U.S. Army Corps of Engineers
Buffalo District Office
1776 Niagara Street, Buffalo, New York, 14207

Proposed Plan for the Seaway Site Tonawanda, New York

April 2008

Formerly Utilized Sites Remedial Action Program

UNITED STATES ARMY CORPS OF ENGINEERS
PROPOSED PLAN FOR THE SEAWAY SITE
TONAWANDA, NEW YORK

A Proposed Plan for the Tonawanda Site in Tonawanda, New York was prepared by the United States Department of Energy (DOE) in September 1993 under its authority to conduct the Formerly Utilized Sites Remedial Action Program (FUSRAP). The 1993 Proposed Plan for the Tonawanda Site addressed remediation of radioactive contamination at the four (4) locations in the Town of Tonawanda that comprised the Tonawanda Site as defined at the time: the Linde (now Praxair) Site; the Ashland 1 Site; the Ashland 2 Site; and the Seaway Site.

On October 13, 1997, the Energy and Water Development Appropriations Act, 1998 was signed into law as Public Law 105-62. Pursuant to this law, the responsibility for identifying and implementing remedial actions at FUSRAP sites was transferred from the DOE to the United States Army Corps of Engineers (USACE). The Energy and Water Development Appropriation Act for Fiscal Year 2000, Public Law 106-60 Section 611, provides authority to USACE to conduct restoration work on FUSRAP Sites as the lead Federal agency subject to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 United States Code 9601 et seq., as amended. Therefore, USACE is conducting this project in accordance with CERCLA.

Subsequent to the 1993 Proposed Plan for the Tonawanda Sites, separate Proposed Plans and Records of Decision were released for Linde and Ashland 1, Ashland 2 and Seaway D. This Proposed Plan addresses the Seaway Site and was prepared to fulfill the requirements of CERCLA Section 117(a) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) [40 CFR 300.343(f)(2)]. It explains USACE's recommendation, the Preferred Alternative, to address soils impacted by Manhattan Engineer District/Atomic Energy Comission (MED/AEC)-related activities and associated Constituents Of Potential Concern (COCs) at the Seaway Site. USACE has concluded that groundwater and leachate at the Seaway Site are not being impacted by MED/AEC-related contamination.

USACE reviewed all relevant documents, and does hereby propose that the final remedial action for the Seaway Site be the alternative designated as Alternative 6, Containment, described in the Proposed Plan. After evaluating this alternative pursuant to the criteria described in the NCP, 40 Code of Federal Regulations Section 300.430(e)(9)(iii), USACE considers it to be protective of human health and the environment and cost effective.

USACE invites members of the public to review the Proposed Plan and the supporting documents which further describe the conditions at the Seaway Site and the basis for this Proposed Plan. Those documents may be found in the administrative record file for the Seaway Site at the following locations:

USACE FUSRAP Public Information Center
1776 Niagara Street, Buffalo, NY 14207
(716) 879-4197
(800) 833-6390 [press 4 at the recorded message]

Tonawanda Public Library
333 Main Street
Tonawanda, NY 14150
(716) 693-5043

Members of the public who wish to comment upon this Proposed Plan may submit their comments in writing to USACE at the following address:

U.S. Army Corps of Engineers, Buffalo District
FUSRAP Information Center
1776 Niagara Street
Buffalo, NY 14207-3199

Please refer to this Proposed Plan or to the Seaway Site in any comments. All comments will be reviewed and considered by USACE in making its final decision on remedial actions to be conducted at the Seaway Site. Comments should be submitted no later than 30 days after the issuance of this Proposed Plan.

After the close of the public comment period, USACE will review all public comments, as well as the information contained in the administrative record file for this site, and any new information developed or received during the course of this public comment period, in light of the requirements of CERCLA and the NCP. An authorized official of USACE will then make a final selection of the remedial action to be conducted at this site. This decision will be documented in a Record of Decision, which will be issued to the public, along with a response to all comments submitted regarding this Proposed Plan.

If there are any questions regarding the comment process, or the Proposed Plan, please direct them to the address noted above, or telephone (716) 879-4197 or 1 (800) 833-6390.

Bruce A. Berwick
Brigadier General
Division Commander

_//signed 04/29/08_____

UNITED STATES ARMY CORPS OF ENGINEERS
PROPOSED PLAN FOR THE SEAWAY SITE
TONAWANDA, NEW YORK

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ACRONYMS AND ABREVIATIONS

Ac	Actinium
AEC	Atomic Energy Commission
ALARA	As Low As Reasonably Achievable
ANL	Argonne National Laboratory
ARAR	Applicable or Relevant and Appropriate Requirement
BFI	Browning Ferris Industries
bgs	below ground surface
BNI	Bechtel National, Inc.
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Constituent of Concern
cy	cubic yard
$DCGL_{emc}$	Derived Concentration Guideline Level (small elevated area)
$DCGL_{w}$	Derived Concentration Guideline Level (wide area)
DOE	Department of Energy
EMP	Environmental Monitoring Plan
FBDU	Ford, Bacon and Davis Utah
FS	Feasibility Study
FSA	Feasibility Study Addendum
FSS	Final Status Survey
FSSP	Final Status Survey Plan
ft	feet
FUSRAP	Formerly Utilized Sites Remedial Action Program
g	gram
HHRA	Human Health Risk Assessment
L	liter
m	meters
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MED	Manhattan Engineer District
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NYSDEC	New York State Department of Environmental Conservation
ORNL	Oak Ridge National Laboratory
PA/SI	Preliminary Assessment/Site Inspection
pCi	picocurie
Pa	Protactinium
PP	Proposed Plan
Ra	Radium
RAO	Remedial Action Objective
RESRAD	RESidual RADioactivity computer code
RI	Remedial Investigation
Rn	Radon
ROD	Record of Decision
s	second
SOR	Sum of Ratios
TEDE	Total Effective Dose Equivalent
Th	Thorium
TMA	Thermo Analytical
U	Uranium

UMTRCA	Uranium Mill Tailings Radiation Control Act
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
yr	year

EXECUTIVE SUMMARY

This Proposed Plan explains the United States Army Corps of Engineer's (USACE) recommendation, the Preferred Alternative, to address soils impacted by Formerly Utilized Sites Remedial Action Program (FUSRAP) related activities and associated Constituents Of Concern (COCs) at the Seaway Site. The Proposed Plan for the remediation of the Seaway Site was prepared by USACE, which is implementing FUSRAP, subject to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This Proposed Plan only addresses FUSRAP-related contamination on the site, and does not address other potential site contamination that cannot be addressed by USACE under its FUSRAP authority. USACE has concluded that groundwater and leachate at the Seaway Site are not being impacted by FUSRAP-related contamination.

The Seaway FUSRAP Site is located in the Town of Tonawanda, New York, about 10 miles north of downtown Buffalo. The Seaway landfill, which is owned the by Sands Mobile Park Corporation, was used for the disposal of various types of wastes starting in 1930 and ending in 1993. The landfill rises to an elevation of approximately 160 feet above the surrounding area at the peak of the capped portion. While about 2/3 is capped, areas of known FURSAP-related material were left uncapped. Later investigations showed FUSRAP-related material in some areas that were capped.

A Waterfront Region Master Plan, written for the area, identifies planned uses for the landfill once closed, as recreational. Currently, land surrounding the landfill is primarily being used for industrial purposes. The nearest residences are located ½ miles away from the site to the northwest, across the Niagara River on Grand Island, and to the east in the Town of Tonawanda.

USACE has identified four areas where FUSRAP-related contaminated soils exist: Area A, Areas B and C, Seaway Northside and Seaway Southside. (Refer to the report cover for an image of these areas.) After investigating the site, USACE has concluded that FUSRAP-related contaminated soil could pose an unacceptable risk to human health under potential future conditions. There is no immediate risk to human health and the environment under current site conditions.

USACE's Preferred Alternative to remediate the impacted soils at the Seaway Site is Alternative 6: Containment. This alternative would involve capping of Areas A, B, and C with a landfill cover 4 to 5 1/2 feet thick and grading, as required. The cap would be constructed of multiple layers of various types of soil, fabric, and geomembranes designed to provide protection. FUSRAP-related contaminated materials located outside of the landfill containment system (i.e., outside of the leachate collection system), such as areas within Seaway Southside and Seaway Northside that exceed the cleanup criteria will be excavated and shipped offsite for disposal. This alternative would

include ensuring that land use controls are in place to prevent future access to and disturbance of the FUSRAP-related waste. Long-term surveillance and maintenance of contained MED/AEC-related waste would be performed by the Federal government. (Monitoring of non-MED/AEC-related waste would remain the responsibility of the property owner.) Containment is considered to be the most protective action alternative in the short-term, more easily implemented than the other alternatives and the most cost effective while being protective of human health and the environment. The present value cost of Alternative 6 is estimated to be 30 million dollars. Safety would be the highest priority during the remediation effort. Through the use of strict safety plans and protocols, safety to residents and workers would be ensured.

Supporting documents regarding the Seaway Site are located in the administrative record file at the Public Information Center at the Buffalo District Office and the Tonawanda Public Library. Of particular importance, is the Feasibility Study Addendum (USACE 2008).

The public is encouraged to review and comment on all of the alternatives identified in this report, especially the selection of the Preferred Alternative. USACE may modify the Preferred Alternative or select another alternative presented in this Proposed Plan based on new information or public and/or regulatory agency comments.

Comments on this proposed remedial action at the Seaway Site will be accepted for 30 days following issuance of the Proposed Plan in accordance with CERCLA. A public meeting will be conducted during the comment period to receive verbal comments from the public. Responses to the public comments and the final remedy selected for the Seaway Site will be documented in the Record of Decision (ROD) that will be published after all comments are addressed.

All written comments should be addressed to:

U.S. Army Corps of Engineers
Buffalo District
FUSRAP Information Center
1776 Niagara Street
Buffalo, NY 14207

1. INTRODUCTION

What's in this section?
What is a Proposed Plan?
Who is issuing this Proposed Plan and why?
What does this Proposed Plan address? What is not addressed?
What documents form the basis for this Proposed Plan and contain more detailed information?

This Proposed Plan (PP) explains USACE's (United States Army Corps of Engineers) recommendation, the Preferred Alternative, to address soils impacted by FUSRAP-related (Formerly Utilized Sites Remedial Action Program) activities and associated constituents of potential concern (COCs) at the Seaway Site. This document presents four remedial alternatives considered by USACE, USACE's Preferred Alternative, and rationale concerning how best to address the contamination at the Seaway Site.

FUSRAP was initiated in 1974 to identify, and if necessary, investigate and clean up or control sites that were part of the Nation's early atomic energy program. Activities at these sites were performed by the Manhattan Engineer District (MED) (1944 – 1946) or under the Atomic Energy Commission (AEC) (1947 – 1975). The AEC and MED were predecessors of the U.S. Department of Energy (DOE). In 1997, Congress transferred responsibility of identifying and implementing the remedial actions for FUSRAP sites from the DOE to USACE.

USACE is issuing this PP as part of its public participation responsibilities under the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 United States Code Section 9601 et seq., as amended, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) 40 CFR § 300.430(f) (2).

The CERCLA process begins with a PA/SI (Preliminary Assessment/Site Inspection) to determine if a FUSRAP eligible site should be designated for cleanup under FUSRAP. If a site meets the criteria to be designated for FUSRAP cleanup, a Remedial Investigation (RI) is performed and includes a sampling program and risk assessment in order to define the extent of the site contamination and risks. The Feasibility Study (FS) is used to develop and evaluate various remediation alternatives. The Preferred Alternative is presented in a PP for public review and comment. This is the stage that the Seaway project is currently in. The selected alternative is documented in a Record of Decision (ROD). If remedial action is prescribed in the ROD, the site enters into a Remedial Design (RD) phase followed by a Remedial Action (RA) phase. Some sites require

Long-Term Monitoring and 5-year reviews, under the requirements 40 CFR 300.430(f)(4)(ii), once the RA has been completed.

The final decision on the remedy to be implemented will be documented in the ROD for the Seaway Site only after consideration of all comments received and any new information presented. USACE may modify the Preferred Alternative presented here or select another option based on new information or public and/or regulatory agency comments. Therefore, the public is encouraged to review and comment on all of the alternatives identified.

