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Remedial Alternatives Analysis Report & Remedial Action Work Plan

Location:

15-Acre Praxair Site
137 47th Street
Niagara Falls, New York

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Prepared for:

Covanta Niagara, L.P.
100 Energy Boulevard at 56th Street
Niagara Falls, New York 14304

LaBella Project No. 212399

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Table of Contents

Certification

I DANIEL NOLL certify that I am currently a NYS registered professional engineer and that this Remedial Action Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

Signed:

3/18/2013
Date:

1.0 Introduction

This Remedial Alternatives Analysis Report (RAAR) and Remedial Action Work Plan (RAWP) identifies, evaluates, and details remedial alternatives to address contamination encountered at the 15-Acre Praxair property located at 137 47th Street in the City of Niagara Falls, Niagara County, New York and provides a detailed plan for implementation of the recommended remedy. Hereinafter, this property will be referred to as the "Site." Figure 1 shows the location of the Site.

The remedial alternatives were evaluated based on the data obtained during various pre-BCP activities, including a recent Remedial Investigation (RI) conducted at the Site. This RAAR and RAWP summarizes the findings of the Remedial Investigation Report for the Site; however, the RI Report should be referenced for greater details on these activities. The alternatives are developed in response to the findings of the RI and are compared using the New York State Department of Environmental Conservation's (NYSDEC's) guidance documents. Based on the use of the surrounding area and the proposed re-use of the Site, appropriate remedial actions are recommended for implementation. The RAWP details the specific actions necessary to implement the recommended alternative.

2.0 Background

2.1 Site Description

The Site encompasses approximately 15 acres of a larger, former industrial complex that is located at 137 47th Street in the City of Niagara Falls and is owned by Praxair, Inc. The Site consists of portions of two tax parcels (SBL #160.09-1-7.111 and SBL #160.06-3-3). As shown by Figure 2, the Site is occupied by one building that was formerly utilized for the maintenance and repair of locomotives; an inactive rail yard; and concrete floor slabs that are remnants of the former industrial complex. The on-site structure encompasses approximately 13,700 square feet, is not currently utilized, and is in a deteriorated state. The remaining portions of the Site generally consist of aged asphalt, concrete and gravel surfaces with some successional vegetation occurring along the eastern site boundary.

2.2 Site History

The Site, formerly part of a larger industrial complex, was owned and operated by the Union Carbide Corporation Metals Division, which first developed the complex in the early 1900s. The plant reportedly produced special alloys, tungsten, ferroalloys, calcium carbide and ferrorvanadium ferrotungsten. Processes used at the plant included submerged arc, open arc, and globar electric furnaces, as well as exothermic and induction furnaces. Wastes generated by the plant included furnace slag (ferroalloys), hydrated lime and miscellaneous plant waste, which were reportedly disposed of at Union Carbide's former disposal site at 56th Street and Pine Avenue in Niagara Falls.

Union Carbide's Linde Division also operated a welding flux manufacturing facility on the plant property. Waste from this operation included sludge from a rotary air filter, which was reportedly disposed of off-site.

The current owner of the property containing the Site, Praxair, Inc., is a corporate successor to Union Carbide's Linde Division. Other industrial operators on the plant property have included ESAB, L-Tech, Stratcor, Inc., US Vanadium and UMETCO. With the exception of the locomotive house, all of the buildings on the Praxair property have been demolished within the last decade.

From the time of the initial development of the Union Carbide plant, the 15-acre Site was primarily utilized for rail facilities that serviced the plant and other adjacent industries. A portion of the welding flux manufacturing facility that was operated by Union Carbide's Linde Division and later by ESAB/L-TEC, however, was located on the western portion of the Site.

3.0 Results of Previous Investigations

This section summarizes the investigation work completed at the Site and presents the Areas of Concern (AOCs) identified at the Site. These AOCs will be subsequently evaluated for remedial alternatives, and are depicted on Figure 3.

3.1 Remedial Investigation Fieldwork

The RI fieldwork included:

- Completion of a geophysical survey to investigate metallic anomalies (e.g., potential buried tanks, vaults, underground utilities) potentially present in the area surrounding the Locomotive House.
- Collection and analysis of on-site surface soil/fill samples to characterize the chemistry of these materials.
- Completion of test pits, test borings and soil probes to enable the classification, screening, sampling and chemical characterization of subsurface soil/fill.
- Radiological screening of soil/fill excavated from the test pits.
- Installation, development and sampling of groundwater monitoring wells in an effort to determine groundwater flow direction and gradient, as well as to enable the collection and chemical analysis of groundwater samples.
- Execution of a geophysical survey in areas of the site that were not historically occupied by rail facilities in an effort to identify subsurface anomalies potentially indicative of buried drums of radioactive slag.
- Performance of a radiological survey to assess baseline gamma radiation levels across the Site and establish current background radiation levels.
- Completion of a radiological investigation, including the excavation of test pits and field screening and laboratory analysis of soil/fill samples, to characterize and delineate the extent of material exhibiting elevated gamma radiation levels, and to investigate subsurface anomalies identified by the geophysical survey.
- Collection and chemical analysis of liquid and sediment samples from onsite pits and sumps within and adjacent to the Locomotive House to characterize and profile for disposal these materials.
- Implementation of a Regulated Building Material (RBM) survey of the Locomotive House to investigate asbestos containing materials (ACMs), lead-based paint (LBP) and/or polychlorinated biphenyl (PCB) containing electrical equipment.

- The survey of surface soil sample locations, test pit locations, soil probe locations, monitoring well locations and elevations and the sediment sample locations.

3.2 Areas of Concern

As described in the RI Report, the results of this investigation identified a number of Areas of Concern (AOCs) at the Site that warrant further consideration. The nature and extent of impacts for these areas have been defined and are summarized in the sections below. For discussion purposes, these impacts were compared to with the Standards Criteria and Guidance values (SCGs) applicable to each medium sampled, including:

- Soil/Fill: NYSDEC's 6NYCRR Part 375 Environmental Remediation Programs: Part 375-6.8: Residential, Commercial and Industrial Use Soil Cleanup Objectives (SCOs)
- Groundwater: NYSDEC's June 1998 Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations in the Technical and Operational Guidance Series (TOGS) 1.1.1

Additionally, gamma radiation measurements were recorded during a walkover survey of the Site using a hand-held gamma scintillation meter/probe system and compared to local background gamma radiation measurements and other threshold values.

3.2.1 AOC #1 Surface Fill

3.2.1.1 AOC #1A – Site-Wide Contaminants of Concern

Polycyclic aromatics hydrocarbons (PAHs) exceeding the Industrial Use SCOs and the Restricted Use SCOs for Groundwater Protection were detected in surface soil/fill samples collected from the northern portion of the Site. The presence of these contaminants is likely related to past industrial operations in that area. The PAHs may also be associated with the operation of railroad spurs in this area.

Pesticide levels exceeding the Industrial Use SCOs were detected in only one location along the edge of the former rail yard on the Site. Levels of pesticides exceeding the Restricted Use SCOs for Groundwater Protection were also detected in several locations along the former rail yard. The presence of these compounds is likely related to the surface application of pesticides on the Site for the control of vegetation during operation of the rail yard and industrial complex.

Arsenic and manganese levels exceeding the Industrial Use SCOs and the Restricted Use SCOs for Groundwater Protection were detected in the surface soil/fill samples collected from several areas of the site. A number of other metals exceeding the Restricted Use SCOs for Groundwater Protection were detected in surface soils/fill across the Site. The presence of these metals is likely related to the deposition of slag, off-specification products and various other processing wastes (e.g., manganese-containing liquids) associated with former industrial operations on and/or adjacent to the Site. This is supported by a correlation with the analytical results from the subsurface fill material and the locations of the samples relative to the welding-flux production facility formerly operated along the western side of the Site.

Based on the findings of the RI, impacts in this AOC have been identified at levels exceeding Site SCOs. As such, remediation and/or engineering controls to address this AOC appear warranted.

3.2.1.2 AOC #1B – Radiological Material

Radiological concerns were identified in the fill material at the Site during the RI.

A baseline radiological assessment performed as part of the RI identified areas of elevated gamma radiation, and was followed by a radiological investigation designed to better characterize and delineate the radiological material present on the Site. The findings of the radiological investigation are summarized below:

- The laboratory results indicate that the material exhibiting elevated gamma radiation consists primarily of slag comprised of 50% iron (FE), 25% calcium oxide (CaO) and 13% silcon monoxide (SiO), which has been previously identified as cyclowollastonite.
- This slag material is typically a by-product of the electrochemical production of elemental phosphorous using uranium-bearing raw materials. Previous radiological surveys of the Niagara Falls area indicate that this material was historically utilized for bedding under paved surfaces (e.g., roads, building slabs) as well as for general hard fill applications.
- No large continuous lenses or laterally extensive subsurface layers of radioactive slag were observed.
- The radioactive slag occurs primarily within two feet of the ground surface in the hot spot areas and appears to be mixed with other non-radiologically impacted fill materials. Gamma radiation levels detected in this material during the on-site investigation generally ranged from 15,000 to 60,000 counts per minute (CPM), with higher readings of 120,000 to 170,000 CPM limited to the area in the vicinity of the TP03 test pit cluster.
- The source of the previously detected peak gamma reading of 420,000 CPM was determined to be a single, football-sized piece of slag that was partially exposed at the ground surface. This piece of slag was removed from the Site for laboratory analysis.
- With the exception of two boring locations, no radiological material was detected via "down-hole" gamma readings taken under the concrete pads. The exceptions to this occurred in the central portion of the large concrete pad that occurs along the western side of the Site. Slightly elevated gamma radiation readings of 22,000 CPM and 19,000 CPM were recorded in the non-native fill material underlying the slab at these locations. Furthermore, some of the concrete appeared to have slag-like material incorporated in the concrete matrix, which may have contributed to the slightly elevated gamma readings in this area.

