Subpart CC Controls (40 CFR 264.1083 and 265.1084)? ☐ Yes ☑ No
   → If Yes, please select one of the following:
   ☐ Waste has been determined to be LDR exempt [265.1083(c)(4) and 265.1084(c)(4)] based on the fact that it meets all applicable organic treatment standards (including UHCs for D-coded characteristic wastes) or a Specified Technology has been utilized.
   ☐ Waste does not qualify for a LDR exemption, but the average VOC at the point of origination is <500 ppmw and this determination was based on analytical testing (upload copy of analysis) or generator knowledge.
2. State Hazardous Waste → Please list all state waste codes: ______________
3. For material that is Treated, Delisted, or Excluded → Please indicate the category, below:
   ☐ Delisted Hazardous Waste ☐ Excluded Waste under 40 CFR 261.4 → Specify Exclusion: ______________
   ☐ Treated Hazardous Waste Debris ☐ Treated Characteristic Hazardous Waste → If checked, complete question 4.
4. Underlying Hazardous Constituents → Please list all Underlying Hazardous Constituents:
5. Benzene NESHAP → Please include percent water/moisture in chemical composition.
   a. Are you a TSDF? → If yes, please complete Benzene NESHAP questionnaire. If not, continue.
   b. What is your facility's current total annual benzene quantity in Megagrams? ☐ <1 Mg ☐ 1–9.99 Mg ☐ ≥10 Mg
      1. Flow weighted average benzene concentration is __________ ppmw.
   c. Is this waste soil from remediation at a closed facility? ☐ Yes ☐ No
      1. Benzene concentration in remediation waste is __________ ppmw.
   d. Has material been treated to remove 99% of the benzene or to achieve <10 ppmw? ☐ Yes ☐ No
   e. Is material exempt from controls in accordance with 40 CFR 61.342? ☐ Yes ☐ No
   → If yes, specify exemption: ______________
   f. Based on your knowledge of your waste and the BWON regulations, do you believe that this waste stream is subject to treatment and control requirements at an off-site TSDF? ☐ Yes ☐ No
6. 40 CFR 63 GGGGG → Does the material contain <500 ppmw VOHAPs at the point of determination? ☐ Yes ☐ No
7. CERCLA or State-Mandated clean up → Please submit the Record of Decision or other documentation to assist others in the evaluation for proper disposal.
8. NRC or state regulated radioactive or NORM Waste → Please identify Isotopes and pCi/g: Radium 226, 228 <6.99pCi/gm Combined

WASTE MANAGEMENT

Additional Profile Information

Profile Number: ______________

C. MATERIAL INFORMATION

Material Composition and Contaminants (Continued from page 2): If more space is needed, please attach additional pages.

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40.	
	≥100%

D. REGULATORY INFORMATION

1. EPA Hazardous Waste
   a. Please list all USEPA listed and characteristic waste code numbers (Continued from page 2):

ENERGYSOLUTIONS

CL-WM-PR-001 F2 (EC-0230)
Revision 9

RADIOACTIVE WASTE PROFILE RECORD

A. GENERATOR AND WASTE STREAM INFORMATION

GENERAL: Complete this form for one waste stream. Contact EnergySolutions at (801) 532-1330 if you have any questions while completing this form. Please indicate "N/A" if a category does not apply.

1. GENERATOR INFORMATION

Generator Name: Austin Master Services, LLC./West Chester, PA EPA ID #: ____

Name of Person Complete Form: Jeffrey Ginsburg

Phone: 801-649-2039 Email: JFGINSBURG@energysolutions.com

Location of Waste (City, State): Martin's Ferry, OH

2. WASTE STREAM INFORMATION

Waste Stream ID: 0965-02 Waste Stream Name: TENORM Fill

Revision: 2 Date: 10/27/2015 Volume: ____

Profile Status: Approved StatusNotes: Profile has been approved.