This response action will address impacted soils at the Seaway Site. Under FUSRAP, USACE is authorized to remediate only those COCs originating from MED/AEC-related activities. At the Seaway Site, these COCs include radioactive residuals only. Constituents not associated with MED/AEC activities may be remediated only if mixed with MED/AEC-related COCs. If these constituents are co-mingled with MED/AEC-related COCs, they will be remediated and addressed in terms of proper disposal and other actions.

USACE has concluded that groundwater and leachate at the Seaway Site are not being impacted by MED/AEC-related contamination. Also, groundwater is not being used as a source of drinking water at or near the site. Therefore, no action with regards to groundwater or leachate is needed, and the remedies presented in this PP do not include actions related to groundwater or leachate.

In 1993, a PP (DOE 1993a) for the Tonawanda Site in Tonawanda, New York was released by the DOE (Seaway is part of the former Tonawanda Site), however a ROD has never been issued for the Seaway Site. Separate PPs and RODs for the other portions of the Tonawanda Site, Ashland and Linde, have already been issued. The 1993 Preferred Alternative for the Seaway Site has been revised based on the following: input from the community after issuance of the previous draft PP; discussions with the community's representatives; review of DOE documents; and USACE investigations and studies.

The main accompanying document to this PP is the Feasibility Study Addendum (FSA). The FSA, released at the same time as this PP, describes all the aspects of this document in greater detail. The reader can consider the FSA to be the primary reference to this document and the first place to look for more information. The following is a list of the main documents that form the basis for this PP.

Produced by USACE

- Addendum to the Feasibility Study for the Seaway Site, Tonawanda, New York (2007).
- Technical Memorandum: Summer 2001 Subsurface Investigation at the Seaway Site – Areas A, B and C, Tonawanda, New York (2002).
- Technical Memorandum: Application of 10 CFR Part 40, Appendix A, Criterion 6(6) and Derivation of Benchmark Doses for the Seaway Landfill Areas, A, B, and C, Tonawanda, New York (2000).
- Technical Memorandum: Estimates of Air Quality Impacts of Radon in Landfill Gas, Seaway Site, Areas A, B and C, Tonawanda, New York (2000).
- Technical Memorandum: Modeling of Radiological Risks From Residual Radioactive Materials Following Implementation of Remedial Alternatives For Seaway Landfill Areas A, B and C, Tonawanda, New York, Revision 2 (2000).
- Technical Memorandum: Synopsis of Volume Calculations for Seaway Site Areas A, B and C, Tonawanda, New York (1999).
- Gamma Walkover Survey of the Seaway Landfill, Tonawanda, New York (USACE 1998b) and Additional Surface Characterization of Areas B and C at the Seaway Site (1999).

Produced by DOE

- Radionuclide Cleanup Guideline Derivation for Ashland 1, Ashland 2 and Seaway, Tonawanda, New York. (1997)
- Feasibility Study for the Tonawanda Site. (1993)
- Baseline Risk Assessment for the Tonawanda Site. (1993)
- Remedial Investigation for the Tonawanda Site. (1993)

These documents regarding the Seaway Site are contained in the administrative record file at the Public Information Center at the Buffalo District USACE Office and the Tonawanda Library. See Section 8 for more detailed information on community roles. USACE encourages the public to review all available materials about Seaway to gain a more comprehensive understanding of the site.

2. SITE BACKGROUND

What's in this section?
Where is the site?
How did the contamination get there?
What has been done so far?

2.1 Site Location

The Seaway FUSRAP Site is located in the Town of Tonawanda, New York approximately 10 miles north of downtown Buffalo. The general location of the site is shown in Figure 1. The Ashland 1, Ashland 2 and Rattlesnake Creek Sites (together called the Ashland Sites), and the Linde Site are located in close proximity to Seaway as shown in Figures 1 and 2. The Seaway Site is accessed by River Road which is adjacent to the Niagara River. The properties immediately east and west of the site are owned by the Ashland Oil & Refining Company. These properties are being used primarily for industrial purposes, as are other nearby properties along River Road. The nearest residences are located ½ miles away from the site to the northwest, across the Niagara River on Grand Island, and to the east in the Town of Tonawanda.

The Seaway Site property comprises about 100 acres referred to as the Seaway Industrial Park. It is owned by the Sands Mobile Park Corporation, successor by merger to the Seaway Industrial Park Development Company, Inc. and since the late 1980's has operated as a landfill by Browning-Ferris Industries, Inc. (BFI).

The Seaway Site is a landfill used for the disposal of various types of wastes starting in 1930 and ending in 1993. The landfill accepted municipal, commercial, industrial (including hazardous materials), and construction wastes from communities within 6 to 8 miles of the site. Approximately 90% of the site has been used for disposal, and approximately 67% has been capped by the property owner. Areas of known FUSRAP-related material were intentionally left uncapped. Later investigations showed some FUSRAP-related material in some areas that were capped (see Figure 3).

2.2 Site History

During the early to mid-1940's, portions of the property located at the former Linde Site were used for the processing of uranium ores under Federal MED/AEC contracts. Also, during that time, efforts took place to identify a storage site for waste residues produced during uranium processing. In 1943, MED leased a 10-acre tract known as the Haist property, now called Ashland 1, to serve as a storage site for the uranium ore processing residues. Residues were deposited at Ashland 1 from 1944 to 1946 and consisted primarily of low-grade uranium ore tailings. In 1960, the property was

transferred to the Ashland Oil Company. In 1974, Ashland Oil Company constructed a bermed area for two petroleum product storage tanks and a drainage ditch on the Ashland 1 property. The majority of the soil removed during the 1974 construction of the bermed area and drainage ditch was transported by the Ashland Oil Company to the Seaway landfill and Ashland 2 Site for disposal, and some of it contained MED/AEC-related contamination.

The RI reports that approximately 6,000 cubic yards (cy) of low grade uranium ore tailings from Ashland 1 were disposed in the Seaway landfill or at Ashland 2 in 1974. These radioactive residuals have become mixed with other soils and solid waste. Since 1974, portions of the residues have been buried under refuse and fill material. In 1984, the Seaway Site was designated into FUSRAP. Table 1 presents a summary of important dates and events.

2.3 Investigations and Activities

Investigations at Seaway include the following:

DOE Investigations (1976-1997)

- In 1976, ORNL (Oak Ridge National Laboratory) conducted a radiological survey of the site which consisted of (1) measurement of external gamma radiation at one meter above the surface on a 400-ft grid, (2) measurement of external gamma radiation at the surface and one meter above the surface on a 100-ft grid, (3) measurement of beta-gamma contamination levels at the surface on the same 100-ft grid, (4) measurement of gamma radiation at various depths in core holes, (5) collection of soil samples from some of the core holes, and (6) collection of water and mud samples (ORNL 1978a).
- In 1976, ORNL conducted an additional survey of the site in which they performed gamma walkovers and collected numerous soil samples in Seaway Areas A, B and C to depths of approximately 2 feet (ORNL 1978b).
- In 1979, EG&G conducted an aerial radiological survey of the Tonawanda area. The Seaway Site was identified as an area with elevated results (EG&G 1979).
- Ford, Bacon and Davis Utah (FDBU) conducted another survey of Seaway in 1981. As stated in the RI, their results generally confirmed the 1976 results but noted that some material in Area C had washed down the slope to the south towards an access road for a section of the landfill (FBDU 1981).
- In 1986 Thermo Analytical (TMA)/Eberline performed a gamma walkover of Area A and noted that they could not find Areas B and C. Areas B and C appeared to be covered by a significant amount of fill material and possibly, refuse. The survey also found that approximately 40% of Area A was found to have a similar, but thinner, layer of material placed over it (TMA/Eberline 1986).

- Bechtel National Incorporated (BNI) conducted two phases of RI investigations at Seaway as part of the overall Tonawanda Site Remedial Investigation efforts. The first phase was from 1988-1989 and the second phase was from 1990-1992. The results are included in the 1993 Remedial Investigation Report (BNI 1993).

USACE Investigations (1997-present)

- August 1998, USACE conducted a gamma walkover survey of Areas A, B and C. The results for Area A were consistent with other investigations. However, there were two isolated areas, one in Area B and one in Area C, where elevated readings were observed at the surface (USACE 1998b).
- December 1998, USACE conducted a limited field investigation in Areas B and C. The investigation involved taking boring samples at the locations of the elevated gamma walkover survey results (USACE 1999a).
- August-September 2001, USACE conducted a more extensive investigation of Areas B and C to better determine the extent of any MED/AEC-related contamination in those areas due to limited previous investigation results. Borings were placed throughout Areas B and C and down-hole gamma logging was performed. Soil samples were also collected and analyzed by an on-site gamma spectroscopy system with some samples being shipped to an off-site lab, as well. The investigation found that there were not small isolated piles of contamination with Areas B and C as noted in the ORNL survey. Instead, the contamination appears to be a large lens of material spread over a large area that encompasses both Areas B and C (USACE 2002).
- During the 2000 to 2002 USACE remediation efforts at Ashland 1 and Seaway Area D, additional data was obtained regarding Seaway Southside, which includes Seaway Area D and contamination found along the Seaway property (USACE 2003). (See Figure 3)

Between 2002 and 2007, USACE worked on completing the Feasibility Study Addendum (FSA) and this PP. Meetings with the New York State Department of Environmental Conservation (NYSDEC) and other Stakeholders were held during this time period to discuss project issues.

There have not been any removal actions at Seaway, except the remediation of Seaway Area D, which was included in the ROD for the Ashland Sites. See Section 3 for a description and location of Area D. Remediation has been completed at the Ashland Sites, which included remediation at Area D. At the time of release of this PP, remediation at the Linde Site was ongoing.

Table 1. Key Events in Seaway History

Year(s)*	Event
1930	Seaway begins to be used as a disposal site
1940-1945	Uranium Ore Processed at Linde Site for the MED/AEC
1944-1946	MED/AEC-related soil residues deposited adjacent to Seaway Site at Ashland 1
1974	Some MED/AEC-related soils relocated to Seaway
1984	Seaway designated into FUSRAP
1993	Disposal of non-MED/AEC-related materials into the landfill ends
1993	DOE releases a RI, FS and PP for the Tonawanda Site, including Seaway
1995	Portions of the landfill are closed
1997	FUSRAP authority transferred to USACE
2002	USACE releases results from additional sampling at Seaway
2008	USACE releases FSA and PP for the Seaway Site

* - Some dates are approximate

3. SITE CHARACTERIZATION

What is in this section?
What are the site conditions?
What MED/AEC-related contaminants are present at the site? Where are they located?
At what levels are contaminants present?
What are the conditions and status of the landfill?
What is the most likely use for the site in the future?

3.1 Site Conditions

Principal features of the site include four areas of MED/AEC-related soil contamination referred to as Area A, Areas B and C, Seaway Northside, and Seaway Southside, and a clay cutoff wall that surrounds the landfill. These features, and the property line, are depicted in Figure 3.

The original topography of the Seaway property has been drastically altered by the landfill, which rises to an elevation of approximately 160 feet above the surrounding area. Figure 4 shows elevations at the site relative to the surrounding area.

Surface water from the landfill is directed to drainage ditches that flow into Rattlesnake Creek, Two Mile Creek, or under River Road into the Niagara River (see Figure 2). A 4-foot diameter reinforced concrete pipe lined with a 39-inch diameter, high density polyethylene sleeve intersects the Seaway property and passes under the landfill, conveying stormwater flow from a ditch at Ashland 1 northeasterly under the landfill to Rattlesnake Creek. This pipe is not connected to the landfill, and does not carry water from the Seaway property.

Due to its former use as a landfill, the Seaway property supports only sparse vegetation composed of shrubs and grasses. NYSDEC regulations require seeding with native grasses during the closure and post-closure phases of solid waste disposal facilities to slow erosion and promote evapotranspiration. Landfill operations and nearby industrial activity have limited wildlife use of the area, although gulls and crows are present (DOE 1993b). The Seaway Site is not located within a 100-year flood zone and no wetlands have been identified on the site (DOE 1993b).

Except for occasional transient individuals, no Federally-listed or proposed endangered or threatened species under jurisdiction of the U.S. Fish and Wildlife Service (USFWS) have been sighted in the project area, and no listed or suspected critical habitats occur on the Seaway Site (DOE 1993b). A review of New York State records on

archaeological, cultural, and historical resources indicates that none of these resources are close to the project area (DOE 1993b).

3.2 Landfill Conditions

All features described in this section were constructed by the property owner, who is responsible for managing and monitoring the landfill.