Based upon the results of this investigation, five discrete areas (among other isolated, smaller areas) were identified as containing slag and slag-like material with gamma radiation surface measurements up to and exceeding approximately six times local background gamma radiation values. These areas are located in the northern portion of the site and are depicted on Figure 3. The maximum depth of the impacted slag observed within these areas was 2.5 feet below grade, and the total estimated amount of radioactive material on the project site at 7,149 tons. This estimate also includes the potential sporadic occurrences of impacted slag in other areas of the site, outside of the five areas of radiological concern.

Despite the elevated gamma radiation measurements, the annual dose rates for on-site workers at one meter and on contact were conservatively calculated to be approximately 200 and 400 mrem per year, respectively (i.e., 2,080 hours per year or 40 hours per work week). These values are well below NYSDOH 16 NYCRR 16.6 - Occupational dose limits of 5,000 mrem per year, which only apply to radiological workers managing the radioactive materials. Conservatively comparing these occupational dose rates to NYSDOH 16 NYCRR 16.7 - Dose Limits to Individual Members of the Public, these values exceed the total effective dose equivalent of 100 mrem per year. Appendix A contains details on anticipated worker dose rate estimates during construction and subsequent public dose rate estimates after site restoration.

Based on the findings of the RI, radiological impacts within this AOC have been identified at gamma radiation levels up to and exceeding approximately six times local background values. As such, remediation and/or engineering controls to address this AOC appear warranted.

3.2.2 AOC #2: Subsurface Fill

3.2.2.1 AOC #2A – Site-Wide Contaminants of Concern

PAHs exceeding the Industrial Use SCOs and the Restricted Use SCOs for Groundwater Protection were detected in one sample originating from subsurface fill located in the north-central portion of the site. The presence of these contaminants likely reflects the chemistry of the fill in that location, but could also be related to past industrial and/or rail activities in that area.

Arsenic and manganese levels exceeding the Industrial Use SCOs and the Restricted Use SCOs for Groundwater Protection were detected in the subsurface fill samples collected from the southern, central and northern portions of the Site. A number of other metals exceeding the Restricted Use SCOs for Groundwater Protection were also detected in subsurface fill samples from across the Site. These results appear to reflect the chemistry of the slag and other industrial fill that is present across the Site to depths ranging from 2 to 8 feet BGS, as well as the fill material that appeared to contain off-specification welding product, which was encountered in the area of the former settling pond near the northern limits of the Site.

The disposal of various other processing wastes (e.g., manganese-containing liquids) associated with former industrial operations on and/or adjacent to the Site may also have contributed to the metals levels in the fill material.

Based on the findings of the RI, impacts in this AOC have been identified at levels exceeding Site SCOs. As such, remediation and/or engineering controls to address this AOC appear warranted.

3.2.2.2 AOC #2B – Petroleum Contamination in the Former USTs/Locomotive House Area:

Although the analytical results from subsurface soil/fill samples collected in the vicinity of the former underground storage tanks (USTs) and Locomotive House did not indicate the presence of volatile organic compounds (VOCs) or semivolatile organic compounds (SVOCs) at levels exceeding Commissioner's Policy CP-51 SCOs, evidence of petroleum impacts consisting of elevated photoionization detector (PID) measurements, staining, sheen and petroleum odors were observed in this area during the field investigation.

Based upon the field screening data and observations collected during the soil probe, test pit and monitoring well programs, the fill displaying petroleum nuisance characteristics occurs in the former UST cavity near the southeast corner of the Locomotive House and in the shallow fill to the east and south of the building. The presence of residual petroleum contamination in this area is likely related to leaks or spills associated with the former USTs and related piping and/or incidental releases associated with maintenance and repair activities conducted in this area.

The RI concluded that, although concentrations did not exceed Site SCOs, nuisance characteristic impacts have been identified in this AOC. As such, remediation and/or engineering controls to address this AOC appear warranted.

3.2.3 AOC #3 Pits and Sumps

Low concentrations of a handful of VOCs commonly associated with solvents and degreasers were detected in the water present in the maintenance pit located within the central bay of the Locomotive House. These contaminants are likely related to the maintenance and repair activities formerly conducted in this building. The elevation of the water within this pit is higher than the water levels within the micro-wells installed around the building. Therefore, it would appear that this water is the result of precipitation that has entered the building through the failing roof and collected in the pit, rather than through groundwater infiltration.

Contamination was detected in the historic sewer system discovered around the perimeter of the Locomotive House. This contamination was characterized by SVOC tentatively identified compounds (TICs) detected in aqueous samples collected from the manholes, as well as sheen and odor when sediments within these structures were disturbed. The highest concentration of SVOC TICs was detected in a brick manhole proximate the southeast corner of the Locomotive House, near the former USTs. Floating globules of Liquid Phase Hydrocarbon (LPH) were observed on the surface of the fluid within this manhole, and a strong petroleum odor was noted when the manhole cover at this location was removed.

A 1977 plant drawing, included as Figure 4, shows the sewer system. It was reported by Praxair that all utilities within the Site had been closed and capped; however, no information regarding this specific sewer system was provided. Therefore, the extent and corresponding volume of this system is not known. No flow was observed in any of the manholes on multiple occasions during the RI field program.

Based on the findings of the RI, impacts including globules of LPH have been identified in this AOC. As such, remediation and/or engineering controls to address this AOC appear warranted.

3.2.4 AOC #4 Regulated Building Materials

The Site is occupied by a 13,700-square-feet building that was formerly utilized for the maintenance and repair of locomotives that is not currently utilized and is in a deteriorated state. As described in the RI, asbestos-containing materials (ACMs), lead-based paint (LBP), polychlorinated biphenyl- (PCB-) containing light fixtures, and mercury vapor-containing light bulbs were identified in the Locomotive House. As such, remediation to address this AOC appears warranted.

3.2.5 Other Media: Groundwater

3.2.5.1 Perched Water

Monitoring wells screened within the fill surrounding the Locomotive House contained low levels of aromatic hydrocarbons and PAHs, as well as VOC and SVOC TICs, which is consistent with the evidence of residual petroleum contamination observed in the fill. Only one VOC was detected in this area at a concentration that slightly exceeded the groundwater standard.

Numerous metals were also detected in the perched water occurring in the fill in the vicinity of the Locomotive House, and the samples collected in this area contained the only contraventions of the groundwater standards for chromium and manganese encountered on the Site. The presence of these contaminants likely reflects the chemistry of the fill in this area.

The same is true of the perched water occurring within the fill in the vicinity of the former settling pond in the northern portion of the site. The only contraventions of the groundwater standards for arsenic and vanadium on the Site were detected in a well in this area, which is screened in the fill. Concentrations of arsenic and vanadium in subsurface fill in this area exceed the Restricted Use SCO for groundwater protection. Therefore, the presence of these contaminants likely reflects the chemistry of the fill in this area.

Based on the findings of the RI, only minor impacts to perched groundwater have been identified at the Site. As such, active remediation to address perched groundwater does not appear to be warranted. However, placement of a restriction on the use of groundwater at the Site is appropriate and will be included in the recommended remedy. Additionally, any future placement of impervious surfaces on the Site (i.e., asphalt or concrete) would help to limit the percolation of precipitation through the fill and reduce impacts to groundwater quality.

3.2.5.2 Overburden Groundwater

The RI included the installation of monitoring wells screened in the upper-most water-bearing unit that occurs within the glaciolacustrine and glacial till deposits on the Site. With the exception of low concentrations of several VOCs in the southern portion of the site and low level, unknown SVOC TICs across the Site, organic contaminants were not detected in this hydrostratigraphic unit. The low level VOCs in the southern portion of the Site could be related to petroleum contamination in the Locomotive House area and/or could have migrated onto the Site from an off-site source. The nature and source of the unknown SVOC TICs are not currently known, but they are likely reflective of the industrial character of the Site and surrounding properties.

Metals detected above the groundwater standards in this hydrostratigraphic unit were limited to aluminum, iron, magnesium and sodium. These parameters are commonly encountered in uncontaminated, natural environments and do not appear to be associated with the contaminated fill on the Site. No exceedances of the groundwater standards for arsenic, chromium or manganese were detected in this groundwater zone.

Based on the findings of the RI, only minor impacts to overburden groundwater have been identified at the Site. As such, active remediation to address overburden groundwater does not appear to be warranted. However, placement of a restriction on the use of groundwater at the Site is appropriate and will be included in the recommended remedy. Additionally, any future placement of impervious surfaces on the Site (i.e., asphalt or concrete) would help to limit the percolation of precipitation through the fill and reduce impacts to groundwater quality.

3.3 Summary of Areas of Concern

Based on the similarities of the proposed remedial actions for AOCs #1 and #2, these AOCs have been classified into one category to provide clarity from a remedial standpoint. Additionally, because the results of the RI indicate that groundwater impacts are minimal, no further discussion of groundwater treatment methods is included in the following sections.

4.0 Objectives

The objectives of this RAA & RAWP are to evaluate remedial alternatives to address the AOCs presented above and select remedial actions to be implemented. As defined in NYSDEC DER-10 (Section 4.0), remedial alternatives will be evaluated based on the following criteria:

a. Overall Protection of Public Health and the Environment: This criterion evaluates exposure and residual risks to human health and the environment during or subsequent to implementation of the alternative.
b. Compliance with SCGs: This criterion evaluates whether the remedial alternative will ultimately result in compliance with SCGs, to the extent practicable.
c. Long-Term Effectiveness and Permanence: This criterion evaluates if the remedy is effective in the long-term after implementation (e.g., potential rebound). In the event that residual impacts will remain as part of the alternative, then the risks and adequacy/reliability of the controls are also evaluated.
d. Reduction of Toxicity, Mobility, or Volume with Treatment: This criterion evaluates the reduction of contaminant toxicity, mobility or volume as a result of the remedial alternative. In addition, the reversibility of the contaminant destruction or treatment is evaluated.
e. Short-Term Effectives: This criterion evaluates if the remedial alternative protects the community, workers and the environment during implementation.
f. Implementability: This criterion evaluates the remedial alternative based on its suitability, implementability at the specific site, and availability of services and materials that will be required.
g. Cost: This criterion evaluates the capital, operation, maintenance, and monitoring costs for the remedial alternative. The estimated costs are presented on a present worth basis.
h. Community Acceptance: This criterion takes into account concerns of the community regarding the proposed remedy. Any public comments and overall public perception are addressed as part of the criterion.
i. Land Use: This criterion evaluates the proposed remedial approach against the current, intended, and reasonably anticipated future use of the land and its surroundings.