CHECK APPROPRIATE BOXES BELOW. Please verify the required forms requested below are completed and submitted with the Radioactive Waste Profile Record.

HAZARDOUS WASTE: Is the waste classified as hazardous waste as defined by 40 CFR 261?

N ☒ If **NO**, complete and attach the **"Low-Level Radioactive Waste Certification Attachment"**.
Y ☐ If **YES**, complete and attach the **"Hazardous Waste Certification Attachment"** and check applicable box below.
Has the waste been treated to meet applicable treatment standards per 40 CFR 268? Y ☐ N ☒
Is the waste to be treated by EnergySolutions? Y ☐ N ☐

LOW-LEVEL RADIOACTIVE WASTE: Is the radioactive waste defined as Low-Level Radioactive Waste in accordance with the Low-Level Radioactive Waste Policy Amendments Act of 1985 or in DOE Order 435.1?
Y ☐ If **YES**, , a current copy of a LLRW Compact Export letter authorizing export must be submitted if applicable. Compact export approval is not required for DOE-generated or 11e.(2) waste streams. Case by case export approval for mixed waste and NORM may be required based on generator's governing Compact requirements; contact Energy***Solutions*** Technical Services staff for additional guidance.

N ☒ If **NO**, check appropriate box: NORM/NARM ☒ 11e.(2) Byproduct Material ☐ Other: ____

SPECIAL NUCLEAR MATERIAL: Does the waste stream contain material with uranium enriched in U-235 or any of the following radionuclides: U-233, Pu-236, Pu-238, Pu-239, Pu-240, Pu-241, Pu-242, Pu-243, or Pu-244?

Y ☐ N ☒ If Yes, complete and attach the "SNM Exemption Certification" form (EC-0230-SNM). Supporting statements, analytical results, and documentation must be included with the submittal.

PCB WASTE: Does the waste contain Polychlorinated Biphenyls (PCB) that are regulated for disposal per 40 CFR 761?

Y ☐ N ☒ If Yes, complete and attach the "PCB Waste Certification" form (EC-98279).

ASBESTOS: Does the waste contain Asbestos Containing Material?

Y ☐ N ☒ If Yes, Asbestos Containing Material must be managed in accordance with applicable federal regulations. Provide a detailed description of the waste containing asbestos in Section B.5 of the waste profile.

RADIOACTIVE WASTE PROFILE RECORD

B. WASTE PHYSICAL PROPERTIES & PACKAGE INFORMATION

1. GENERAL CHARACTERISTICS

Does the waste contain free liquids? (>1%) Y ☐ N ☒

If **Yes**, what is the percent of free liquid by waste _____ %

If **Yes**, is the liquid aqueous (water-based)? Y ☐ N ☐

Density range of the waste: 30 – 150

Does the waste contain absorbent? Y ☒ N ☐

List percentage of waste type by volume: Soil 85 % Concrete & Metal 5 % DAW 5 % Resins _____% Sludge _____%

Other constituents and percentage by volume? 5% miscellaneous debris including size-reduced empoundment liners, slag, and rubble Other 5 %

2. MATERIAL SIZE

Gradation of Material: Indicate the percentage of waste material that would **pass through** the following grid sizes. For example, 95% of the material would pass through a 12" square, 90% passes through a 4" square, 80% passes through a 1" square, etc.

.12" 85 % .4" 75 % .1" 50 % .1/4" 25 % .1/40" 5 % 1/200" 0 %

Does the waste stream contain oversize debris (i.e., no dimension < 10 inches and any dimension > 12 feet)? Y ☐ N ☒
If Yes, include a detailed description (i.e., weight, size, drawings, etc.) of the oversize debris in the narrative of Section B.5.

3. MOISTURE CONTENT

For soil or soil-like materials, please use **Std. Proctor Method ASTM D-698** to determine the optimum moisture content. The waste material must not exceed 3 percentage points above optimum moisture upon arrival at EnergySolutions' disposal facility unless approved by EnergySolutions.