Berms, extending 10 feet above the ground surface, were constructed around most of the landfill perimeter at most locations. The interior slope of the berms (the landfill side) are designed with a 2-foot thick clay liner connected to a clay cutoff wall. Where the berm is not constructed in the northeast corner of the landfill, the landfill cap was designed to be connected directly to the clay cutoff wall. The landfill cap consists of 24 inches of low-permeability clay, covered by 6 inches of topsoil seeded with grassy vegetation.

The clay cutoff wall and leachate collection system was constructed at the landfill with design approval by NYSDEC which required that the cutoff wall have a permeability of 1 x 10^{-7} centimeters per second (cm/s) or less over a minimum width of 2 ft. The depth of the cutoff wall as constructed varied with site conditions and ranged from 6 to 24 feet below the ground surface. The wall was keyed into the underlying clay strata a minimum of 2 feet and the thickness of the wall is 30 to 36 inches (CH_2M Hill 1984). The location of the cutoff wall is shown in Figure 3.

The leachate collection pipe system consists of 6-inch diameter perforated pipe installed inside the clay cutoff wall in a gravel/crushed stone trench surrounded by filter fabric. The perimeter leachate collection pipes drain to low spots in the system, on the east and west sides of the landfill. Leachate collected at these locations is pumped northerly to high points in the system, with flow continuing northerly by gravity to a metering manhole located on the northern portion of the landfill property and then by gravity to the Town of Tonawanda municipal wastewater collection system at a manhole on River Road.

Installation of a gas collection system began in 1995. The gas collection system consists of 34 extraction wells located in the southern portion of the landfill. Pipelines run from the wells to a set of blowers designed to convey landfill gas to a flare, where combustible gases are burned. Passive landfill gas vents are installed in the two capped areas in the northern portion of the landfill. These vents are not connected to the landfill gas collection system. Operation of the active collection system and flare began in February 1996. With NYSDEC approval, active gas collection and use of the flare was discontinued in October 2000.

The current site owner has an Environmental Monitoring Plan (EMP) in place to detect changes in groundwater and surface water quality that may potentially occur as a result of operations at the facility. Annual baseline and quarterly routine monitoring of 17 groundwater wells, 6 surface water stations, and leachate generated by the landfill is specified in the EMP.

3.3 Contaminants of Concern at Seaway

This PP only discusses COCs associated with MED/AEC-related activities. USACE has identified five MED/AEC-related COCs at the Seaway Site: Radium-226 (Ra-226), Thorium-230 (Th-230), and Total Uranium (U) including the uranium daughters Actinium-227 (Ac-227) and Protactinium (Pa-231). Hereafter, references to COCs in this document will pertain to these COCs. The uranium contamination at the Seaway Site consists of natural uranium which contains three isotopes: U-234, U-235, and U-238. U-234 and U-238 are in the same decay series that also includes Ra-226 and Th-230. Ac-227 and Pa-231 are in the U-235 decay series (ANL 2007). Total U is simply the sum of the concentrations of the three uranium isotopes.

This PP discusses COCs associated with MED-related activities that originated at the Linde Site. Uranium ores were processed at the Linde Site to remove the uranium, which was then further refined. The waste materials associated with the processing of the ores contained other radiological constituents that were not removed with the uranium. These radionuclides consisted primarily of radium and thorium decay products associated with the uranium isotopes, and residual amounts of uranium not removed due to processing inefficiencies. These solid waste materials were referred to as mill tailings, or residues. As discussed in Section 2, some of those waste materials were moved to Ashland 1 and subsequently to the Seaway Site.

Because the Seaway Site, also referred to as the Niagara Landfill, was used for waste disposal for many years, a wide range of chemical contaminants are expected to exist in the filled areas. Waste reported to have been disposed at the landfill ranges from garbage to fly ash to industrial sludges, solvents, and other wastes. As described in Section 1, USACE will not remediate any radioactive or chemical contamination that is not MED/AEC-related or is not mixed or co-mingled with MED/AEC-related contamination.

Radium (Ra) is a naturally occurring element, found in small concentrations in soil, rocks, surface water, groundwater, plants and animals. Radium can be ingested or inhaled, and although much of the radium is excreted from the body, some of it may remain in the bloodstream or lungs and be carried throughout the body. Radium also is a source of radon gas, and exposure to radon is known to cause bone and lung cancer. (ANL 2007)

Thorium (Th) is a naturally occurring element, found in soil, rocks, surface water, groundwater, and plants. Thorium can be ingested or inhaled, and can cause lung, pancreatic, and certain blood cancers. Thorium is also known to attach to the skeletal system and cause bone cancer. (ANL 2007)

Uranium (U) and Uranium Daughters are also naturally occurring, found throughout the world in soils, geologic formations, water, animals and even some natural foods. As with the other COCs, uranium can be ingested or inhaled. The most prevalent human health concerns of uranium exposure occur through ingestion and can lead to bone cancer and kidney damage. Actinium and protactinium are decay products of uranium, found in small quantities whenever uranium is present. Since the MED/AEC-related materials at Seaway have been depleted of uranium, quantities of actinium and protactinium above equilibrium amounts remain. Like all the others, actinium and protactinium can be ingested or inhaled and can cause cancer. (ANL 2007)

3.4 Nature and Extent of Contamination

3.4.1 Soil

Estimated MED/AEC-related contaminated soil volumes are presented in Table 2. Volume estimating methodologies for Area A are documented in *Technical Memorandum: Synopsis of Volume Calculations for Seaway Site Areas A, B and C, Tonawanda, New York* (USACE 1999b), and in *Technical Memorandum: Summer 2001 Subsurface Investigation of the Seaway Site - Areas A, B and C, Tonawanda, New York* (USACE 2002) and *Addendum to the Feasibility Study for the Seaway Site, Tonawanda, New York* (USACE 2008) for Areas B and C.

The range of COC concentrations for each of the areas is presented in Table 3. The extent of each of the following areas is shown in Figure 3 and on the cover of this PP.

3.4.1.1 Area A

Area A is a large, elliptically shaped area approximately 12 acres in size, located in the northeast section of the landfill. Most of MED/AEC-related contamination is at or near the surface, but some has been covered with a thin layer of material up to 10 feet in depth.

3.4.1.2 Areas B and C

Areas B and C, located between two closed portions of the landfill, are irregularly shaped and together comprise approximately 7 acres. The summer 2001 investigation by USACE found that the areas originally designated by the DOE as Areas B and C were much larger than previously thought, and that contamination extended into areas of the closed portion of the landfill. This new delineation is a single contiguous area, although

still referred to as Areas B and C. Much of these areas have been covered with a thick layer of soil and other materials, ranging from a few feet to more than 70 feet in the portion under the large capped portion of the landfill. This is depicted in Figure 5.

3.4.1.3 Seaway Northside

During remediation of the Ashland 2 area, contaminated materials were found up to the Seaway property line. The contaminated material appeared to be the result of surface runoff from Seaway Area A into the drainage system leading into Rattlesnake Creek. Therefore, the remediation of this material is being included as part of the Seaway remedial action and is called Seaway Northside. A sample of the material showed Ra-226 and Th-230 concentrations of 14 and 396 pCi/g, respectively. Based on this limited data, the contaminated area was assumed to be an 8 foot wide by 72 foot section on the Ashland 2 property and from the property line to the Seaway landfill clay containment cutoff wall. More characterization of this area may be performed prior to implementation of remedial actions.

3.4.1.4 Area D

Area D is located on the opposite end of the landfill as Areas A, B and C. It was another known area of MED/AEC-related contamination left open during capping, and is directly adjacent to Ashland 1. Due to its proximity to Ashland 1, remediation of Area D was completed under the ROD for the Ashland Sites and is therefore not considered under this PP.

3.4.1.5 Seaway Southside

During the remediation of Seaway Area D, two other areas of contamination on the Seaway property were identified. These areas were not remediated as part of Ashland 1 because of potential impacts to closed portions of the landfill that would have been caused by excavation. Impacting the landfill would not have been consistent with the other excavation actions performed at Ashland 1. These areas have therefore been included as part of the Seaway project. The MED/AEC-related materials located in Seaway Southside are the same type residues found in Seaway since all residues were once located at Ashland 1. The contaminants of concern identified for Areas A, B and C are the same for Seaway Southside.

3.4.2 Air

When Ra-226 in soil decays, small amounts of Radon-222 (Rn-222) gas are formed. The amount of Rn-222 is calculated from soil concentrations of radium. USACE has concluded that currently, for the uncapped portions of the landfill, the radon flux, measured in $pCi/m^2/s$ is approximately, 6.5 for Area A, and much lower for areas B and C (USACE 2000b). These rates are well below proposed Applicable or Relevent and Appropriate Requirements (ARARs) and do not pose an immediate risk to human health

and the environment. (Per 40 CFR Part 192, the maximum allowable value is 20 $pCi/m^2/s$, see Section 4.)

NYSDEC conducted radon measurements of the landfill gas that, at that time, was collected in the southern portion of the Niagara Landfill and conveyed to the flare and found the impacts to be negligible (NYSDEC 1996).

USACE also conducted an assessment of potential air quality impacts of radon in landfill gas from Seaway Areas A, B and C in the event the open portions of the landfill are capped. The assessment concluded that the 40 CFR Part 192 radon flux standard would be met in the case where landfill gas from Areas A, B and C is collected and conveyed to the existing gas collection system and flare (USACE 2000b). The assessment also concluded that standards would be met in the case of construction of multiple passive landfill gas vents as part of capping Areas A, B and C as long as the vents are constructed at the proper height above the cap and at the proper distance from the property line.

3.4.3 Surface Water

USACE has concluded that the landfill leachate at the Seaway Site is not being significantly impacted by radionuclides similar to the MED/AEC-related contamination under the current, uncapped conditions. The landfill has a leachate system which collects leachate from the entire landfill base, as required by State regulations. This system would collect leachate, if any, from the MED/AEC-related wastes in the landfill as well. The MED/AEC-related wastes in the landfill are residues from processing for uranium removal at the Linde Site, including treatment to remove soluble constituents. The remaining residues transported to the landfill area are highly insoluble and not subject to significant leaching. Any leachate potentially generated from the MED/AEC-related waste at the Seaway Site would be collected in the facility's leachate collection system, which is monitored for radioactive constituents, and discharged to the Town's wastewater treatment facility. Six surface water sampling points are also monitored under the landfill owner's EMP.

3.4.4 Groundwater

The subsurface at the Seaway Site includes two confining clay strata varying in thickness from 45 to 75 feet. The permeabilities of these clay materials is 1.6×10^{-8} centimeters per second (cm/s). USACE has reviewed these subsurface conditions, the landfill design (which includes a clay cutoff wall and a leachate collection system) as well as the results of leachate and groundwater monitoring. USACE has concluded that the groundwater at the Seaway Site is not being impacted by MED/AEC-related contamination, under the current uncapped conditions, and will not be impacted in the next 1000 years (USACE 2002). USACE concludes that the existing controls provide sufficient protection to prevent any MED/AEC-related material from adversely impacting

the groundwater outside of the capped landfill structure. Groundwater is not being used as a source of drinking water at or near the site.

3.5 Land Use Controls and Future Land Use

The landfill has been closed, except in Areas A, B, and C and areas between Areas A, B, and C, in accordance with NYSDEC's solid waste regulations, 6 NYCRR Part 360. The landfill has also been designated as an inactive hazardous waste disposal site pursuant to 6 NYCRR Part 375, Inactive Hazardous Waste Disposal Sites, and is listed in the Registry maintained by NYSDEC. As a location subject to 6 NYCRR Part 360 and 6 NYCRR Part 375, the Seaway Site is subject to land use controls enforceable by NYSDEC.

In 1992, a Waterfront Region Master Plan was written to address revitalization of the Town of Tonawanda waterfront area. This Master Plan defined a planning region, set goals and objectives, outlined a plan for future development, and recommended strategies for plan implementation in phases. This plan concluded that the landfill, once closed, could be redeveloped and used for low-intensity recreational uses such as ball fields, walking trails, or open space. This is consistent with the way other closed landfills are being used across the country (EPA 2005.) Therefore, USACE has determined that the most reasonable expected future site use of the Seaway Site is recreational, which is consistent with plans for the area.

The areas all around the Seaway Site are planned for industrial land uses. Due to the heavy presence of industrial land use surrounding the Seaway Site and uncertainties in the future regarding re-use of the entire property, USACE considered the possibility that portions of the site might be used for industrial uses. So, both recreational and industrial scenarios were evaluated, although USACE has determined that the most likely future site use of the Seaway Site is recreational.