5.0 Remedial Action Objectives

Remedial Action Objectives (RAOs) are medium-specific objectives for the protection of public health and the environment and are developed based on contaminant-specific standards, criteria, and guidance (SCGs) established by NYSDEC and/or New York State Department of Health (NYSDOH).

Fill RAOs

The RAOs for fill used in this RAA & RAWP are:

- RAOs for Public Health Protection
    - Prevent ingestion/direct contact with contaminated fill.
    - Prevent exposure to elevated radiation levels within slag fill.
    - NYCRR Subpart 375-6 Remedial Program Soil Cleanup Objectives (RPSCOs) for the Protection of Public Health/Industrial Use.
    - NYSDEC CP-51 Supplemental Soil Cleanup Objectives (SSCOs) for the Protection of Ecological Resources.
    - NYCRR Subpart 375-6 RPSCOs for the Protection of Groundwater.
- RAOs for Environmental Protection
    - Prevent migration of contaminants that would result in groundwater or surface water contamination.
    - Prevent impacts to biota from ingestion/direct contact with fill causing toxicity or impacts from bioaccumulation through the terrestrial food chain.

Pits and Sumps RAOs

The RAOs for the water in the sumps and pits used in this RAA & RAWP are:

- RAOs for Public Health Protection
    - Prevent ingestion of water impacted by contaminants.
    - Prevent contact with contaminants in the impacted water.
    - Prevent surface water contamination.
- RAOs for Environmental Protection
    - Prevent impacts to biota from ingestion/direct contact with surface water causing toxicity and impacts from bioaccumulation through the marine or aquatic food chain.

Regulated Building Materials

The RAOs for regulated building materials used in this RAA & RAWP are:

- RAOs for Public Health Protection
    - Prevent contact with or inhalation of contaminants in building materials.
    - Prevent the release of contaminants via wind erosion of deteriorated asbestos containing materials.

6.0 Development of Remedial Alternatives

This section develops the remedial alternatives being considered to address the AOCs identified for the Site. The remedial alternatives evaluated are summarized below:

6.1 Fill

As discussed in Section 3.3, this category includes AOC #1 (surface fill) and AOC #2 (subsurface fill).

6.1.1 No Action

The No Action Alternative is included as a procedural requirement and as a baseline to evaluate other alternatives. Under this alternative, no further remedial or monitoring activities would occur and no environmental easement would be recorded. The fill at the Site would remain virtually as it is and change in use would not be limited except by existing land use controls such as zoning.

6.1.2 Site Management Plan with Institutional Controls

Under this Restricted Use Alternative, institutional controls (e.g., deed restrictions, NYSDEC Environmental Easement, etc.) would be placed on the property to control use of the Site and a Site Management Plan (SMP), including a Health and Safety Plan (HASP), would be developed to protect against exposure.

6.1.3 Selected Fill Removal and Cover System Installation (BCP Track 4 – Restricted Use Cleanup - Industrial)

The planned site redevelopment consists of the construction of an intermodal transportation facility with associated rail yard, green space, and concrete- and asphalt-paved areas.

Under this Industrial Restricted Use Alternative, any fill excavated during the site redevelopment activities (such as the construction of the stormwater conveyance system and other utilities) will be disposed of at an off-site waste facility. Additionally, grossly contaminated fill exhibiting significant nuisance characteristics in the area of the former UST cavity near the southeast corner of the Locomotive House would be removed and disposed off-site.

During removal, the fill will be screened for radiological impacts and the material with significant radiological impacts will be segregated for disposal at an appropriately permitted out-of-state facility, while the remaining excavated material will be disposed at a facility in New York State. Underlying native soil would be characterized for potential re-use on- or off-site.

The extent of the excavation of the grossly contaminated fill impacted with petroleum nuisance characteristics in the area of the former UST cavity near the southeast corner of the Locomotive House will be based on visual and olfactory evidence. Fill with significant petroleum-related olfactory and visual impacts will be excavated for off-site disposal. No post-excavation confirmation sampling will be completed because previous sampling indicates that the material in this area meets the SCOs.

Any on-site fill not excavated as part of site redevelopment activities would be left in place and covered to limit the potential for exposure. Institutional controls in the form of an NYSDEC Environmental Easement would be placed on the property to control use of the Site and an Operations, Maintenance, and Monitoring Plan (OM&M Plan), including a Site Management Plan (SMP) and a Health and Safety Plan (HASP), would be developed to further protect against exposure.

The estimated volume of the material to be excavated during the construction of the stormwater conveyance system is 10,450 tons. However, a portion of this material is native material, as the excavation extends below the fill/native material interface, resulting in the anticipated off-site disposal of approximately 5,200 tons of fill. Additionally, another approximately 2,900 tons of fill will be generated during grading activities and the removal of railroad ties from the Site. An estimated 100 tons of material will be excavated to facilitate the installation of utilities to service the new structure that will be constructed in the general area of the Locomotive House. Lastly, an estimated 7,200 tons of petroleum-contaminated soil will be generated during excavation activities in the former UST cavity near the southeast corner of the Locomotive House.

The cover system would be integrated into the redevelopment plans for the Site, and would therefore consist of a variety of cover materials, each of which will provide adequate protection of human health. (It should be noted that the Site contains one existing set of railroad tracks that are actively used; the construction of which used ballast imported from off-site which adequately covers the on-site fill in the area of these extant tracks.) Figure 5 shows the Site Development Plan, and the following is a breakdown of the planned development and cover system to be placed at the Site based on that plan:

New Cover Type	Estimated Area (square feet)
Asphalt	186,000
Concrete	125,000
Railroad Ballast	90,000
Cover Soil	129,000
Building	10,000

For the area of the active existing railroad and ballast, the fill material has already been covered by the ballast, so no new material will be placed in this area. The fill in the remaining areas will be covered with new, clean material imported to the Site during construction.

The Environmental Easement will be filed with Niagara County to run with the deed and include the following requirements:

- The property use will remain industrial
- The cover system will remain in place
- A Soil/Fill Management Plan will be implemented for all invasive activities at the Site
- The use of groundwater without treatment and Niagara County Department of Health approval will be prohibited
- Annual certification that institutional and engineering controls will be required

6.1.4 Complete Fill Removal and Disposal (BCP Track 1 – Unrestricted Use Cleanup)

Under this Unrestricted Use Alternative, the fill impacted with contaminants at concentrations above the appropriate Unrestricted Use SCOs would be excavated and disposed of at appropriately permitted off-site waste disposal facilities.

Based on the RI results, and for purposes of this assessment, all fill has been assumed to contain concentrations of contaminants above the Unrestricted Use SCOs. Based on an estimated average fill thickness of five feet throughout the Site, the estimated volume of fill at the Site is 121,323 cubic yards. Assuming a conversion rate of 1.62 tons per cubic yard, the weight of this fill material is estimated at 196,500 tons.

This alternative assumes that the radiologically impacted fill will be disposed separately from the remainder of the fill from the Site. Based on this, the following material is estimated to be removed and disposed off-site:

- Fill with radiological impacts – 7,150 tons
- Remaining on-site fill – 189,400 tons

6.2 Pits and Sumps

As discussed in Section 3.2.3, the maintenance pit in the Locomotive House and the historic sewer system around the perimeter of the Locomotive House were found to be impacted with contaminants. In the historic sewer system, the most significant impacts were identified in manhole MH-02.

6.2.1 No Action

The No Action Alternative is included as a procedural requirement and as a baseline to evaluate other alternatives. Under this alternative, no further remedial or monitoring activities would occur and no environmental easement would be recorded. These areas would remain virtually as they are and change in use would not be limited except by existing land use controls such as zoning.

6.2.2 Site Management Plan with Institutional Controls

Under this restricted use alternative, institutional controls (e.g., deed restrictions, NYSDEC Environmental Easement, etc.) would be placed on the property to control use of the Site and a Site Management Plan (SMP), including a Health and Safety Plan (HASP), would be developed to protect against exposure.

6.2.3 Impacted Water Removal and Structure Closure (BCP Track 4 – Restricted Use Cleanup-Industrial)

Under this restricted use alternative, a video inspection of the historic sewer system will be performed and the potential for removal of the water from and closure of the system will be evaluated. No flow has been observed in this historic sewer system, so it is assumed that the system is inactive. If it is confirmed that the historic sewer system is inactive and closure is feasible, a marine-type concrete will be used to close the sewer at manholes MH-01 and MH-03 in order to isolate the most impacted area (MH-02). After

allowing the concrete to set, the water in the sewer will be removed from MH-02 and discharged to holding tanks and later to the adjacent Covanta facility for incineration. Flowable fill or other similar product will be used to fill the sewer following removal of the water.

The water in the maintenance pit in the Locomotive House will be pumped and discharged to holding tanks for later discharge to the adjacent Covanta facility for incineration. The pit will be backfilled with clean material following removal of the water and perforation of the bottom of the pit.

6.3 Regulated Building Materials:

This category includes ACMs, LBP, PCB-containing light fixtures, and mercury vapor-containing light bulbs in the Locomotive House.