Optimum Moisture Content: 16.7 % at Maximum Dry Density (lb/ft^3): 114

Average Moisture Content: 14 % Moisture Content Range: 10 % - 22.5 %

4. WASTE SHIPPING & PACKAGING

Transportation Mode: ☒ Highway ☒ Rail

Shipping & Container Packages: ☒ Drums* (≤ 85 gallons) ☒ Boxes (≤ 100 ft^3) ☒ Soft-Sided Bags (≤ 10 yd^3)
(Check all that apply)

☒ Intermodal ☒ Sealand ☒ Gondola** ☐ Box Car

Other:

*Palletized drums are preferred by the disposal site. Please specify in the "Other" field if drums will not be palletized.
**Dimensions of gondola railcars must be between 48 to 65 feet in length and 8.5 to 12.5 feet in height as measured from the top of the rail to the top of the railcar unless approved by EnergySolutions.

5. NARRATIVE DESCRIPTION AND HISTORY OF WASTE

Please submit a narrative description and history of the waste as an attachment to the Radioactive Waste Profile Record. This attachment should include the following:

- Process that generated the waste
- Waste material physical composition and characteristics
- Radiological and chemical characterization method
- Basis for determining manifested radionuclide concentrations
- Description and amounts of absorbents, if applicable
- Basis of non-hazardous or hazardous waste determinations
- Treatment processes, if applicable
- Product information or Material Safety Data Sheets associated with the waste as applicable
- Information requested in other sections of this form

RADIOACTIVE WASTE PROFILE RECORD

Waste Stream ID: 0965-02 Revision: 2 Date of Revision: 10/27/2015

C. RADIOLOGICAL INFORMATION

Obtain sufficient samples to adequately determine a range and weighted average of activity in the waste. Attach the gamma spectroscopy or radiochemistry data supporting the radionuclide information listed below.

1. Does the waste material contain accessible surfaces with contact dose rates greater than 500 mR/hr? Y ☐ N ☒

2. Does the waste material contain any of the following isotopes: Aluminum-26, Berkelium-247, Calcium-41, Californium-250, Chlorine-36, Rhenium-187, Terbium-157, or Terbium-158? Y ☐ N ☐

3. Please list the following information for each isotope associated with the waste. Provide an explanation in the narrative description of Section B.5 if the waste contains localized "hot spots" or elevated concentrations that significantly exceed the upper concentration range. If additional space is needed, provide an Attachment C.3 to this profile record formatted as below.

Isotope	Manifested Upper Concentration (pCi/g)	Weighted Avg. per Container (pCi/g)	Isotope	Manifested Upper Concentration (pCi/g)	Weighted Avg. per Container (pCi/g)
IR-192	1.500E2 pCi/g	2.500E1 pCi/g			
RA-226	1.500E3 pCi/g	5.000E1 pCi/g			
RA-228	1.500E3 pCi/g	5.000E1 pCi/g			
SB-124	1.500E2 pCi/g	2.500E1 pCi/g			
SC-46	1.500E2 pCi/g	2.500E1 pCi/g			
TH(NAT)	1.000E3 pCi/g	5.000E1 pCi/g			
U (NAT)	2.000E3 pCi/g	3.000E1 pCi/g			

Physical Properties Narrative

Revision 2: AMS is expanding it's services to include more non-oil and gas industry waste material. Waste may come from the metals industry, ore refining, etc. - it remains a TENORM waste stream, and the radiological parameters are unchanged. No other changes to the profile.

Revision 1 B.5 - *changes to R0 bold and italic*

Process that generated the waste

The Austin Master's Services Martin's Ferry (MF) location serves in part as a waste consolidation facility to the oil and gas industry. Waste is either managed for regional landfill disposal, or if radionuclide activities warrant, shipment to Clive as TENORM waste and utilized as fill. Waste from the oil and gas industry includes soils, sludges (percipitated dissolved solids, dried/pressed, with soil like properties), absorbed aqueous liquids, contaminated equipment, and miscellaneous debris such as DAW and empoundment liners. The MF facility will receive waste from wellheads and oil and gas production facilities located primarily in the US northeast.