Table 2. Estimated MED/AEC-Related Contaminated In-Situ[1] Volumes

Area[2]	Volume (yd^3)
Area A	39,500
Areas B&C	23,000
Seaway Northside	5,260
Seaway Southside	733
Total Contaminated Volume	68,493

1-In-situ volume is the gross amount of contaminated soil, not adjusted for increases that occur during actual remediation

2-Area D was remdiated as part of the Ashland ROD and no contaminated volume remains

Table 3. Range of Soil Concentrations for Constituents of Potential Concern (pCi/g)

Radionuclide All Values in pCi/g	Area A			Areas B&C			Northside[1]			Southside		
	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
Ra-226	ND	140	8	ND	93	4	-	14	-	ND	14	2
Th-230	ND	2,800	130	ND	547	8	-	400	-	ND	1900	240
Uranium[2]												
U-234	ND	54	8	ND	32	7	-	-	-	-	-	-
U-235	ND	11	0.5	ND	6	0.6	-	-	-	-	-	-
U-238	ND	74	10	ND	100	7	-	22	-	ND	220	25
Uranium Daughters												
Ac-227	ND	25	7	ND	25	5	-	12	-	-	-	-
Pa-231	ND	39	4	ND	28	4	-	12	-	-	-	-

ND – Not Detected

1-There is only one result for Seaway Northside, which is indicated as the maximum.

2-Total Uranium is calculated by adding the values for U-234, U-235 and U-238

4. SUMMARY OF SITE RISKS AND REMEDIAL ACTION OBJECTIVES

What's in this section?
How did USACE determine an action needed to be taken?
Who or what is at risk?
What regulations apply to the remedial alternatives?
If there is a removal, to what level will contamination be removed?
What about if contamination is left in place?

Risk assessments evaluate potential sources of contamination and routes of migration based on current and potential future site uses. Risk assessment results are based upon potential exposure pathways that can occur or are reasonably likely to occur in the future. These assessments are conservative estimates that ensure protection of human health and the environment.

4.1 Human Health Risks of Radiological Contaminants

In 1993, a baseline human health risk assessment for the Tonawanda Site was performed by the DOE (DOE 1993b). In June 2000, USACE prepared a technical memorandum titled *Modeling of Radiological Risks from Residual Radioactive Materials following Implementation of Remedial Alternatives for Seaway Landfill Areas A, B, and C, Final Rev. 2* (USACE 2000a), which used RESidual RADioctivity computer code (RESRAD) Version 5.82 to assess residual risk after the implementation of various remedial alternatives. USACE established cleanup goals for the Seaway Site in the July 2000 technical memorandum titled *Application of 10 CFR Part 40, Appendix A, Criterion 6(6) and Derivation of Benchmark Doses for the Seaway Landfill Areas A, B, and C, Tonawanda, New York* (USACE 2000c). In 2007, USACE re-assessed the list of COCs, cancer risks, and remediation goals for the Seaway Site. The results of this assessment are presented in Appendix C of the FSA (USACE 2008) and this PP. The 2008 assessment utilized data from the 2001 characterization effort and the most recent version of RESRAD, version 6.3.

The Human Health Risk Assessment (HHRA) for radiological constituents at the Seaway Site utilized RESRAD, which calculates the total excess cancer risk (i.e., the risk of persons developing cancer as the result of exposure to site contaminants) from radiological constituents to a particular receptor, for all applicable exposure pathways. Input parameters are selected to model a hypothetical human user of the site or receptor. Risk estimates were calculated covering a 1,000 year period, to be consistent with the potential ARARs identified later in this section. The maximum risk over this

period was then compared to the acceptable risk range specified in the NCP (USEPA 1990) of 10^{-6} to 10^{-4} (or one in 1,000,000 to one in 10,000).

A recreational receptor was evaluated as the reasonably anticipated future land use. A conservative industrial site worker scenario was also evaluated because the site was a former industrial facility, is currently zoned industrial, and is surrounded by active and inactive industrial properties. Risk for both receptors was evaluated for exposure to surface soil (0-2 feet below ground surface (bgs)) through incidental soil ingestion, inhalation of dust, and direct external gamma exposure. Groundwater is not used as a source of drinking water at or near the Seaway Site.

Total excess cancer risk for a recreational receptor was:
1×10^{-4} for Area A
2×10^{-5} for Area B, and
6×10^{-5} for Area C.

Total excess cancer risk for an industrial worker receptor was:
3×10^{-3} for Area A,
7×10^{-4} for Area B, and
2×10^{-3} for Area C.

Because the exposure to the industrial worker is above the acceptable risk range of 10^{-6} to 10^{-4}, action is required to ensure protection of human health and the environment.

DOE determined that Hazard Indices for chemical risk associated with COCs for all exposure pathways for all scenarios evaluated at the Tonawanda Site properties were much less than 1 thus indicating that no unacceptable effects would be expected. Addressing risks due to exposure to non-MED/AEC-related chemicals that may be present in the landfill is beyond the scope of FUSRAP authority.

4.2 Ecological Risks

The Seaway Site is located in a highly modified urban, industrial area and provides minimal urban wildlife habitat supporting only birds and small mammals, such as crows gulls, and rats. No threatened or endangered species exist on the Seaway Site and ecological risks are minimal. The Seaway Site does not provide adequate habitat for ecological receptors to evaluate remedial alternatives based on the protection of ecological receptors.

4.3 Remedial Action Objectives

Remedial Action Objectives (RAOs) are used to provide a general description of what the remedial action at a site will accomplish. CERCLA specifies two "threshold criteria" for deriving target cleanup levels for contaminated environmental media at waste sites:

- The remediation objectives must achieve overall protection of human health and the environment.
- Concentrations of contaminants (including radionuclides) in the environment must comply with Federal and state Applicable or Relevant and Appropriate Requirements (ARARs).

A remedial alternative must satisfy these "threshold criteria" to be eligible for selection.

For the Seaway Site, the RAOs are:

- ensure protection of human health and the environment from exposure at unacceptable levels to MED/AEC-related radiological contaminants of concern that are eligible for FUSRAP remediation;
- ensure that the remedial action complies with the selected ARARs;
- prevent or mitigate the release of MED/AEC-related materials (i.e., uranium, radium and thorium) to adjacent areas and surface water by surface runoff; and, reduce risks to human health associated with direct external exposure to, direct contact with, and inhalation and incidental ingestion of MED/AEC-related radiological contaminants in the surface and subsurface soils at the site.

4.4 ARARs for the Site

ARARs are defined as applicable or relevant and appropriate requirements. Applicable requirements are cleanup standards, standards of control, or other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location or other circumstance at a CERCLA site. An applicable requirement directly and fully addresses an element of the remedial action. A relevant and appropriate ARAR, while not directly applicable, addresses problems or situations sufficiently similar to those encountered at the site and its use is well suited to the site. USACE has determined that the following are the potential ARARs for the remedial activities at the Seaway Site. Table 4 presents a summary of ARARs. Appendix F of the FSA (USACE 2008) presents an evaluation of Potential ARARs.

4.4.1 40 CFR Part 192

Subparts A and B of 40 CFR Part 192 are considered relevant and appropriate to the Seaway Site. They are not considered applicable since they only apply to sites designated under the Uranium Mill Tailings Radiation Control Act (UMTRCA). They are considered relevant and appropriate based on the similarities to processing at UMTRCA sites to the processing that took place at Linde and the resulting radionuclides found in

the waste. They are well suited for use at the site since the purpose of these regulations is to manage residual radioactive materials at inactive mill tailing sites.

Subpart A of 40 CFR Part 192 establishes standards for control of residual radioactive materials at UMTRCA Sites. It requires that designs for control must be effective for up to one thousand years, to the extent reasonably achievable, and, in any case, for at least 200 years.

It also requires reasonable assurance that releases of Radon-222 (Rn-222) from residual radioactive material to the atmosphere will not exceed an average release rate of 20 picocuries per square meter per second ($pCi/m^2/s$), or increase the annual average concentration of Rn-222 in air at or above any location outside the disposal area by more than 0.5 pCi/l.

USACE has also concluded that the groundwater at the Seaway Site is not being impacted by MED-related contamination located in Seaway Areas A, B, and C, Seaway Northside and Seaway Southside, and will not be impacted in the next 1000 years (USACE 2002). Groundwater is not being used as a source of drinking water at or near the site. No ARARs are necessary for protection of the public or environment from groundwater. Therefore, the remaining parts of Subpart A regarding groundwater protection are not relevant and appropriate.

Subpart B of 40 CFR Part 192 addresses cleanup of land contaminated with residual radioactive material from inactive uranium processing sites, and sets standards for residual concentrations of Ra-226 in soil. It requires that the concentration of Ra-226 in land averaged over any area of 100 square meters shall not exceed the background level by more than:
5 pCi/g, averaged over the top 15 cm of soil beneath the surface -and-
15 pCi/g averaged over 15 cm thick layers more than 15cm beneath the surface.

4.4.2 10 CFR Part 40, Appendix A

10 CFR Part 40, Appendix A, is the NRC regulation that establishes technical, financial, ownership and long-term site surveillance criteria relating to the siting, operation, decontamination, decommissioning and reclamation of licensed uranium and thorium mills and tailings. It is not considered applicable since it only applies to NRC licensed sites, and Seaway is not a NRC licensed site. 10 CFR Part 40, Appendix A, Criterion 6(1) and 10 CFR Part 40, Appendix A, Criterion 6(6) are considered relevant and appropriate based on the similarities of uranium processing and tailings at Linde to licensed NRC uranium and thorium mills and tailings. They are well suited for use at the Seaway Site since their purpose is to manage residual radioactive material at the end of a milling operation at sites similar to Seaway. The remaining parts of 10 CFR Part 40, Appendix A are not relevant and appropriate because they do not provide

substantive criteria pertaining to the hazardous substances or circumstances of their release at the site. In addition, they do not address circumstances sufficiently similar to the Seaway Site.

10 CFR Part 40, Appendix A, Criterion 6(1) establishes performance criteria for covers to be placed over tailings or wastes at the end of milling operations. The performance standards for covers required by Criterion 6(1) are the same as those found in 40 CFR Part 192, Subpart A.

10 CFR Part 40, Appendix A, Criterion 6(6) provides a means to derive cleanup goals for radionuclides other than radium. As per 40 CFR Part 192, radium is limited to 5 pCi/g in the top 15 cm of soil and 15 pCi/g above background below 15 cm. 10 CFR Part 40, Appendix A, Criterion 6(6) requires that if other radionuclides are present, their cleanup goals are the concentration of the radionuclide that would produce the same dose as 5 pCi/g of radium in the top 15 cm or 15 pCi/g of radium below 15 cm. This dose for radium is called the 'benchmark' dose. The cleanup goals for radionuclides other than radium must also be As Low As Reasonably Achievable (ALARA). 10 CFR Part 40, Appendix A, Criterion 6(6) also states if more than one residual radionuclide is present in the same 100-square-meter area, the sum of the ratios (SOR) shall not exceed "1" (unity). For example, a theoretical site that has three radionuclides present would require the following SOR calculation to be less than one:

$$SOR = \frac{R_1 - Bk_1}{CS_1} + \frac{R_2 - Bk_2}{CS_2} + \frac{R_3 - Bk_3}{CS_3} < 1$$

where:
R_1, R_2, and R_3 are the residual soil concentrations of the radionuclides, respectively
Bk_1, Bk_2, and Bk_3 are the background concentrations of the radionuclides in soil, respectively –and-
CS_1, CS_2 and CS_3 are the cleanup standards for the radionuclides in soil, respectively.

4.5 Proposed Cleanup Guidelines for the Seaway Site

For areas where MED/AEC-related contamination would be left in place, the standards in Table 5 would apply. For areas where soil would be removed, the standards in Table 6 and the SOR calculations presented in Table 7 would apply.

The standards presented in Table 6 were developed for the Seaway Site and are compliant with the potential ARARs described in this section. Detailed analysis regarding calculation of cleanup values can be found in Appendix C of the FSA (USACE 2008). Total uranium means the sum of all applicable uranium isotopes (U-235, U-234 and U-238). Since soils will potentially contain a mix of residual radionuclides once

remediation is complete, a Sum of Ratios (SOR) calculation will be used to ensure that the total dose represented by the residual radionuclides is less than the requirements. In order to assure compliance with a continuous (or sliding) 100 square meter area anywhere across the site, the standards were calculated for an area of 2000 square meters. An industrial scenario was considered in the development of the removal guidelines, and are presented in Table 6.