6.3.1 No Action

The No Action Alternative is included as a procedural requirement and as a baseline to evaluate other alternatives. Under this alternative, no further remedial or monitoring activities would occur and no environmental easement would be recorded. The building materials would remain in-place and change in use would not be limited except by existing land use controls such as zoning.

6.3.2 Regulated Building Materials Removal (BCP Track 1 - Unrestricted Use Cleanup)

Under this Unrestricted Use Alternative, the regulated building materials will be properly removed and disposed off-site. The building will be demolished and the slab will be left in place for potential reuse.

7.0 Detailed Evaluation of Alternatives

7.1 Fill

This category includes AOC #1 (surface soil) and AOC #2 (subsurface soil).

7.1.1 No Action Alternative

Description

The No Action Alternative is included as a procedural requirement and as a baseline from which to evaluate other alternatives. Under this alternative, no further remedial or monitoring activities would occur and no environmental easement would be recorded. The fill at the Site would remain virtually as it is and change in use would not be limited except by existing land use controls such as zoning.

Assessment

This alternative will not be protective of human health or the environment. A number of surface and subsurface fill samples contained contaminants concentrations exceeding the NYSDEC Part 375 Soil Cleanup Objectives and measurements of radiological activity in the fill significantly exceeded thresholds

typically utilized by the NYSDEC. Therefore, the potential exists for human exposure and impacts to the environment.

This alternative would not result in the reduction of contaminant toxicity, mobility or volume and therefore would not be in compliance with the RAOs for the fill material.

There would be no increased short-term risks associated with the No Action Alternative for the fill since remedial activities are not implemented; however, this alternative will not be effective in the long-term and is not a permanent remedy.

Based on the findings of the studies performed to date, it is anticipated that this alternative will not be acceptable to the community.

Of the alternatives being considered, the No Action Alternative for the fill material is not effective for the long-term and does not reduce toxicity, mobility, or volume of contamination. There is no cost associated with this alternative.

7.1.2 Restricted Use Alternative - Site Management Plan with Institutional Controls

Description

Under this Restricted Use Alternative, institutional controls (e.g., deed restrictions, NYSDEC Environmental Easement, etc.) would be placed on the property and an SMP including a HASP, would be developed and implemented to minimize potential exposures and also control Site use. The SMP would include procedures for properly handling and disposing of impacted media (e.g., fill, etc.) during future invasive activities.

Assessment

This alternative will not be protective of human health or the environment. A number of surface and subsurface fill samples contained contaminants concentrations exceeding the NYSDEC Part 375 Soil Cleanup Objectives and measurements of radiological activity in the fill exceeded the thresholds typically applied by the NYSDEC. Although the SMP would minimize potential future exposures during invasive activities performed at the Site and the institutional controls would provide the necessary mechanism to ensure proper notification to future owners, the potential remains for human exposure and impacts to the environment.

This alternative would not result in the reduction of contaminant toxicity, mobility or volume and therefore would not be in compliance with the RAOs for the fill material.

There would be no increased short-term risks associated with this Restricted Use Alternative for this area since active remedial activities are not implemented; however, this alternative will not be effective in the long-term and is not a permanent remedy.

Based on the findings of the studies performed to date, it is anticipated that this alternative will not be acceptable to the community.

The institutional action alternative for this AOC is feasible. However, based on the planned development in this area, this alternative for the fill material is not effective for the long-term and does not reduce

toxicity, mobility, or volume of contamination. As such, this alternative may not be the most practical for this AOC at this time. The estimated cost for this alternative is $25,000.

7.1.3 Restricted Industrial Use Alternative - Select Fill Removal and Cover System Installation

Description

Under this BCP Track 4 Restricted Industrial Use Alternative, the fill excavated during site redevelopment activities would be disposed of at an off-site waste facility while the remaining fill would be left in place and covered to limit the potential for exposure. Backfill of these any utility excavations would include the piping and stone necessary to construct the storm water conveyance system or other utilities at the Site. Due to the presence of petroleum nuisance characteristics, the grossly contaminated fill proximal to the Locomotive House will be excavated and disposed off-site. Backfill of this excavation will include the placement of clean material from an off-site source. Institutional controls in the form of an NYSDEC Environmental Easement would be placed on the property to control use of the Site and an SMP, including a HASP, would be developed to further protect against exposure.

Assessment

This alternative is protective of human health and the environment. Impacted fill would be removed and disposed of off-site, or would be covered with clean material to limit the potential for exposure to fill. Subsequent to railroad and site construction, the presence of the cover would reduce gamma radiation levels at the Site's surface, as demonstrated in the Review of Overburden Shielding Calculation in Appendix A. These calculations address those residual "hot spots" remaining in the subsurface that are not within the excavation limits of the project, and thus will not be removed. In summary, the calculations used conservative assumptions to calculate an annual dose following placement of the cover system. These calculations demonstrate that the expected annual dose rate for future on-site workers will be well below the NYSDOH guidance. To confirm the efficacy of the cover system, a final site gamma survey will be conducted following the placement of the cover system. To further protect human health, any future invasive work would be performed in accordance with an NYSDEC-approved Site Management Plan, and certification of the engineering and institutional controls would be performed on an annual basis.

The removal of a portion of the fill would result in the reduction of the toxicity, mobility, and volume of contaminants on the Site, and the placement of a clean cover system across the entire Site would reduce the mobility of organic and metal analytes in the remaining material. Additionally, the potential for radiological exposure (which was already shown to be low) would be further reduced through removal and capping. Therefore, the Site would be in compliance with RAOs.

This alternative would increase short-term risks for the community and the workers implementing the alternative (i.e., through the disturbance of impacted fill). However, these risks would be minimized through the implementation of appropriate fill handling procedures, air monitoring, and dust suppression techniques. Furthermore, this alternative would be effective in the long-term. The fill removal and disposal would be a permanent remedy to address that material removed from the Site, and the placement of a cover system over the remaining material; the enactment of Environmental Easements; and the use of an OM&M Plan and an SMP for future invasive activities at the Site would also constitute a long-term remedy.

The restriction of the land use to industrial uses conforms to uses in the surrounding area, which is heavily industrial in nature. Additionally, the City of Niagara Falls' Strategic Master Plan indicates that "given the likely extent of contamination of these lands (referring to industrial lands within the Buffalo Avenue Corridor and other corridors), reuse for non-industrial activities is not expected in the short to medium-term." The Site is also located within the limits of the proposed Buffalo Avenue Industrial Corridor Brownfield Opportunity Area (BOA). The Pre-Nomination Phase of the BOA Program has been completed, and the study has also indicated that use of the property for industrial purposes provides the most benefit for the community.

Based on the findings of the studies performed to date, it is anticipated that the results of this alternative would be acceptable to the community.

The Restricted Industrial Use Alternative for this AOC is feasible. The cost for this alternative is approximately $8,530,000, as shown on Table 1.

7.1.4 Unrestricted Use Cleanup - Complete Fill Removal and Disposal

Description

Under this Unrestricted Use Alternative, all of the fill would be excavated and disposed of off-site in accordance with applicable regulations. The need for the removal of the entire volume of fill on-site is based on the RI results, which indicate that the fill material contains contaminants at concentrations at least as high as the Unrestricted Use SCOs, and, in many instances, in excess of the less stringent Restricted Use SCOs.

Assessment

This alternative would be protective of human health and the environment. Soil with contaminant concentrations above RAOs on-site would be removed and disposed of off-site.

This alternative would result in the reduction of the toxicity, mobility, and volume of contaminants in the soil. Therefore, the removal of fill would be in compliance with the SCGs.

This alternative would increase short-term risks for the community and the workers implementing the alternative (i.e., through the disturbance of impacted fill). However, these risks would be minimized through the implementation of appropriate fill handling procedures, air monitoring, and dust suppression techniques. Furthermore, this alternative would be effective in the long-term. The fill removal and disposal alternative would be a permanent remedy to address radiological concerns at the Site as well as the contaminant concentrations in the fill throughout the Site.

Based on the findings of the studies performed to date, it is anticipated that the results of this alternative would be acceptable to the community.

The cost for this alternative is $26.6M, as shown in Table 2. The high cost of this alternative makes this approach infeasible.

7.2 Pits and Sumps

This category includes the maintenance pit in the Locomotive House and the historic sewer system around the perimeter of the Locomotive House.

7.2.1 No Action Alternative

Description

Under this alternative, impacted media in this AOC would remain as is and future Site use and development would not be limited. In addition, remedial and monitoring activities as well as placement of institutional controls at the Site would not be implemented.

Assessment

This alternative may not be protective of human health or the environment. These structures were found to be impacted with contaminants.

This alternative would not result in the reduction of contaminant toxicity, mobility or volume and therefore would not be in compliance with the SCGs.

There would be no increased short-term risks associated with the no action alternative for this area since remedial activities are not implemented; however, this alternative may not be effective in the long-term and is not a permanent remedy.

Based on the findings of the studies performed to date, it is anticipated that this alternative may not be acceptable to the community.

Of the alternatives being considered, the No Action Alternative for the pits and sumps is not effective for the long-term and does not reduce toxicity, mobility, or volume of contamination. There is no cost associated with this alternative.

7.2.2 Restricted Use Alternative - Site Management Plan with Institutional Controls

Description

Under this Restricted Use Alternative, institutional controls (e.g., deed restrictions, NYSDEC Environmental Easement, etc.) would be placed on the property and an SMP including a HASP, would be developed and implemented to minimize potential exposures and also control Site use. The SMP would include procedures for properly handling and disposing of impacted media (e.g., soil, etc.) in these areas should they be disturbed in the future.

Assessment

This alternative will not be protective of human health or the environment. The pit and the historic sewer system contained water with contaminant impacts, and this water would remain in place. Although the SMP would minimize potential future exposures and the institutional controls would provide the necessary mechanism to ensure proper notification to future owners, the potential remains for human exposure and impacts to the environment.