There may be occasions when the MF facitliy will serve as a transload/consolidation facility to industries other than oil and gas (e.g. metalurgical). Provided the waste parameters are bounded under this profile, they may be shipped under 0965-02.

Waste material physical composition and characteristics

The waste material is a soil-like sludge that meets the EnergySolutions criteria for soil waste as determined by ASTM D-698. The waste contains moderate levels of moisture, but <1% free standing and non-corrosive liquids. As contractually specified, 85% of the 0965-02 waste will have soil-like properties. 15% of the waste stream as a whole may include material that does not exhibit soil like properties, such as DAW, metal and concrete debris, non-soil sludges, and size reduced liners. Some of this material may be blended with the soil at the Martin's Ferry facility, and some of it may have dedicated packaging and be in the shipping gondola.

Isotopic tracers are often used in fracking operations. Utilized as sands they are introduced downhole to determine the extent of induced fractures, and then recovered. Typically short lived beta emitters, tracer sands will be blended to ensure geophysical (Procter Test) parameters established in this profile are satisfied.

It is possible that odors that are typical to the petroleum exploration and production industry may be associated with waste shipped from MF.

Radiological and chemical characterization method

The waste material come from multiple sources (i.e., fracking operations throughout the region). The radiological and chemical properties are relatively consistent throughout the region. Chemical and radiological sampling/analysis was performed on a project to establish this profile. Additional waste populations will be evaluated against the regulatory limits for toxicity characteristic constituents and the radiological values provided herein. Oil and gas industry waste is exempt from RCRA Subtitle C hazardous waste regulations (EPA 1988).

Basis for determining manifested radionuclide concentrations

The manifested radionuclide concentrations will be determined through direct sampling, or dose-to-curie methods.

Description and amounts of absorbents, if applicable

Soil-like absorbents may be added to ensure that the waste does not contain 1% or greater free standing liquids. The properties of the absorbent chosen will comply with the Clive soil/soil-like criteria.

RADIOACTIVE WASTE PROFILE RECORD

LOW-LEVEL RADIOACTIVE WASTE CERTIFICATION ATTACHMENT

This form is required only if the checkbox for Hazardous Waste on page one has been checked No. Otherwise, complete the Hazardous Waste Certification Attachment instead of this attachment. EnergySolutions may waive the chemical laboratory analyses if the material is not amenable to chemical sampling and analysis (e.g., debris items including metal pieces, concrete, plastic, etc.). Justification for waiving the chemical analyses must be provided in Section B.5.

D. MINIMUM REQUIRED CHEMICAL ANALYSIS

The following parameters must be analyzed by a Utah or NELAC certified laboratory. Typical SW-846 analytical methods have been listed. Other approved methods are acceptable. Attach the most recent or applicable chemical analytical results representing the waste.

1. GENERAL CHEMICAL PARAMETERS

SW-846 Analytical Methods

PFLT: Pass Pass / Fail **Method 9095** Not applicable for liquid radioactive waste streams.

2. 40 CFR 261.24 Table 1 – Contaminants of Toxicity Characteristic

Metals: Methods 6010 & *7470

Arsenic	9.400E-2 mg/L TCLP	Chromium	4.240E0 ND	Selenium	4.900E-1
Barium	2.800E-2	Lead	3.620E0	Silver	3.650E-1
Cadmium	ND	*Mercury	ND		

Organics, Pesticides/Herbicides: Methods 8081/*8151

Endrin	ND	Toxaphene	ND	Chlordane	ND
Lindane	ND	*2,4-D	ND	Heptachlor	ND
Methoxychlor	ND	*2,4,5-TP Silvex	ND		