USACE determined that the site-specific activities of the uranium daughters Ac-227 and Pa-231 were correlated with the site-specific activities of U-235 and U-238, respectively. USACE combined the dose contributions from these radionuclides with the doses from U-235 and U-238, respectively, so that the cleanup guidelines for U-235 and U-238 were lowered accordingly (USACE 2008).

4.6 Final Status Survey after Remedial Actions

Final Status Survey (FSS) at the Seaway Site will be conducted in a manner consistent with guidance contained in the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) (EPA 2001). MARSSIM utilizes activity concentration values, known as Derived Concentration Guideline Levels (DCGLs). MARSSIM assumes that two types of DCGLs will be applied to a site, a $DCGL_w$ and a $DCGL_{emc}$. The $DCGL_w$ represents a wide area average value that must be attained. The $DCGL_{emc}$ refers to elevated area or "hot spot" criteria. $DCGL_{emc}$ requirements ensure that no localized areas will remain that potentially pose unacceptable risks. DCGL requirements will be derived for the Seaway Site before remediation begins. A detailed Final Status Survey Plan (FSSP) will also be developed prior to the initiation of remediation at the Seaway Site. The FSSP will contain the confirmation methodology that will be used to demonstrate compliance with $DCGL_w$ and $DCGL_{emc}$ requirements at the site once remediation is complete.

Table 4. Summary of Proposed ARARs

ARAR/Applicability	Description
General	
40 CFR Part 192, Subpart A –and- 10 CFR Part 40, Appendix A, Criterion 6(1)	Remedy is effective for 1000 years
Removal of Impacted Soils	
40 CFR Part 192, Subpart B	Ra-226 concentration in surface soils <5 pCi/g, <15 pCi/g in subsurface soils averaged over 100 m^2
10 CFR Part 40, Appendix A, Criterion 6(6)	All other COCs will have an equivalent dose to Ra-226
Containment of Impacted Soils	
40 CFR Part 192, Subpart A	Radon flux <20 pCi/m^2/s concentration in air at or outside border <0.5 pCi/L increase

Table 5. Guidelines for Airborne Rn-222

Radon – Non-receptor Specific	Units	Rn-222
Increase at site perimeter	pCi/L	<0.5
Radon Flux	pCi/m^2/s	20

Table 6. Removal Standards for Soil (pCi/g) (Incremental to Background)

Radionuclide (all values are pCi/g)	Background	Surface Soil Standard	Subsurface Soil Standard
Ra-226	1.1	5	15
Th-230	1.4	15	44
U-Total	6.3	110	1000

Table 7. SOR Calculations

$$SOR_{surface} = + \frac{^{226}Ra - B_k}{5} + \frac{^{230}Th - B_k}{15} + \frac{U_{Total} - B_k}{110}$$

$$SOR_{subsurface} = + \frac{^{226}Ra - B_k}{15} + \frac{^{230}Th - B_k}{44} + \frac{U_{Total} - B_k}{1000}$$

B_k - background concentration

5. SUMMARY OF REMEDIAL ALTERNATIVES

What's in this section?
What possible actions are being considered and evaluated?

This section summarizes remedial alternatives developed in the Feasibility Study Addendum for the Seaway Site (USACE 2008) to address soil contamination. Remedial alternatives are developed which provide adequate protection of human health and the environment and meet requirements (ARARs). The alternatives encompass a range of potential actions, and include:

- Alternative 1 - No Action
- Alternative 2 - Complete Excavation with Off-Site Disposal
- Alternative 4 - Partial Excavation with Off-Site Disposal
- Alternative 6 – Containment

Alternative 3- Complete Excavation with Onsite Disposal, and Alternative 5-Partial Excavation with Onsite Disposal, from the DOE's 1993 PP, involving the consolidation of all MED/AEC-related waste from the four Tonawanda Sites and disposal of the waste in an on-site engineered disposal facility have been dropped from consideration since the other Tonawanda Sites have been or are in the process of being remediated under separate CERCLA actions and all excavated wastes are being shipped off-site for disposal.

Table 8 presents a summary of statistics about the last three alternatives. Figure 6 provides a visual illustration of Alternatives 2, 4 and 6. Figure 5 illustrates the varying depths of soil and other materials covering MED/AEC-related material.

All alternatives do not assume action by the owner to install a final landfill cap to complete and enclose the landfill. The action alternatives are protective on their own.

5.1 Alternative 1: No Action

Evaluation of the no-action alternative is required under CERCLA regulations to provide a baseline for comparison with other alternatives. Under this alternative, no action is taken to implement remedial activities.

5.2 Alternative 2: Complete Excavation with Offsite Disposal

For Alternative 2, all MED/AEC-related soils containing radionuclides above guidelines would be excavated and shipped offsite for disposal. After removal, Areas A, B and C, Seaway Northside and Seaway Southside would be covered with a 1-foot layer of clean

fill. Also, those areas of the closed portion of the landfill impacted by the removal activities would be restored to the original design configuration that existed prior to remediation. For cost estimating purposes, it was assumed that approximately 10% of the MED/AEC-related material is co-mingled with RCRA hazardous constituents and will have a higher disposal cost.

Contamination under the closed portions of the landfill was not bounded. An additional unknown quantity of soil may need to be removed. Under this alternative, USACE would identify and remove all soil that exceeds the cleanup criterion.

Long-term monitoring of MED/AEC-related contaminated soils under FUSRAP and land use controls would not be necessary after implementation of this alternative.

5.3 Alternative 4: Partial Excavation with Offsite Disposal

Alternative 4 would involve removal and off-site disposal of all *accessible* MED/AEC-related contaminated soils exceeding the cleanup levels within the landfill containment system (i.e., inside of the leachate collection system). Accessible soils are defined as MED/AEC-related contaminated soils that are:

- Not located under 10 feet or more of non-MED/AEC-related material;
- And, removal of such soil would not impact the integrity of the closed portions of the landfill.

All of the soil in Area A is accessible since most of the MED/AEC-related contaminated soils are at or near the surface. A small plateau area in the south-west corner of Area C also has MED/AEC-related contaminated soils at or near the surface and is also considered to be accessible (see Figure 5). All other MED/AEC-related soils in areas B and C are not considered accessible since they do no meet the two conditions previously mentioned. In order to maintain the integrity of the existing closed portions of the landfill and remove the accessible soils in this lower plateau of Area C, excavation is assumed to begin 5 feet from the rip-rap dividing the closed portions of the landfill to the north and south of Areas A, B and C and then proceed downward at a 1:1.5 slope. Any MED/AEC-related contaminated materials that must be moved due to grading will be shipped offsite for disposal.

Following excavation and grading, as required, Areas B and C would be capped with a landfill cover 4-5.5 feet thick. This type cover would not be necessary for Area A, since no MED/AEC-related contaminated soils above the cleanup levels would remain. The cap would be constructed of multiple layers of various types of soil, fabric, and geomembranes designed to provide protection. A cap design similar to what is described in New York State Regulation 6NYCRR Part 360 is assumed. This cap is not the same as the final landfill cap, which may be installed by the property owner, to complete and enclose the landfill.

Also, all MED/AEC-related contaminated materials located outside of the containment, such as areas within Seaway Southside and Northside, which exceed the cleanup criteria will be excavated and shipped offsite for disposal. Any impacts to the closed cap due to this remediation would be restored to the original design configuration that existed prior to remediation.

This alternative would include long-term surveillance and maintenance of MED/AEC-related contaminated materials in capped areas by the Federal government. (Monitoring of non-MED/AEC-related waste would remain the responsibility of the property owner.) This alternative would also include ensuring that land use controls required pursuant to 6NYCRR Part 360 are in place to prevent future access to and disturbance of the contained waste.

5.4 Alternative 6: Containment

Alternative 6 would involve capping of Areas A, B, and C with a landfill cover 4-5.5 feet thick, and grading as required. The cap would be constructed of multiple layers of various types of soil, fabric, and geomembranes designed to provide protection. A cap design similar to what is described in New York State Regulation 6NYCRR Part 360 is assumed. This cap is not the same as the final landfill cap, which may be installed by the property owner, to complete and enclose the landfill.

MED/AEC-related contaminated materials located outside of the landfill containment system (i.e., outside of the leachate collection system), such as areas within Seaway Northside and Southside that exceed the cleanup criteria will be excavated and shipped offsite for disposal. Any impacts to the closed cap due to this remediation would be restored to the original design configuration that existed prior to remediation. Any MED/AEC-related contaminated materials that must be moved due to grading will be shipped offsite for disposal. It is NYSDEC's position that New York State regulations preclude the disposal of MED/AEC-related contaminated soil into the Seaway landfill.

This alternative would include long-term surveillance and maintenance of MED/AEC-related materials in capped areas by the Federal government. (Monitoring of non-MED/AEC-related waste would remain the responsibility of the property owner.) This alternative would also include ensuring that land use controls required pursuant to 6NYCRR Part 360 are in place to prevent future access to and disturbance of the contained waste.

Table 8. Vital Statistics for Alternatives 2, 4 and 6

Estimate or Projection	Alternative 2	Alternative 4	Alternative 6
In-situ volume to be shipped off-site (yd^3)	68,493	48,378	5,726
In-situ volume remaining at site after construction (yd^3)	0	20,115	62,767
Ex-situ volume to be shipped off-site (yd^3)	152,020	115,940	7,920
Area to be capped (acres)	0	4	18
Duration of construction (Years)*	4.2	3.7	2.4
Cost of construction (millions of $)	$113 M	$80 M	$30 M
Annual maintenance cost after construction ($)**	$0	$68,000	$84,800

* Includes Remedial Design and Remedial Action

** Total O&M costs for the 1,000 year period (non-discounted) divided by 1,000.

6. EVALUATION OF REMEDIAL ALTERNATIVES

What's in this section?
How are alternatives evaluated, under CERCLA?
What was the result of the evaluation of each alternative for each factor?

6.1 Factors Used to Evaluate Alternatives under CERCLA

Section 300.430 (e) of the NCP lists nine criteria by which each remedial alternative must be assessed. The acceptability and performance of each alternative against the criteria is evaluated individually so that relative strengths and weaknesses may be identified. Also, a comparative analysis among the alternatives is performed, to identify the advantages and disadvantages of each alternative relative to one another.

Assessments against two of the criteria, called threshold criteria (Overall Protection of Human Health and the Environment and Compliance with Applicable or Relevant and Appropriate Requirements), must be satisfied in order for an alternative to be eligible for selection.

Five of the criteria, called balancing criteria, (Long-term Effectiveness and Permanence, Reduction of Toxicity, Mobility, or Volume through Treatment, Short-term Effectiveness, Implementability, and Cost) represent the primary criteria upon which the analysis is based. These balancing criteria are used to weigh major tradeoffs among alternatives. In addition, CERCLA Section 121 sets forth requirements for remedial action including the preference for treatment which reduces volume, toxicity or mobility.

The remaining two criteria, state acceptance and community acceptance, are categorized as modifying criteria. The modifying criteria are evaluated following comments on the PP and will be addressed in the responsiveness summary of the ROD. The nine criteria are briefly defined as follows:

- **Overall Protection of Human Health and the Environment** addresses whether or not a remedy provides adequate protection and describes how exposure to the hazardous substances released at the site is eliminated, reduced, or controlled through treatment, engineering controls, or land-use controls.
- **Compliance with Applicable or Relevant and Appropriate Requirements** addresses whether or not a remedy will meet all of the applicable or relevant and appropriate requirements of Federal and State environmental statutes and/or provide grounds for invoking a waiver.
- **Long-term Effectiveness and Permanence** refers to the magnitude of residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time once the cleanup goals have been met.

- **Reduction of Toxicity, Mobility, or Volume through Treatment** is the anticipated performance of the treatment technologies that may be employed in a remedy.
- **Short-term Effectiveness** refers to the speed with which the remedy achieves protection, as well as the remedy's potential to create adverse impacts on human health and the environment that may result during the construction and implementation period.
- **Implementability** is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement the chosen solution.
- **Cost** includes capital, and operation and maintenance costs.
- **State Acceptance is assessed following a review of the PP and** indicates whether, based on its review of the Remedial Investigation/Feasibility Study and PP, the support agency concurs with, opposes, or has no comment on the Preferred Alternative.
- **Community Acceptance** is assessed following a review of the public comments received on the PP.