This alternative would not result in the reduction of contaminant toxicity, mobility or volume and therefore would not be in compliance with the RAOs for the pit and sumps.

There would be no increased short-term risks associated with the no action alternative for this area since active remedial activities are not implemented; however, this alternative will not be effective in the long-term and is not a permanent remedy.

Based on the findings of the studies performed to date, it is anticipated that this alternative will not be acceptable to the community.

The Restricted Use Alternative for this AOC is feasible. However, based on the planned development for the Site, this alternative for the pits and sumps is not effective for the long-term and does not reduce toxicity, mobility, or volume of contamination. As such, this alternative may not be the most practical for this AOC at this time. The estimated cost for this alternative is $25,000.

7.2.3 Restricted Use Alternative - Impacted Material Removal and Structure Closure

Description

Under this alternative, a video inspection of the historic sewer system will be performed and the potential for removal of the water from and closure of the system will be evaluated. No flow has been observed in this historic sewer system, so it is assumed that the system is inactive. If it is confirmed that the historic sewer system is inactive and closure is feasible, a marine-type concrete will be used to close the sewer at manholes MH-01 and MH-03 in order to isolate the most impacted area (MH-02). After allowing the concrete to set, the water in the sewer will be removed from MH-02 and discharged to holding tanks and later to the adjacent Covanta facility for incineration. Flowable fill or other similar product will be used to fill the sewer following removal of the water.

The water in the maintenance pit in the Locomotive House will be pumped and discharged to holding tanks for later discharge to the adjacent Covanta facility for incineration. The pit will be backfilled with clean material following removal of the water and perforation of the bottom.

Assessment

This alternative would be protective of human health and the environment. Water in the pit in the Locomotive House and in the historic sewer system with contaminant impacts would be removed and disposed of off-site.

This alternative would result in the reduction of the toxicity, mobility, and volume of contaminants in the site structures. Therefore, the alternative would be in compliance with the SCGs.

This alternative would increase short-term risks for the community and the workers implementing the alternative. However, these risks would be minimized through the implementation of appropriate water handling procedures. Furthermore, this alternative would be effective in the long-term. The Impacted Material Removal and Structure Closure Alternative would be a permanent remedy to address the contaminant impacts in the pits and sumps at the Site.

Based on the findings of the studies performed to date, it is anticipated that the results of this alternative would be acceptable to the community.

The Impacted Material Removal and Structure Closure Alternative for this AOC is feasible. The estimated cost for this alternative is $52,000, as shown on Table 3.

7.3 Regulated Building Materials

This category includes ACMs, LBP, PCB-containing light fixtures, and mercury vapor-containing light bulbs in the Locomotive House.

7.3.1 No Action Alternative

Description

Under this alternative, impacted media in this AOC would remain as is and future Site use and development would not be limited. In addition, remedial and monitoring activities as well as placement of institutional controls at the Site would not be implemented.

Assessment

This alternative may not be protective of human health or the environment due to the continued presence of these regulated building materials.

This alternative would not result in the reduction of contaminant toxicity, mobility or volume and therefore would not be in compliance with the SCGs.

There would be no increased short-term risks associated with the no action alternative for this area since remedial activities are not implemented; however, this alternative may not be effective in the long-term and is not a permanent remedy.

Based on the findings of the studies performed to date it is anticipated that this alternative may not be acceptable to the community.

Of the alternatives being considered, the No Action Alternative for the regulated building materials is not effective for the long-term and does not reduce toxicity, mobility, or volume of contamination. There is no cost associated with this alternative.

7.3.2 Unrestricted Use Alternative - Regulated Building Materials Removal

Description

Under this Unrestricted Use Alternative, all of the regulated building materials will be properly removed from the Locomotive House and disposed off-site. The building will be demolished and the slab will be left in place for potential reuse.

Assessment

This alternative should be protective of human health and the environment. All of the regulated building materials will be removed from the Site.

This alternative would result in the reduction of the toxicity, mobility, and volume of contaminants in the site structure. Therefore, this alternative would be in compliance with the SCGs.

This alternative would increase short-term risks for the community and the workers implementing the alternative. However, these risks would be minimized through the implementation of appropriate materials handling procedures and air monitoring. Furthermore, this alternative would be effective in the long-term. The Regulated Building Materials Removal Alternative would be a permanent remedy to address the materials present in the on-site building.

Based on the findings of the studies performed to date, it is anticipated that the results of this alternative would be acceptable to the community.

The Regulated Building Materials Removal Alternative for this AOC is feasible. The cost for this alternative is $202,000, as shown on Table 4.

8.0 Comparative Evaluation of Alternatives and Recommended Actions

This section of the report compares the remedial alternatives proposed for each of the impacted media and presents the recommended action for each media group.

8.1 Fill

- The No Action Alternative will not be protective of human health and the environment and would likely not be acceptable to the community. In addition, development of the Site is anticipated to take place and, as such, impacts are likely to be encountered, which indicates a level of risk in relation to exposure to workers in these areas.
- The Site Management Plan with Institutional Controls Alternative will not be protective of human health and the environment and would likely not be acceptable to the community. Although this alternative would begin to manage the risk associated with the Site, the contaminated fill will remain at the surface of the Site and could cause exposure to site workers and those near the site. Additionally, the material with radiological impacts would remain at the site, potentially exposing site workers. As such, this alternative does not effectively protect human health.
- The Selected Fill Removal and Cover System Installation Alternative would be a long-term and permanent remedy and is anticipated to be acceptable to the community. The remedy reduces the toxicity, mobility and volume of impacted media via removal of a portion of the fill from the Site and effectively reduces or eliminates potential exposure routes through the construction of a cover system; the placement of an environmental easement; the use of an OM&M Plan; annual certification; and the implementation of an SMP. As such, this alternative appears to be practical to address the impacted fill.
- The Complete Fill Removal and Disposal Alternative would be a long-term remedy and is anticipated to be acceptable to the community. This alternative effectively reduces the toxicity, mobility, and volume of impacted media through the removal of all fill from the Site and replacement with clean material. However, removal of more than 15 acres of fill to an estimated average depth of five feet is impractical, and the high cost of this option makes this alternative infeasible.

The recommended remedial action for the fill at the Site is the Selected Fill Removal and Cover System Installation (Restricted Industrial Use) Alternative, which includes:

- The off-site disposal of fill excavated during redevelopment activities
- The excavation and off-site disposal of grossly contaminated fill in the former UST cavity
- The installation of a cover system across the entire Site
- The placement of an environmental easement on the property
- The implementation of an OM&M Plan and annual certification of the engineering and institutional controls
- The use of a SMP for future invasive actions at the Site

8.2 Pits and Sumps

- The No Action Alternative is not protective of human health or the environment. In addition, the No Action Alternative may not be acceptable to the community and may not be appropriate for redevelopment of the Site.
- The Site Management Plan with Institutional Controls Alternative will not be protective of human health and the environment and would likely not be acceptable to the community. Although this alternative would begin to manage the risk associated with the Site, the contaminated material will remain at the Site and could cause exposure to site workers or be released to the environment. As such, this alternative does not effectively protect human health.
- The Impacted Material Removal and Structure Closure Alternative would be a long-term and permanent remedy and is anticipated to be acceptable to the community. This action would effectively reduce the toxicity, mobility, and volume of impacted media through the removal of impacted materials and adequately protect human health and the environment. The relatively low cost of this alternative makes it practical.

The recommended remedial action is the Impacted Material Removal and Structure Closure (Restricted Use Cleanup) Alternative, which includes the removal of impacted water from the historic sewer system followed by closure of the sewer system. The water in the maintenance pit in the Locomotive House will be removed and the pit will be filled with clean material following perforation of the bottom of the pit.

8.3 Regulated Building Materials

- The No Action Alternative is not protective of human health or the environment. In addition, the No Action Alternative may not be acceptable to the community.
- The Regulated Building Materials Removal Alternative is anticipated to be acceptable to the community. This remedial alternative reduces the toxicity, mobility and volume of impacted media through removal of all regulated building materials. The relatively low cost of this alternative makes it practical.

The recommended remedial action is the Regulated Building Materials Removal (Unrestricted Use Cleanup) Alternative. This action combines removal of all appropriate material and demolition of the structure.

9.0 Summary of Recommended Final Remedial Actions

Based on the above recommendations, this section summarizes the overall final remedial strategy for the Site.

The following table summarizes the recommended remedy and associated costs:

Category	Recommended Remedy	Estimated Cost
Fill	Selected Fill Removal and Cover System Installation	$8,530,000
Pits and Sumps	Impacted Material Removal and Structure Closure	$52,000
Regulated Building Materials	Regulated Building Materials Removal	$202,000
Total		**$8,784,000**

Subsequent to NYSDEC approval and completing the recommended remedy, a Final Engineering Report would be submitted with the SMP.

10.0 Remedial Action Work Plan

This section presents the Remedial Action Work Plan for the recommended actions for the Site. The development of this RAWP is in accordance with the Brownfield Cleanup Program Guide dated May 2004 and NYSDEC DER-10 dated May 2010.

The remedial activities will be conducted in support of the redevelopment of the Site as an intermodal transportation facility. The facility will include a rail yard, concrete- and asphalt-paved working areas, one new building, and grassed areas. Figure 5 shows the Site Development Plan. As part of the development, a conveyance system will be constructed to handle stormwater, and Figure 6 shows the preliminary design of this system. The following sub-sections present the methods for implementation of the RAWP.

10.1 Standards, Criteria and Guidance

The Standards, Criteria and Guidance (SCGs) utilized as part of this RAWP were identified in Section 5.0.

10.2 Summary of the Remedial Goals

The proposed future use for the Site is industrial. As such, at a minimum, the remedy must eliminate or mitigate all significant threats to public health and/or the environment presented by the impacts identified at the Site through the proper application of scientific and engineering principles.