Organics, Semi-Volatile: Method 8270

o-Cresol	ND	Hexachlorobenzene	ND	Pentachlorophenol	ND
m-Cresol	ND	Hexachlorobutadiene	ND	Pyridine	ND
p-Cresol	ND	Hexachloroethane	ND	2,4,5-Trichlorophenol	ND
Total Cresol	ND	Nitrobenzene	ND	2,4,6-Trichlorophenol	ND
2,4-Dinitrotoluene	ND				

Organics, Volatile: Method 8260

Benzene	4.000E-2	1,4-Dichlorobenzene	ND	Methyl ethyl keytone	ND
Carbon Tetrachloride	ND	1,2-Dichloroethane	ND	Tetrachloroethylene	ND
Chlorobenzene	ND	1,1-Dichloroethylene	ND	Trichloroethylene	ND
Chloroform	ND	Vinyl Chloride	ND		

3. Was the waste at the point of generation a RCRA hazardous waste per 40 CFR 261? Y ☐ N ☒

If Yes, list former hazardous waste codes and former underlying hazardous constituents. List worst-case concentrations for each hazardous constituent. If additional space is needed, provide an Attachment D.3 to this profile record formatted as below. Attach the most recent chemical analytical results demonstrating compliance with applicable treatment standards.

If No, indicate "N/A" in Section D.3 below.

RADIOACTIVE WASTE PROFILE RECORD

D. 3.

Former EPA HW Codes or Underlying Hazardous Constituents	Treatment Standard (mg/kg unless noted as mg/L TCLP or Technology Code)	Worst Case Concentration (mg/kg unless noted as mg/L TCLP)

4. **OTHER CHEMICAL CONSTITUENTS**

List any other chemical constituents of concern (e.g., PCBs, chelating agents, etc.) and worst-case concentrations. If additional space is needed, provide an Attachment D.4 to this profile record formatted as below.

Other Chemical Constituents	Worst-Case Concentration (mg/kg unless noted as mg/L TCLP)	Other Hazardous Constituents	Worst-Case Concentration (mg/kg unless noted as mg/L TCLP)

5. **LABORATORY CERTIFICATION**

☒ **UTAH or NELAC CERTIFIED**
The Utah or NELAC certified laboratory holds a current certification for the applicable chemical test methods insofar as such official certifications are given. Please provide a copy of the laboratory's current certification letter for each parameter analyzed and each method used for chemical analyses required by this form.

☐ **OTHER LABORATORY CERTIFICATION** (Describe below)

6. **CERTIFICATION**

I certify that sample results representative of the waste described in this profile were or shall be obtained using state- and EPA-approved analytical methods. I also certify that where necessary representative samples were or shall be provided to EnergySolutions and to qualified laboratories for the analytical results reported herein. I further certify that the waste described in this record is not prohibited from land disposal in 40 CFR 268 (unless prior arrangements are made for treatment at EnergySolutions) and that all applicable treatment standards are clearly indicated on this form. I also certify that the information provided on this form is complete, true, and correct and is accurately supported and documented by any laboratory testing as required by EnergySolutions. I certify that the results of any said testing have been submitted to EnergySolutions. I certify that the waste does not contain any prohibited items listed in EnergySolutions' Radioactive Material License.

Signature: Jeffrey Ginsburg Signature Key: 48a3fbc8-7ef2-4c5f-975c-cca2d0f87f33 Date: 10/27/2015

Low-Level Radioactive Waste Certification Attachment

Attachment 2

Waste Manifest Example

NON-HAZARDOUS MANIFEST

WASTE MANAGEMENT

NON-HAZARDOUS MANIFEST	1. Generator's US EPA ID No. N Y R 0 0 0 2 1 5 5 1 7	Manifest Doc No.	2. Page 1 of 1