6.2 Results of the Evaluations

This section of the PP profiles the relative performance of each alternative against the nine criteria, noting how it compares to other options under consideration. More detailed information and analysis of the alternatives can be found in the Feasibility Study Addendum Report (USACE 2008). Table 9 presents a summary of the remedial alternative evaluation.

Overall Protection of Human Health and the Environment. Alternative 1 provides no increased protection over the current site conditions and would not be protective of human health and the environment over the long-term for foreseeable future land uses. The overall levels of protectiveness for Alternatives 2, 4, and 6 are considered to be the same because each provide for long-term disposal and control of the MED/AEC-related material. Alternatives 2, 4 and 6 all involve the isolation, either onsite or offsite, of the COCs in facilities designed to eliminate the possibility of exposure.

Compliance with ARARs. Alternative 2 meets the 40 CFR Part 192 and 10 CFR Part 40, Appendix A, Criterion 6(6) ARARs because all soil containing COCs exceeding the cleanup guideline would be excavated and permanently isolated in an off-site disposal cell or facility. Alternatives 4 and 6, which involve leaving in place some soil above MED/AEC-related contaminated soil removal standards, would comply with the 40 CFR Part 192 and 10 CFR Part 40, Appendix A, Criterion 6(1) ARARs through the use of barriers. These barriers include long-term surveillance and maintenance of capped areas by the Federal government and ensuring that land use controls required pursuant

to 6NYCRR Part 360 are in place to prevent future access to and disturbance of the contained waste. (Monitoring of non-MED/AEC-related waste would remain the responsibility of the property owner.) Alternative 1, however, is noncompliant with the proposed ARARs because all of the waste containing radionuclides above the 40 CFR 192 and 10 CFR Part 40, Appendix A, Criterion 6(6) standards are left in place and no barriers or land use controls would be established to ensure adequate control of the radioactive material.

Long-term Effectiveness and Permanence. Alternatives 2, 4 and 6 all provide equal long-term protection and reliability since they all include the disposal of the MED/AEC-related material either at an off-site disposal facility or at the Seaway landfill. All disposal alternatives, including at the site, will be subject to long-term governmental controls related to a permanently closed waste disposal facility. The site closure standards at the Seaway landfill, and those at any possible offsite disposal location, are considered to be equivalent in their long-term reliability and protective design standards designed to preclude releases to the environment and protect the public from contact with the materials. Alternative 1, no action, does not provide long-term effectiveness because the post-implementation remedial risks equal those now at the site, which are not acceptable.

Reduction in Toxicity, Mobility, or Volume through Treatment. None of the alternatives provide treatment for the materials to be removed. Alternatives 2, 4 and 6 reduce mobility by further isolating MED/AEC-related contamination from the environment. These three alternatives also provide for some degree of offsite disposal, will include consolidation at an offsite facility, and any treatment which is required to meet the standards of the facility. During the Feasibility Study, currently available technologies for treatment in the course of removal were evaluated and none were found to be economically or technologically feasible at this time.

Short-term Effectiveness. Alternative 1, no action, does not create additional short-term risks. The short-term effectiveness of the other alternatives rank in the following order, from highest to lowest: Alternative 6, Alternative 4, and Alternative 2.

Alternative 6 has fairly high short-term effectiveness. The excavation of Seaway Northside and Southside, which is common to alternatives 2, 4 and 6, creates some complexity and risk, but these areas are small, especially relative to the total amount of contaminated volume. The excavation and subsequent handling at the off-site disposal facility of significantly greater amounts of materials in Alternatives 2 and 4 pose greater risks beyond those presented by Alternative 6. Alternative 6 also has the shortest duration of construction at 2.4 years, compared with 3.7 years for Alternative 4 and 4.2 years for Alternative 2.

Alternative 2 provides low short-term effectiveness because of the increased risk to the remediation workers and community since it involves great impact to the closed portions of the landfill. Significant quantities of refuse and cover would have to be removed to gain access to MED/AEC-related soils. In some areas, the amount of cover exceeds 80 feet. The landfill material in these areas may include a wide range of industrial wastes and debris along with municipal refuse. These wastes represent an unknown hazard to workers and the public. Methane gas and other gases present in the landfill may also be released if waste is excavated or cover or caps are disturbed.

Although Alternative 4 does not involve direct impact with the closed portions of the landfill, there would be excavation in close proximity to the closed portions and a much greater amount of excavation. Therefore, Alternative 4 has more short-term effectiveness than Alternative 2 but less than alternative 6.

Implementability. Engineering, design, and administrative requirements increase with the complexity of the alternatives. Alternative 1 is most easily implemented, followed by Alternative 6, Alternative 4, and lastly Alternative 2.

Alternative 1 is most easily implemented since it involves no actions. Implementing Alternative 2 would involve a high degree of difficulty since complete removal would have to ensure the integrity of the existing covered and capped landfill. There would also be a need to remove a large volume of refuse currently covering MED/AEC-related material, greater than 80 feet in some areas. These actions, although implementable, are technically difficult from an engineering perspective. Alternative 4 would still involve a moderate amount of difficulty due to excavation close to capped portions of the landfill, namely the soil sloping and other precautions that would be required to reach the contamination. Alternative 6 is relatively easy to implement, since there are little design and engineering complexities, and materials are readily available. All three action alternatives would have to ensure the integrity of the existing covered and capped landfill and associated containment system during removal actions in Seaway Southside and Northside.

The implementation of land use controls (Alternatives 4 and 6) is considered to be feasible and implementable given: New York State controls already in place for the landfill, the expected future use of the site, and that the Federal government will be responsible for long-term surveillance and maintenance of MED/AEC-related material. (Monitoring of non-MED/AEC-related waste would remain the responsibility of the property owner.)

Cost. The No Action alternative has no cost since it involves no remedial actions. Alternative 2 has the highest estimated cost, at a present worth cost of approximately $113,000,000. (Since contamination under the closed portions of the landfill is

unbounded, there could be significantly more cost required to complete this alternative). Of the three action alternatives, Alternative 6 has the lowest estimated cost to complete, with a present worth cost of approximately $30,000,000. Partial excavation is in between the two other action alternatives, with a present worth cost of approximately $80,000,000. All disposal alternatives assume disposal at an appropriate landfill out of New York State. For Alternative 2, 10% of the radioactive material is assumed to be co-mingled with RCRA hazardous material that requires disposal at a higher cost. Alternatives 4 and 6 do not anticipate disposal of radioactive soil co-mingled with RCRA hazardous material

State Acceptance. Comments will be accepted from support agencies on the PP. The primary agency supporting this investigation is NYSDEC. This criterion will be addressed in the responsiveness summary of the Record of Decision.

Community Acceptance. Comments will be accepted from the community on the PP. This criterion will be addressed in the responsiveness summary of the Record of Decision.

Table 9. Summary of Remedial Alternative Evaluation

Criteria	Alternative 1 No Action	Alternative 2 Complete Excavation	Alternative 4 Partial Excavation	Alternative 6 Containment
Protection of Human Health and the Environment	Does not reduce risks to human health or the environment.	Provides protection of human health and the environment.	Provides protection of human health and the environment.	Provides protection of human health and the environment.
Compliance with proposed ARARs	Does not satisfy ARARs.	Satisfies ARARs.	Satisfies ARARs.	Satisfies ARARs.
Long-Term Effectiveness and Permanence	Does not provide long-term effectiveness or permanence.	Subject to long-term controls related to an offsite waste disposal facility.	Subject to long-term controls related to a permanently closed waste disposal facility.	Subject to long-term controls related to a permanently closed waste disposal facility.
Reduction of Toxicity, Mobility and/or Volume Through Treatment	Does not reduce contaminants' toxicity, mobility or volume.	No treatment. Reduced mobility through isolation. Minimal consolidation in volume.	No treatment. Reduced mobility through isolation. Minimal consolidation in volume.	No treatment. Reduced mobility through isolation. Minimal consolidation in volume.
Short-Term Effectiveness	No increase in short-term risks.	Opening of closed portions of the landfill creates risks to workers and public.	Excavation and transportation of Area A and portions of Area C creates risks to workers.	Small amount of excavation creates some risk to workers. Shortest duration of construction.
Implementability	There are no technical or administrative implementability issues.	High degree of complexity, due to impacts to the closed portions of the landfill and removal of large amounts of soil covering MED/AEC-related material.	Medium degree of complexity, due to excavation in close proximity to the closed portions of the landfill and non MED/AEC-related contamination.	Relatively easy to implement. Excavation in Seaway Northside and Southside areas only.
Cost - Present Value (Millions of $)	$0	$113M	$80M	$30M
State Accept	TBE	TBE	TBE	TBE
Community Accept	TBE	TBE	TBE	TBE

TBE – To Be Evaluated (after review of the PP.)

7. PREFERRED ALTERNATIVE

What's in this section?
What alternative is preferred by USACE?
Why was this alternative chosen?

USACE prefers Alternative 6, Containment. This alternative satisfies the two CERCLA threshold criteria of protectiveness and compliance with selected ARARs. It is the most protective action alternative in the short-term, provides equal long-term protectiveness and permanence to the other action alternatives, is easily implemented and is far more cost effective than the other action alternatives.

Implementation of this alternative would involve placement of a cap at least 4-$5^1/_2$ feet thick, over areas A, B and C of the site, and grading and consolidation of the landfilled material, as required. MED/AEC-related contaminated materials located outside of the landfill containment system (i.e., outside of the leachate collection system), such as areas within Seaway Northside and Southside, that exceed the cleanup criteria will be excavated and shipped offsite for disposal. Any impacts to the closed cap would be mitigated by restoring to the original design configuration that existed prior to remediation. Any MED/AEC-related contaminated materials that must be moved due to grading will be shipped offsite for disposal.

This alternative would include ensuring that land use controls required pursuant to 6NYCRR Part 360 are in place to prevent future access to and disturbance of the contained waste. Long-term surveillance and maintenance of MED/AEC-related contaminated material contained in capped areas would be performed by the Federal government in accordance with a Land Use Control Plan that would be developed by USACE during the completion of the ROD. (Monitoring of non-MED/AEC-related waste will remain the responsibility of the property owner.) As required under CERCLA, implementation will include review of site conditions and cap integrity every five years to ensure that land use controls are effective and that operations and maintenance are conducted in accordance with the plan.

Alternative 4, Partial Excavation with Off-Site Disposal adds excavation and off-site disposal of material from Areas A and C, with an associated increase in short-term risks as well as remedial costs, with no increase in protectiveness or other significant benefits. This remedy would require reliance on land use controls to ensure long-term integrity of capped areas, as does Alternative 6. Alternative 6 is also more easily implemented than Alternative 4.

Containment is also preferred over Alternative 2, Complete Excavation with Off-Site Disposal. While Alternative 2 does not require the use of land use controls to ensure long-term integrity of a capping system, its implementation would require massive excavation operations in areas of the landfill where industrial and municipal refuse have been placed, with resulting potential for generation of odors and work performed in hazardous conditions. Additionally, the extensive excavation required in implementing Alternative 2 would disturb the cap already in place at the landfill. Alternative 2 is about 5 times more costly than the Preferred Alternative, with no additional benefits in terms of protectiveness. Table 10 provides a brief summary of the evaluation of alternatives.

Table 10. Brief Summary of Evaluation of Alternatives

Criteria	Alternative 1 No Action	Alternative 2 Complete Excavation and Disposal	Alternative 4 Partial Excavation and Disposal	Alternative 6 Containment
Protection of Human Health and the Environment	No	Yes	Yes	Yes
Compliance with ARARs	No	Yes	Yes	Yes
Long-Term Effectiveness and Permanence*	NR	5	5	5
Reduction of Toxicity, Mobility and/or Volume *	NR	1	1	1
Short-Term Effectiveness*	NR	2	3	4
Implementability*	NR	2	3	4
Cost (millions of dollars)	$0	$113	$80	$30
State Acceptance	TBE	TBE	TBE	TBE
Community Acceptance	TBE	TBE	TBE	TBE

*- Criteria rated 0 to 5, where 5 is most favorable
NR - Criteria for alternative not rated because it did not meet the threshold criteria
TBE - To Be Evaluated (after review of the PP).

8. COMMUNITY ROLE IN SELECTION PROCESS

What's in this section?
What is the role of the community?
How do I find more information?
How do I provide input?
Will USACE employees make a public presentation and be available to take verbal comments?