The Remedial Goals for this Remedial Action Work Plan are as follows:

a. Remove and dispose of fill material excavated to facilitate site redevelopment (i.e., for the construction of the stormwater conveyance system, utilities, etc.).
b. Remove and dispose grossly contaminated fill impacted with significant nuisance characteristics in the area of the former UST cavity near the southeast corner of the Locomotive House.
c. Cover entire site with clean fill, asphalt, concrete or railroad ballast.
d. Remove contaminated water from sumps and pits and close the structures in place.
e. Remove and properly dispose regulated building materials.
f. Place an environmental easement on the property.
g. Implement an OM&M Plan for the engineering controls at the Site.
h. Perform annual certification of the engineering and institutional controls.
i. Use a SMP to manage fill excavated during future invasive actions at the Site.

All work will be completed in accordance with applicable local, state, and federal regulations.

10.3 Field Activities Plan

The field activities for the remedial actions are described in the following subsections:

- Fill removal and off-site disposal (Section 10.3.1)
- Remediation of pits and sumps (Section 10.3.2)
- Construction water management (Section 10.3.3)
- Waste stream tracking (Section 10.3.4)
- Backfill (Section 10.3.5)
- Monitoring well decommissioning (Section 10.3.6)
- Cover system construction (Section 10.3.7)
- Regulated building materials (Section 10.3.8)
- Decontamination (Section 10.3.9)
- Health and Safety and Community Air Monitoring (Section 10.3.10)
- Dust Control (Section 10.3.11)
- Stormwater Management (Section 10.3.12)
- Site Control (Section 10.3.13)
- Site Management Plan/Institutional Controls (Section 10.3.14)

10.3.1 Fill Removal and Off-Site Disposal

The site redevelopment plans require the excavation of fill from areas in which the stormwater conveyance system and other utilities will be constructed and the grading of the planned rail yard to create a stable surface upon which to construct the rail facilities. Additionally, grossly contaminated fill in the area of the former UST cavity near the southeast corner of the Locomotive House will be excavated and disposed off-site. This work will include:

- For grading purposes, unsuitable fill will be removed from the Site, including the existing railroad ties; fill that is present between the ties; and stockpiled wood chips. Figure 7 shows the approximate extent of the areas that currently contain these materials. These materials will be properly disposed off-site via:
    - Wood chips and railroad ties will be incinerated at the adjacent Covanta facility.
    - Fill material will be properly disposed off-site.
- The unsuitable fill will be removed using a bulldozer, excavator, loader, or other appropriate equipment.
- In the areas of utilities and other site development structures and in the area of the former UST cavity near the southeast corner of the Locomotive House, fill will be excavated using a backhoe, excavator, loader or other appropriate equipment.
- A LaBella scientist or engineer will screen the removed fill for visual and olfactory observations and for total volatile compounds using a photoionization detector (PID).
- Additionally, a GRD radiological technician will screen the fill for radiological constituents using a Ludlum model #2221 scaler with a #44-10 probe. Appendix B contains additional information on the radiological screening of excavated materials.
- Based on the screening results, the excavated fill will be segregated into one of several classes of materials and staged in discrete piles (or directly loaded into trucks). Table 1 identifies the criteria for segregation of excavated fill and the currently anticipated volumes of each type of material.
- Fill materials not direct-loaded onto trucks for off-site disposal will be segregated by class, as shown in Table 1, and handled, stockpiled, and characterized accordingly.

Table 1 - Soil and Fill Segregation Plan

Class of Material	Physical Description	Anticipated Weight and General Depths
Class 1	Fill materials exhibiting gamma radiation field survey results less than 10,000 cpm with PID measurements of less than 5 ppm and no observable free product	9,111 tons[1] (0 to 5 ft.)
Class 2	Fill materials exhibiting gamma radiation field survey results less than 10,000 cpm with PID measurements of more than 5 ppm and/or observable free product	0 tons (0 to 5 ft.)
Class 3	Any fill materials exhibiting gamma radiation field survey results ranging from 10,000 to 30,000 CPM	2,000 tons (0 to 5 ft.)
Class 4	Any fill materials exhibiting gamma radiation field survey results over 30,000 CPM	0 tons (0 to 5 ft.)
Class 5	Non-impacted, native soils	4,320 tons[1] (5 to 25 ft.)

Note: The average depth to the native material is estimated at five feet; however, the top six inches of the native material will also be handled as Class 1 material to address any potential impacts form the overlying fill material.

- Excavated fill to be stockpiled on-site will be placed on and covered by a minimum of double 6-mil polyethylene sheeting which is sufficiently anchored to prevent any wind and water erosion. The cover will be inspected at least once per day with corrective action taken as needed. The inspections and any corrective actions will be documented in logs and will occur until the fill materials have been properly removed and disposed off-site.
- Characterization sampling of the stockpiled fill (Classes 1 through 4) will conform to the requirements of the facility at which the material is planned to be disposed.
- The final, off-site disposal location will be based on the characterization data obtained at the time of the work and at a facility approved for such waste.
    - Class 1 and 2 materials may be disposed at Modern Landfill in Model City, New York.
    - Class 3 materials will likely be disposed at the EQ Landfill in Wayne, Michigan.
    - Class 4 materials will likely be disposed at the EnergySolutions Landfill in Tooele County, Utah.
    - Railroad ties and stockpiled wood chips will be incinerated at the adjacent Covanta facility.
- Excavation and handling of the non-impacted, native soils underlying the fill (Class 5 Materials) will include:
    - The removal of the top six inches of native material and handling the uppermost native material in the same manner as the fill material above it.
    - Native soil will be re-used on-site to create berms or other features and will be covered with one foot of clean, off-site material.
- The excavation of the grossly contaminated fill impacted with petroleum nuisance characteristics in the area of the former UST cavity near the southeast corner of the Locomotive House will proceed based on the following:
        - Visual and olfactory evidence will be used to determine the limits of the grossly contaminated materials.
        - Fill with significant petroleum-related olfactory and visual impacts will be excavated for off-site disposal.
        - Fill that does not display significant petroleum-related olfactory and visual impacts will be left in place.
        - Once the limits of grossly contaminated fill have been reached, the excavation activities will be terminated.
        - No post-excavation confirmation sampling will be completed because previous sampling indicates that the material in this area meets the SCOs.
- Good housekeeping practices will be followed during excavation activities to prevent leaving contaminated material on the ground surface (e.g., precautions will be taken to prevent impacts to the ground surface due to material spilled from the excavator bucket). Any material that does spill on to the ground surface will be promptly picked up and placed in an appropriate location (e.g., dump truck, fill pile, etc.).
- Transportation of all wastes will be completed by properly permitted vehicles.
- To the extent practicable, trucks will travel along routes that avoid residential areas.
- Soil/fill excavated from the Site will not be re-used at other sites. All excavated soil/fill will be properly disposed at a permitted landfill or will be re-used on-site (native material only).

10.3.2 Remediation of Pits and Sumps

10.3.2.1 Historic Sewer

To initiate the cleaning and closure of the historic sewer system, a video inspection will be performed and the potential for removal of the water from and closure of the system will be evaluated. The video inspection will include the use of a video camera mounted on a camera tractor to assess the condition and length of the historic sewer. Figure 4 shows the approximate location of the historic sewer.

The video equipment will be lowered into the center access point (manhole) and will remotely travel as far as possible in both directions. If the termination of the sewer is not reached in one or both directions, the equipment will be extracted and placed in other manholes to attempt to reach the termination point. The equipment will be decontaminated following completion of the survey.

No flow has been observed in this historic sewer system, so it has been assumed that the system is inactive. If the video survey confirms that the historic sewer system is inactive and that the closure of the sewer is feasible, a marine-type concrete will be used to seal the sewer at manholes MH-01 and MH-03. The water will be removed from the entire system via pumps and discharged into containment tanks. The contained water will be incinerated at the adjacent Covanta facility.

Following removal of the water from the sewer, flowable fill or a similar product will be pumped into the sewer piping to permanently close the system. The flowable fill will meet the provisions of the Allowable Constituent Levels for Imported Fill or Soil, which are included in Appendix C.

10.3.2.2 Locomotive House Maintenance Pit

Following demolition of the structure, the water within the maintenance pit in the Locomotive House will be removed and the bottom of the pit will be perforated. The water will be removed from the pit via pumps and discharged into containment tanks and the contained water will be incinerated at the adjacent Covanta facility.

Following removal of the water from the pit, clean fill or gravel will be placed in the pit and compacted as appropriate.

10.3.3 Construction Water Management

This section identifies proper handling, treatment and discharge procedures for groundwater and/or rainwater that may enter excavations during remediation/redevelopment activities.

Contractors performing subsurface work at the Site will be required to provide temporary dewatering to handle groundwater and stormwater run-in to excavations during the remedial/redevelopment activities. Dewatering methods may include the use of sumps and pumps or the installation of well points. The water will be pumped or hauled from the collection points to the ground surface at on-site locations downgradient of the excavation, where it will be allowed to infiltrate back into the porous fill. No water that is collected will be allowed to be discharged off-site. Alternatively, the water may be pumped from the excavations and stored in tanks for ultimate discharge at the adjacent Covanta facility.

If the groundwater or stormwater that collects in the excavations exhibits evidence of contamination (i.e., sheen, odor, etc.), it may be necessary to treat the water prior to surface discharge or to discharging the water to the incinerator at the adjacent Covanta facility.

10.3.4 Waste Stream Tracking and Verification

The following documentation will be kept in relation to waste streams:

- Correspondence from the facility accepting the waste stream
- Waste profiles
- Waste characterization sampling, and results
- Manifests
- Bills of lading
- Weight tickets

The tracking information will be provided in the FER**.**

10.3.5 Backfill

Following completion, the excavations will generally be backfilled to pre-existing grade or proposed final grade of the development. Because the excavations will be completed to facilitate the installation of the stormwater conveyance system, the backfill will include appropriate stone, piping and other materials necessary for its construction.