3. Generator's Mailing Address: **FORT SCHUYLER MGMT. CORP.** **1339 S. PARK AVE** **BUFFALO, NY 14224** 4. Generator's Phone 716-574-4520	Generator's Site Address (If different than mailing): **FORT SCHYLER MGMT. CORP.** **1339 S. PARK AVE** **BUFFALO, NY 14224** **ERIE COUNTY**	A. Manifest Number **WMNA** B. State Generator's ID
5. Transporter 1 Company Name	6. US EPA ID Number	C. State Transporter's ID D. Transporter's Phone
7. Transporter 2 Company Name	8. US EPA ID Number	E. State Transporter's ID F. Transporter's Phone
9. Designated Facility Name and Site Address Mahoning Landfill 3510 Garfield Road New Springfield, OH 44443	10. US EPA ID Number	G. State Facility ID H. State Facility Phone 330-549-5357

GENERATOR

11. Description of Waste Materials	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt./Vol.	I. Misc. Comments
a. HISTORICAL FILL WM Profile # **498431OH**					
b. WM Profile #					
c. WM Profile #					
d. WM Profile #					

J. Additional Descriptions for Materials Listed Above BILL TO: AUSTIN MASTER SERVICES LLC	K. Disposal Location			
	Cell		Level	
	Grid			

15. Special Handling Instructions and Additional Information

Purchase Order # EMERGENCY CONTACT / PHONE NO.: PAT HORKMAN 860-324-6599

16. GENERATOR'S CERTIFICATE:

I hereby certify that the above-described materials are not hazardous wastes as defined by CFR Part 261 or any applicable state law, have been fully and accurately described, classified and packaged and are in proper condition for transportation according to applicable regulations.

Printed Name	Signature "On behalf of"	Month	Day	Year

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed Name	Signature	Month	Day	Year

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed Name	Signature	Month	Day	Year

FACILITY

19. Certificate of Final Treatment/Disposal

I certify, on behalf of the above listed treatment facility, that to the best of my knowledge, the above-described waste was managed in compliance with all applicable laws, regulations, permits and licenses on the dates listed above.

20. Facility Owner or Operator: Certification of receipt of non-hazardous materials covered by this manifest.

Printed Name	Signature	Month	Day	Year

White- TREATMENT, STORAGE, DISPOSAL FACILITY COPY Blue- GENERATOR #2 COPY Yellow- GENERATOR #1 COPY

Pink- FACILITY USE ONLY Gold- TRANSPORTER #1 COPY

Attachment 3

Waste Disposal Certificate Example

WASTE MANAGEMENT

Waste Management, Mahoning Landfill, Inc.

CERTIFICATE OF DISPOSAL

This letter is to certify that _____25.97_____________ tons, from _______WALNUT DISPOSAL_____ were disposed of in accordance with all applicable non-hazardous solid waste regulations. Waste was received and disposed of on _____December 12__________________, 20__14____.

Randa Miller

Landfill representative signature

12/12/14

Date

Attachment 4

Weigh Ticket Example

0531760

WASTE MANAGEMENT

Mahoning Landfill
3510 Garfield Rd
New Springfield, OH, 44443
Ph: 330-549-5357

Original
Ticket# 283947

Customer: AUSTIN MASTER SERVICES
355 CIRCLE OF PROGRESS DR
POTTSTOWN, PA, 19464

Ticket Date 05/04/2015

Account #: 0001777
Payment Type: Credit Account
Check #:
Manual Tckt#:
PO:

Carrier: TONAWANDA TANK
Dest.:
Vehicle#: 4879 Volume 45.0
Container:
Driver:
Haul Tic#:
Contract:

Manifest: 3263971
Profile 493274OH (HISTORICAL FILL)
Generator 119-MERANIHOSPITALITY MERANI HOSPITALITY INC

	Time	Scale	Operator
In	05/04/2015 09:43:38	scale 1	Rande Miller
Out	05/04/2015 10:13:06	scale 1	Rande Miller