Public input is encouraged by USACE and no final decision will be made on a remedy until all comments are considered.

The administrative record file contains all of the documentation used to support the preferred remedy, and is available at the following locations:

USACE FUSRAP Public Information Center
1776 Niagara Street
Buffalo, NY 14207

Tonawanda Public Library
333 Main Street
Tonawanda, NY 14150

Comments on the proposed remedial action at the Seaway Site will be accepted for 30 days following issuance of the PP in accordance with CERCLA, as amended, and the NCP. A public meeting will be held during the comment period to receive any verbal comments the public wishes to make. Responses to written and verbal public comments will be presented in a response to comments in the ROD, which will document the final remedy selected for the Seaway Site.

All written comments should be addressed to:

U.S. Army Corps of Engineers
Buffalo District
FUSRAP Information Center
1776 Niagara Street
Buffalo, NY 14207

If there are any questions regarding the comment process, or the Proposed Plan, please direct them to the address noted above, or telephone (716) 879-4197 or 1 (800) 833-6390.

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Figures

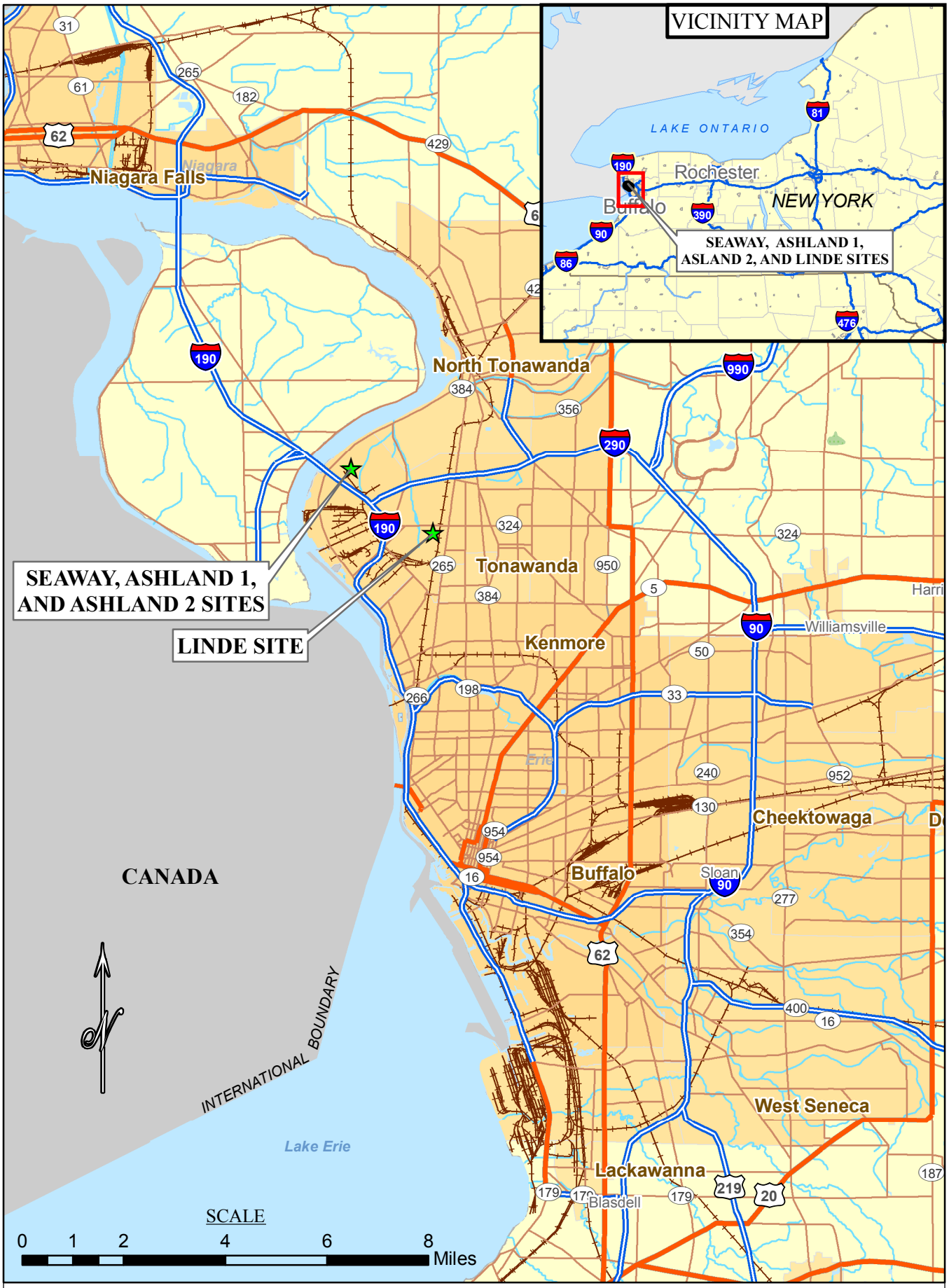


FIGURE 1: LOCATIONS OF THE TOWN OF TONAWANDA, NEW YORK AND THE SEAWAY, ASHLAND, AND LINDE SITES

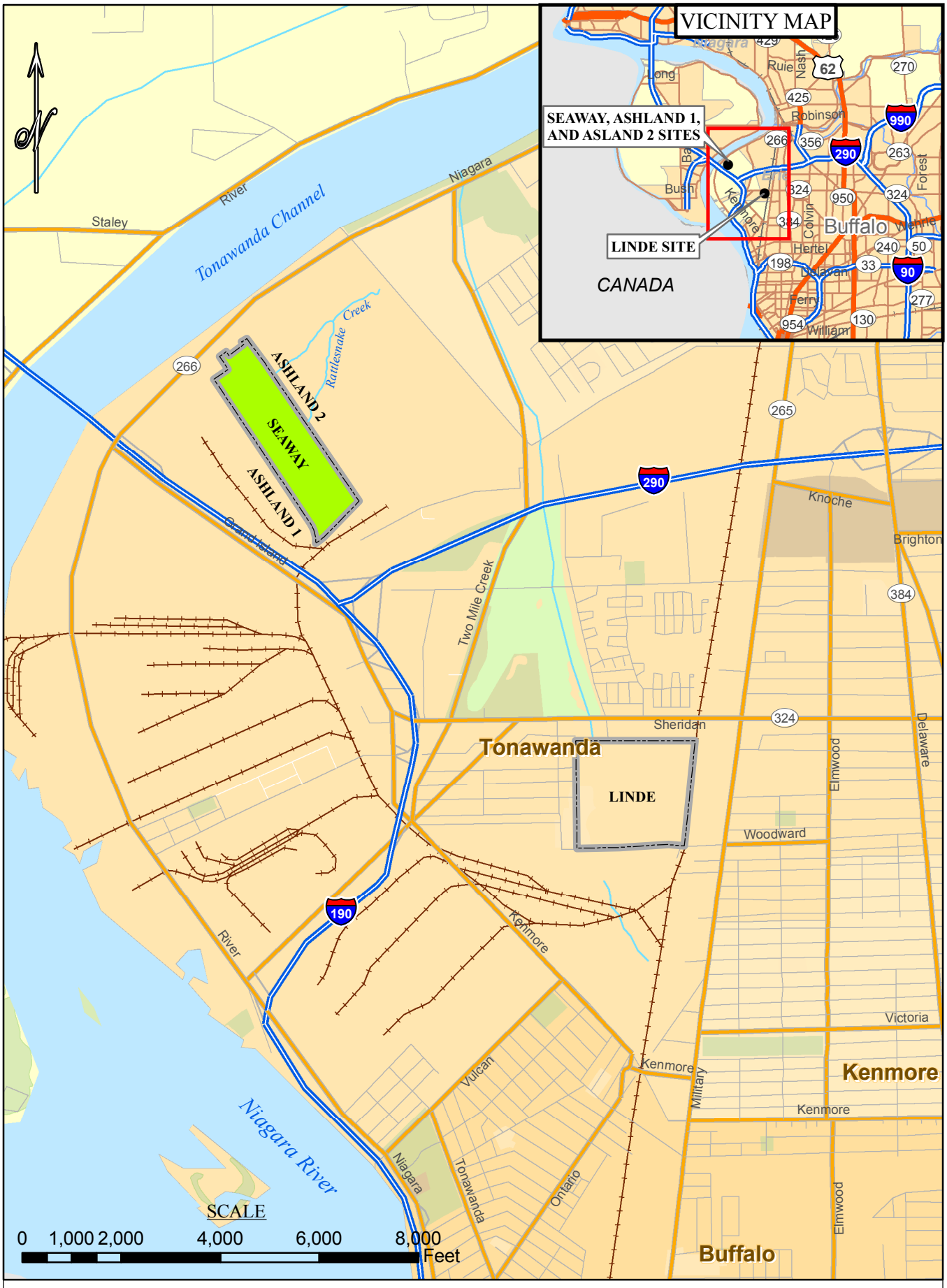
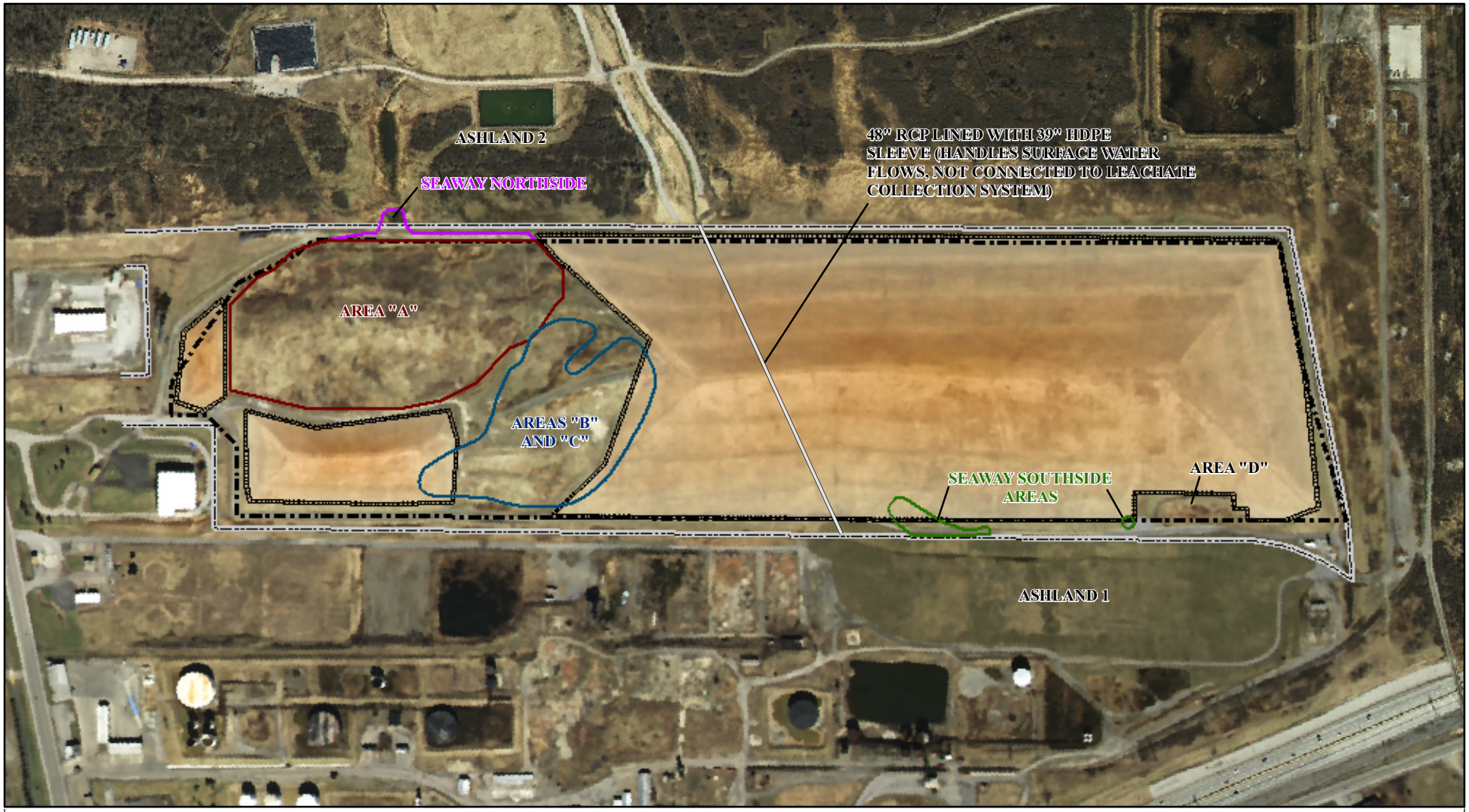