For each source of backfill that is imported to the Site, one of the following will be completed prior to importing the backfill.

a. Documentation will be provided to NYSDEC as to the source of the material and the consistency of the material in accordance with the exemption for no chemical testing listed in DER-10 Section 5.4(e)(5); **OR**
b. Chemical testing will be completed in accordance with the following table:

Recommended Number of Soil Samples for Soil Imported To or Exported From a Site			
Contaminant	**VOCs**	**SVOCs, Inorganics & PCBs/Pesticides**	
Soil Quantity (cubic yards)	**Discrete Samples**	**Composite**	**Discrete Samples/Composite**
0-50	1	1	3-5 discrete samples from different locations in the fill being provided will comprise a composite sample for analysis
50-100	2	1	
100-200	3	1	
200-300	4	1	
300-400	4	2	
400-500	5	2	
500-800	6	2	
800-1000	7	2	
1000	Add an additional 2 VOC and 1 composite for each additional 1000 Cubic yards or consult with DER		

Taken from DER-10 - Table 5.4(e)10

In the event that laboratory analytical testing is conducted, the results for each new source of fill must meet the values provided in Appendix 5 of DER-10 (provided as Appendix C in this Work Plan) for Restricted Residential use and must receive approval by the NYSDEC.

Prior to performing backfilling activities, all equipment that has come into contact with impacted soils will be decontaminated on the decontamination pad, which is discussed in Section 10.3.9.

10.3.6 Monitoring Well Decommissioning

A number of monitoring wells currently exist on-site. Because groundwater does not exhibit significant impacts, long-term groundwater monitoring will not be a part of the final remedy for the Site. To facilitate the construction of the cover system, all on-site monitoring wells will be decommissioned in accordance with the procedures listed in NYSDEC's *CP-43: Groundwater Monitoring Well Decommissioning Policy, November 2009*. The decommissioning of these wells will include:

- Removing the protective casing and riser pipe
- Excavating the concrete surface seal
- Injecting grout into the bottom of the well via a tremie pipe
- Backfilling the upper five feet with clean fill
- Preparing decommissioning logs that will be included as an attachment in the FER

10.3.7 Cover System Construction

To eliminate potential exposure to the fill material at the surface of the Site, a cover will be installed across the entire Site. The installed cover will constitute the site restoration efforts for the Site. As shown on Figures 8 and 9, the cover will vary across the Site based on planned redevelopment requirements and will consist of the following:

Cover System Details

Cover Type	Cross-Section
Asphalt	Top Course - 1.5 inches Base Course - 3 inches Binder - 2.5 inches Subbase - 12 inches
Railroad Ballast	Ties intermixed with ballast – 7 inches Ballast – 4 inches Sub-ballast – 6 inches
Concrete	Concrete – 8 inches Subbase – 12 inches
Clean Fill	Clean fill – 12 inches

Prior to placement of the cover, rough grading will be performed using a bulldozer. In areas to be covered by soil, orange snow fence or similar demarcation layer will be placed on the graded ground surface. The soil cover material will be imported from an approved source and documentation will be provided to demonstrate that the imported soil conforms to the SCOs. The soil will be dumped, spread with a

bulldozer, and properly compacted to minimize future settling. Following placement, the soil cover will be seeded.

In the case of the ballast, asphalt, and concrete, a proof roller will be used following grading to smooth the subgrade surface. Once the subgrade is prepared, a gravel subbase or sub-ballast to provide stability for construction and limit subsidence will be placed using a bulldozer. Rail ballast, asphalt, or concrete will be placed on the subbase in accordance with standard construction practices.

Following placement of the cover, annual inspections will be performed in accordance with the Site Management Plan prepared for the Site.

10.3.8 Regulated Building Materials

Asbestos-containing materials (ACMs), lead-based paint (LBP), polychlorinated biphenyl- (PCB-) containing light fixtures, and mercury vapor-containing light bulbs were identified in the Locomotive House. The planned action to address these issues includes the abatement of asbestos and the removal of the light fixtures and bulbs. A certified asbestos contractor will remove, handle, and dispose the asbestos in accordance with State and Federal regulatory requirements. The light fixtures and bulbs will also be removed and disposed in accordance with regulatory requirements.

Following removal of the regulated building materials, the building will be demolished.

10.3.9 Decontamination

To prevent cross-contamination to surrounding areas, vehicles (excavators, drill rigs, etc.) and equipment that contact contaminated material will be decontaminated prior to leaving the Site. A decontamination pad will be created on-site and the size will be large enough to accommodate the placement of equipment requiring decontamination.

Water utilized for decontamination will be containerized and handled in the same manner as any construction water, as discussed in Section 10.3.3.

The tracking of site soil/fill onto public streets will not be permitted, and provisions will be made to ensure that any material tracked off-site will be addressed via street-sweeping or other means.

10.3.10 Health and Safety and Community Air Monitoring

Appendix D provides the Site-Specific Community Air Monitoring Plan and Fugitive Dust and Particulate Monitoring Plan that will be utilized during the implementation of the remedy. GRD's radiological air monitoring plan is also included in Appendix D. Appendix E includes LaBella's Health and Safety Plan (HASP) for the project, as well as GRD's HASP regarding radiological monitoring.

10.3.11 Erosion and Dust Controls

As part of the remedial actions to be performed at the Site, measures will be needed to limit erosion and dust generation. Erosion control and dust suppression techniques will be employed as necessary to limit

erosion and fugitive dust generated in disturbed areas during remediation and redevelopment activities. Such techniques may be employed even if the community air monitoring results indicate that particulate levels are below action levels. Techniques may include but are not limited to:

- Using silt fencing, hay bales, and/or mulching
- Applying water on haul roads
- Wetting equipment and excavation surfaces
- Hauling materials in properly tarped or watertight containers
- Limiting vehicle speed on the Site
- Limiting the size of excavations
- Covering excavated areas and materials following excavation

Effectiveness of the dust suppression measures will be evaluated based on the results of the air monitoring that will be conducted under the Site-Specific Community Air Monitoring Plan provided in Appendix D.

10.3.12 Stormwater Management

Stormwater management is an important component of the remedial construction at the Site. Therefore, the following Stormwater Pollution Prevention Plan (SWPPP) was developed to help control runoff and pollutants during remedial construction at the Site. This SWPPP is not intended to address post-development stormwater, as that topic will be addressed during final design of the intermodal transportation facility. However, Figure 6 includes a preliminary, conceptual plan for the construction of the permanent stormwater management system.

The following subsections comprise the SWPPP as it relates to the remedial construction activities, and were developed in general accordance with the NYSDEC's *Instruction Manual for Stormwater Construction Permit*, July 2004. All work will comply with the applicable local, state, and federal regulations, including, but not limited to, the provisions set forth in the NYSDEC SPDES General Permit for Stormwater Discharge GP-02-01.

10.3.12.1 Stormwater Management Objectives

The principal objective of this SWPPP is to comply with the NYSDEC SPDES Stormwater Permit for remedial construction activities by planning and implementing the following practices:

- Reduction and/or elimination of erosion and sediment loading to water bodies during remedial construction
- Maintenance of stormwater controls during remedial construction.

As discussed previously, the stormwater management structures and procedures necessary to address post-remediation stormwater will be addressed during final design of the intermodal transportation facility.

10.3.12.2 Pre-Remediation Conditions

The Site encompasses approximately 15 acres of a larger, former industrial property that is located at 137 47th Street in the City of Niagara Falls. As shown by Figure 2, the Site is occupied by one building that was formerly utilized for the maintenance and repair of locomotives; an inactive rail yard; and concrete floor slabs that are remnants of the former industrial complex. The on-site structure encompasses approximately 13,700 square feet, is not currently utilized, and is in a deteriorated state. The remaining portions of the Site generally consist of aged asphalt, concrete and gravel surfaces with some successional vegetation occurring along the eastern site boundary. Generally, the Site drains from west to east, and ponding is generally absent from the Site.

Recent subsurface investigations indicated that the Site contains an approximate average of four feet of relatively porous fill. In areas not overlain by impervious surfaces, this fill material appears to drain surface water effectively.

10.3.12.3 Proposed (Post-Remedial) Conditions

As shown in Figure 5, the proposed intermodal facility will include the installation of large sections of impervious (asphalt- and concrete-paved) surfaces. Stormwater drainage will be addressed through construction of appropriate facilities designed to handle the 100-year storm. These facilities will include a series large diameter pipes, separators, a drainage swale, and a pump station. Figure 6 shows a preliminary design of the stormwater facilities, although these plans may be modified during final design. Permanent stormwater drainage issues will be addressed during the detailed design stage.

The proposed stormwater drainage system will include one swale that is designed to receive overflow during large storm events. The swale is not designed to act as a bio-filtration system but instead is used for overflow relief during large storm events. Water within the swale will return to the system when surcharge levels in the storm sewer return to previous levels. The swale will be excavated into the fill at the Site, and the soil will be field screened and disposed appropriately off-site. The area of the swale will be covered with a minimum of one foot of imported clean fill.

10.3.12.4 Erosion and Sediment Control

Every effort will be made to minimize erosion and sediment runoff during remedial construction. Measures described in Section 10.3.12 will be implemented to control the migration of sediment from the Site.

10.3.12.5 Water Quantity and Quality Control

The permanent water quantity and quality controls will be addressed during detailed design in accordance with all applicable regulations.

10.3.13 Site Control

Site control is an important aspect of this remedial program. In order to safeguard the health and safety of site workers and the general public, access to all remedial work areas will be restricted. Existing perimeter

fencing and security/surveillance will facilitate site control. Additionally, temporary construction fencing will be erected around accessible excavations and staging areas to prevent unauthorized personnel from entering these areas as appropriate.