Comments: 632

Inbound		
	Gross	78960 lb
	Tare	35060 lb
	Net	43900 lb
	Tons	21.95

Product	LD%	Qty	Rate	Fee	Amount	Origin
Cont Soil Sp. W.-Tons-Unspec	100	21.95 Tons				NY-NIAGARA

Total Fees
Total Ticket

Driver's Signature

FJ7437 (ALL)
Standard Register
404WM-N

Attachment 5

SME Analytical Review and Approval Certification Example

Austin Master Services, LLC
801 North First St
Martins Ferry, OH 43935
(860) 324-6599
www.austinmasterservices.com

ISOCS Operator: Anthony Mazzocco

Container ID: Truck_206_Trailer_147T
Container Type: 45yd End Dump
Analysis ID: Truck_206_Trailer_147T_20151125.CNF
Project: Martin's Ferry
Analysis Date: 11/25/2015
Analysis Time: 9:24:09 AM

Parameters Radionuclide	Approved Method	Activity Concentration (pCi/g)	Uncertainty (pCi/g)	MDA (pCi/g)
Ra-226	ODH In-Situ	3.882	0.149	0.342
Ra-228	ODH In-Situ	0.318	0.114	0.506
Total radium		4.200	0.188	0.611
Total Radium with Uncertainty		4.39		

The radium contents of this container PASS for disposition in Ohio. The total radium activity concentration plus the total radium measurement uncertainty of the contents is less than the regulated value of 6.99 pCi/g. Therefore, the contents of this container can be dispositioned as is at a municipal landfill in the state of Ohio.

The contents of this container were analyzed using in-situ gamma spectroscopy. The method, ODH In-Situ under Austin Masters' Radioactive Materials License. #03219510000. ODH In-Situ is approved by Ohio Department of Health and the Ohio Environmental Protection Agency as an acceptable method for the analysis of Ra-226 and Ra-228.

The Ra-226 values were quantitated from the 186 keV peak as well as several peaks from the radioactive progeny of Ra-226. Ra-228 values were quantitated from several peaks from the radioactive progeny of Ra-228. The most likely peaks for quantitation of Ra-226 and Ra-228 are listed as follows (all in units of keV): Ra-226 -- 186.2, 295.2, 351.9, and 609.3; Ra-228 -- 583.2, 911.1, and 969.1. The uncertainty is the total propagated uncertainty listed at 2 sigma. The minimum

detectable activity (MDA) was calculated using equations from Curie's Limits for Qualitative Detection and Quantitative Determination paper. Where there is no reported activity the uncertianty is listed as zero and the activty equivalent to the MDA.

Note: *the complete analytical report related to this container is available upon request. All reports are maintained by Austin Masters for a period of three years.*