FIGURE 2: LOCATIONS OF THE SEAWAY, ASHLAND, AND LINDE SITES



LEGEND

- Property Line*
- Clay Cutoff Wall*
- Capped Areas as of 1995*

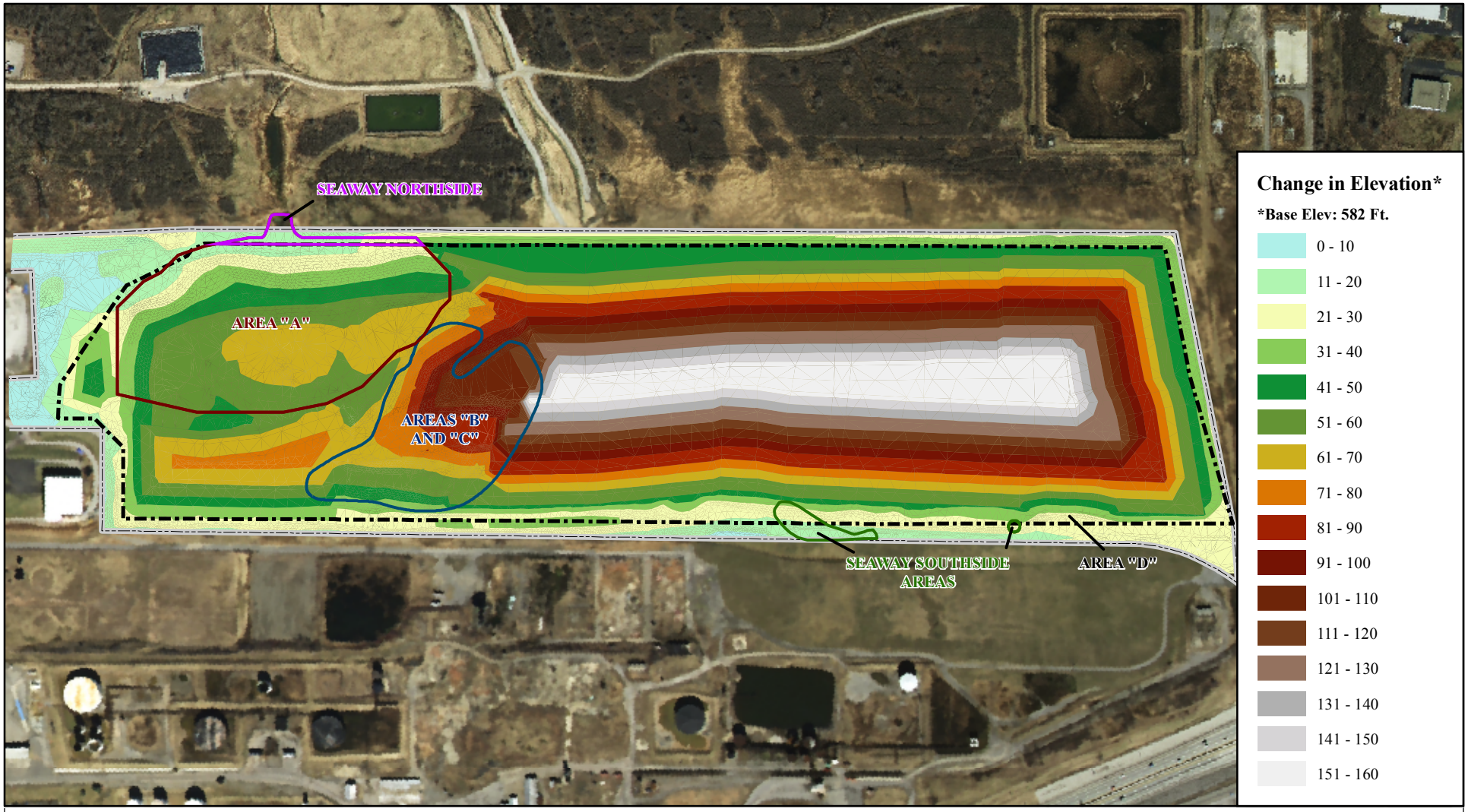
* All Areas and Boundaries are Approximate.

FIGURE 3: CONCEPTUALIZATION OF THE SEAWAY LANDFILL SITE IN TONAWANDA, NEW YORK

SCALE

0 100 200 400 600 800 1,000 1,200 Feet

The 2005 Erie County 12-inch Resolution Natural Color Orthoimagery was Developed by The NYS Cyber Security and Critical Infrastructure Coordination



LEGEND

Property Line*

Clay Cutoff Wall*

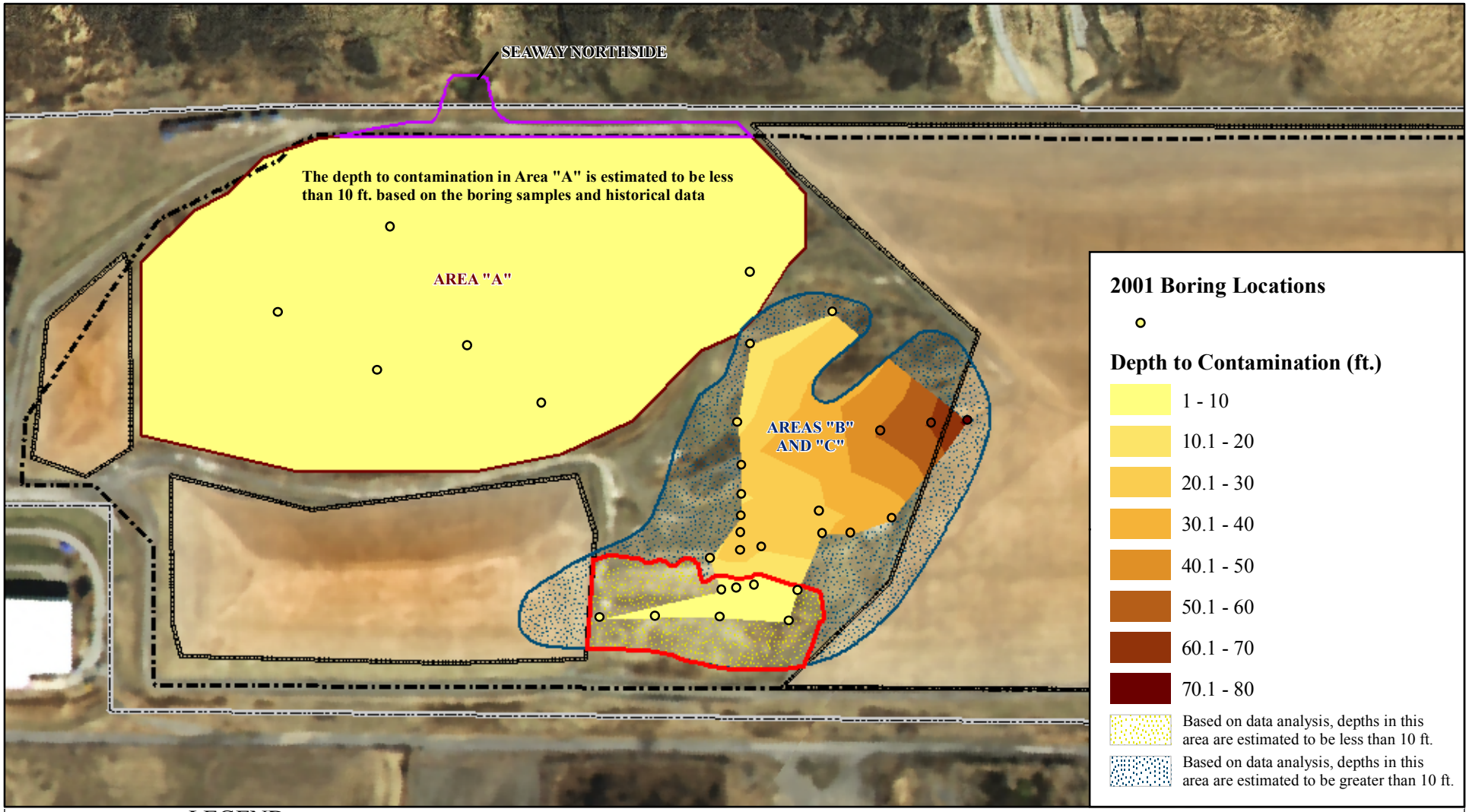
* All Areas and Boundaries are Approximate.

FIGURE 4: CHANGES IN ELEVATIONS ON THE SEAWAY SITE

SCALE

0 100 200 400 600 800 1,000 1,200 Feet

The 2005 Erie County 12-inch Resolution Natural Color Orthoimagery was Developed by The NYS Cyber Security and Critical Infrastructure Coordination



LEGEND

- Property Line*
- Clay Cutoff Wall*
- Alt. #4 Partial Excavation for Areas A & B
- Capped Areas as of 1995*

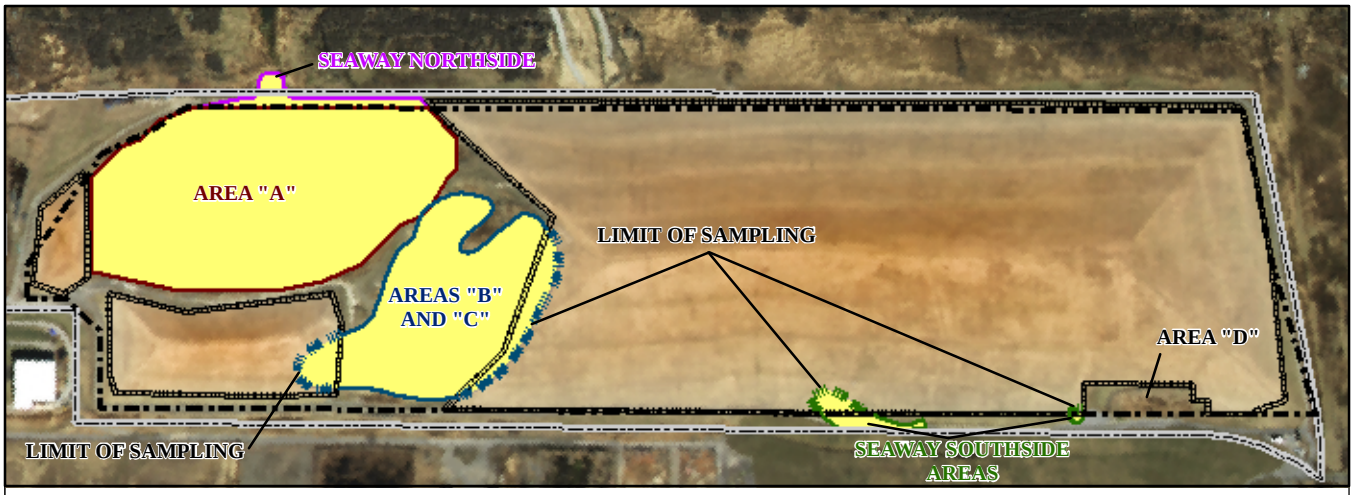
* All Areas and Boundaries are Approximate.

FIGURE 5: ESTIMATED DEPTHS TO MED/AEC-RELATED CONTAMINATION

SCALE

0 100 200 400 600 800 Feet

The 2005 Erie County 12-inch Resolution Natural Color Orthoimagery was Developed by The NYS Cyber Security and Critical Infrastructure Coordination



ALTERNATIVE #2: COMPLETE EXCAVATION WITH OFFSITE DISPOSAL

ALTERNATIVE #4: PARTIAL EXCAVATION WITH OFFSITE DISPOSAL

ALTERNATIVE #6: CONTAINMENT

LEGEND

- Clay Cutoff Wall *
- Property Line *
- 4 To 5.5 Foot Cover Areas*
- Excavated Areas *
- Capped Areas as of 1995 *

FIGURE 6: CONCEPTUALIZATION OF ALTERNATIVES #2, #4, AND #6.

SCALE

0 150 300 600 900 1,200 Feet

* All Areas and Boundaries are Approximate.

The 2005 Erie County 12-inch Resolution Natural Color Orthoimagery was Developed by The NYS Cyber Security and Critical Infrastructure Coordination