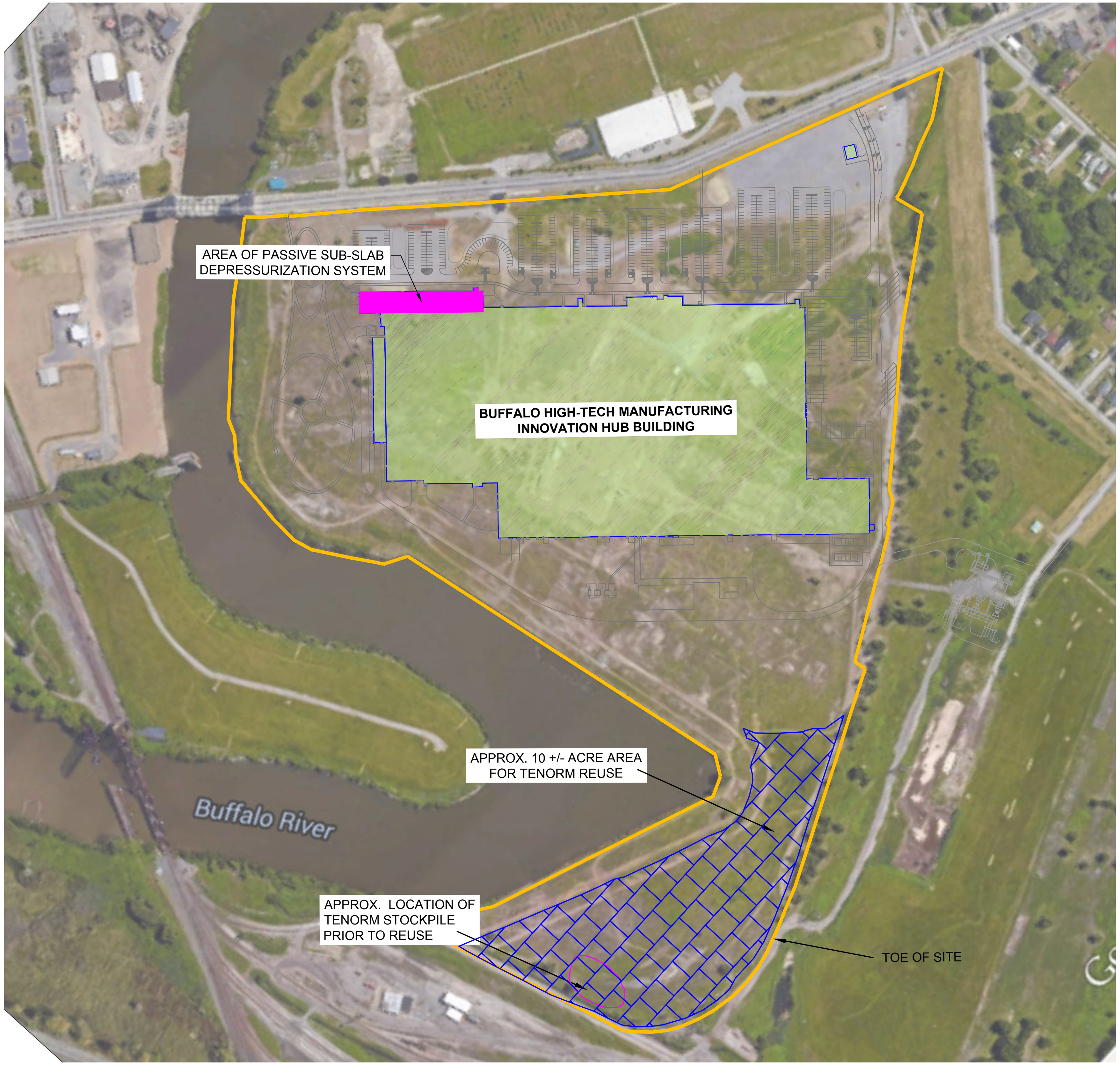
Peter Collopy
SME Analyst (Print) `

Peter Collopy
SME Analyst (Signature)

11/25/2015
Date

FIGURES

F:\CAD\TurnKey\LPCiminelli Construction\SMP\Appendix A\Figure A-1; Tenorm Reuse Location Plan.dwg



LEGEND:

- PROPERTY BOUNDARY
- BUILDING
- ASPHALT (PARKING/ROADWAY)
- TENORM REUSE AREA AND COVER SYSTEM
- PASSIVE SUB-SLAB DEPRESSURIZATION AREA

N

400' 0' 400' 800'

SCALE: 1 INCH = 400 FEET
SCALE IN FEET
(approximate)

BENCHMARK
ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC
2558 HAMBURG TURNPIKE
SUITE 300
BUFFALO, NY 14218
(716) 856-0599

JOB NO.: 0330-015-002

TENORM REUSE LOCATION PLAN

SITE MANAGEMENT PLAN

RIVERBEND SITE AREA I
BUFFALO, NEW YORK

PREPARED FOR
FORT SCHUYLER MANAGEMENT CORPORATION

FIGURE A-1

DATE: JULY 2016
DRAFTED BY: RFL