10.3.14 Site Management Plan/Institutional Controls

A Site Management Plan (SMP) coupled with Institutional Controls will be developed for the entire Site. The intent of this document will be to manage any soil impacts remaining at the Site at levels above the Part 375-6 Unrestricted Use SCOs and to restrict groundwater use at the Site. This document will be developed and submitted for regulatory approval during the course of the remedial activities.

The SMP will include the following:

- Identification of specific areas of residual impacted fill that remain on-site and illustrate these areas on mapping.
- A Soil/Fill Management Plan that identifies proper handling, characterization, transportation and disposal requirements for the various impacted material should such material be encountered during any site redevelopment or future construction activities (e.g., underground utility work). This Soil/Fill Management plan will include provisions for radiological monitoring as well as other monitoring that may be appropriate for the Site.
- An Operation, Maintenance and Monitoring (OM&M) Plan for the Site that includes the requirements for cover system monitoring, as appropriate.
- Indicate that groundwater cannot be used as a source of drinking water or extracted for any reason without prior approval from regulatory agencies.
- Indicate that the above Site use and groundwater use restrictions are part of an environmental easement and will include a copy of the easement.
- Indicate that these measures are included on the deed (i.e., deed restrictions) and that these restrictions are recorded with the Niagara County Clerk.
- Indicate that an annual certification be submitted to NYSDEC certifying that the requirements of the SMP were adhered to.
- The environmental easement that indicates the above requirements and the SMP will be recorded with the Niagara County Clerk and will be provided to NYSDEC prior to finalizing/recording these documents.

11.0 Schedule and Reporting

Schedule

Implementation of the RAWP is scheduled to begin within 30 days of NYSDEC approval of this work plan. The work will be completed in accordance with the schedule shown on Figure 10.

Periodic Reporting

Following initiation of the remedial efforts, periodic job progress meeting will be held at the Site until the completion of the remedial work. In addition, monthly progress reports will be submitted in accordance with the BCP agreement until the Certificate of Completion is issued.

Site Management Plan/Institutional Controls

The draft SMP and deed restrictions to be recorded with the Clerk will be submitted to the NYSDEC within one month of initiating remedial construction.

Final Engineering Report

The information and laboratory analytical data obtained during the remedy will be included in the FER. The FER will be completed in accordance with DER-10.

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TABLE 1
REMEDIAL COST ESTIMATE
Select Fill Removal and Cover System Installation
15-Acre Praxair Site

Item	Estimated Quantity	Unit Cost	Estimated Total
Select Fill Removal and Placement of Cover			
Clearing and Grubbing	6 acres	$10,000 acre	$60,000
Removing Existing Ties[2]	1 LS	$100,000 LS	$100,000
Mill Asphalt Pavement, Stockpile and Lay Down	25,000 SF	$1 SF	$25,000
Cracking & Seating of Concrete	1 LS	$10,000 LS	$10,000
Removal and Disposal of Unsuitable Material (Woodchips)	4,000 CY	$10 CY	$40,000
Concrete Pavement (20' west of Track 1 and Storage area)	45,000 SF	$8 SF	$337,500
Asphalt Pavement	186,000 SF	$6 SF	$1,116,000
Gravel Drives	67,000 SF	$3 SF	$201,000
Import Topsoil	3,400 CY	$40	$136,000
Establish Field Mix Turf	2 acres	$3,000	$6,000
Erosion Control	1 LS	$20,000 LS	$20,000
Ballast in Track	9,300 TF	$30 TF	$279,000
Concrete Pavement (inside rail section - 8" in depth)	80,000 SF	$8 SF	$600,000
Ballast for Turnouts	11 each	$5,000 each	$55,000
Monitoring Station	1 LS	$28,500 LS	$28,500
144" Dia. Sewer	275 LF	$1,200 LF	$330,000
6" Dia. Sewer	10 LF	$85 LF	$850
24" Dia. Sewer	1,325 LF	$110 LF	$145,750
36" Dia. Sewer	750 LF	$140 LF	$105,000
Combined Sewer Connection	1 LS	$15,000 LS	$15,000
5' Dia, Manhole	6 EA	$6,600 EA	$39,600
6' Dia. Manhole	1 EA	$9,600 EA	$9,600
8' Vortex Separator	1 EA	$71,800 EA	$71,800
12' Vortex Separator	1 EA	$102,100 EA	$102,100
Trench Drain	2,450 LF	$200 LF	$490,000
4" Underdrain (with sock and stone)	5,150 LF	$30 LF	$154,500
Detention Basin	5,850 CY	$20 CY	$117,000
4' MH	16 EA	$5,500 EA	$88,000
Cleanouts	16 EA	$1,000 EA	$16,000
Catch Basins	5 EA	$5,000 EA	$25,000
12-inch RCP Pipe	750 LF	$100 LF	$75,000
		Fill Removal Subtotal:	$4,799,200
Transportation, Disposal, Testing, and Monitoring			
Transportation and Off-Site Disposal - Rail Yard Fill[5]	2,900 tons	$60 /ton	$174,000
Transportation and Off-Site Disposal - Non-rad[6]	3,450 tons	$60 /ton	$207,000
Transportation and Off-Site Disposal - Rad[6,7]	1,750 tons	$275 /ton	$481,250
Handling and On-site Placement of Clean, Native Soil[8]	5,250 tons	$20 /ton	$105,000
Radiological Monitoring	50 days	$800 /day	$40,000
Characterization Analysis	16 samples	$800 /sample	$12,800
Disposal of water[9]	100,000 gallons	$0.10 /gallon	$10,000
Frac Tank Mobilization/Demob. & Cleaning	5 lump sum	$1,500 each	$7,500
Frac Tank Rental[10]	250 days	$50 /day	$12,500
		Transportation, Disposal, Testing, and Monitoring Subtotal:	*$1,050,050*
Fill Removal and off-site Disposal - Locomotive House Area			
Petroleum-Contam. Fill: Excav. and Transport to Adjacent Facility	7,200 tons	$20 ton	$144,000
Fill Generated During Installation of Utilities to Service New Building	100 tons	$20 ton	$2,000
Off-site Disposal[11]	7,300 tons	$0 ton	$0
Clean Backfill for Petroleum Excavation	7,200 tons	$15 ton	$108,000
		Fill Removal Subtotal:	$254,000
Environmental Easement and Site Management Plan			
Placement of Environmental Easement	1 each	$15,000 each	$15,000
Preparation of OM&M Plan	1 each	$10,000 each	$10,000
		EE and SMP Subtotal:	*$25,000*
		Subtotal:	**$6,128,250**
Taxes (8%)			$467,940
Engineering Fees (10%)			$612,825
Contingency (20%)			$1,319,238
		Estimated Total Cost	**$8,528,253**

Notes/Assumptions:
1. Rail cost estimates from Lee Fulton & Associates
2. Assumes ties can be incinerated at adjacent Covanta facility.
3. Stormwater improvement cost estimates from AECOM
4. Cost estimates includes excavation, labor, backfill materials (piping, equipment, stone, etc.)
5. Assumes off-site disposal of 60% of the material in the top 8 inches of material over the 4.5 acre existing rail yard
6. Assumes all fill is non-hazardous
7. Assumes disposal in Michigan
8. Assumes native material can be re-used on-site and average fill depth of five feet, plus off-site disposal of top six inches of native material
9. Containerized water can be discharged to the ground surface or the adjacent Covanta facility
10. Assumes 5 tanks for 50 working days
11. Assumes that the petroleum-contaminated fill can be incinerated at the adjacent Covanta facility.

TABLE 2
REMEDIAL COST ESTIMATE
Complete Fill Removal
15-Acre Praxair Site

Item	Estimated Quantity		Unit Cost		Estimated Total
Complete Fill Removal					
Excavation of Fill[1]	196,543	tons	$10	/ton	$1,965,427
Transportation and Off-Site Disposal - Radiological Fill[2]	7,149	tons	$275	/ton	$1,965,975
Transportation and Off-Site Disposal - Non-Radiological Fill[2]	189,394	tons	$60	/ton	$11,363,623
Radiological Monitoring	125	days	$800	/day	$100,000
Importation, Placement & Compaction Exc. Backfill	196,543	tons	$18	/ton	$3,537,769
Frac Tank Mobilization/Demob. & Cleaning	5	lump sum	$1,500	each	$7,500
Frac Tank Rental[3]	600	days	$50	/day	$30,000
Disposal of Water[4]	1,000,000	gallons	$0.10	/gallon	$100,000
			Fill Removal Subtotal:		*$19,070,294*
			Subtotal:		**$19,070,294**
Taxes (8%)					$1,525,624
Engineering Fees (10%)					$1,907,029
Contingency (20%)					$4,119,184
			Estimated Total Cost		**$26,622,131**

Notes/Assumptions:
1. Average fill depth is five feet across the Site
2. All fill is non-hazardous
3. Use of 5 tanks for six months
4. Containerized water can be discharged to the adjacent Covanta facility

TABLE 3
REMEDIAL COST ESTIMATE
Pits and Sumps - Impacted Water Removal and Closure
15-Acre Praxair Site

Item	Estimated Quantity	Unit Cost	Estimated Total
Water Removal and Decommissioning of Historic Sewer System			
Video Inspection	1 each	$10,000 each	$10,000
Closure of Sewer Manholes 1 and 3 - Concrete[1]	20 CY	$100 /CY	$2,000
Frac Tank Mobilization/Demob. & Cleaning	3 each	$1,500 each	$4,500
Frac Tank Rental[2]	30 days	$50 /day/tank	$1,500
Labor - Water Removal/Disposal	5 days	$1,000 /day	$5,000
Closure of Sewer - Flowable fill[3]	116.4 CY	$80 CY	$9,308
Disposal of Water[4]	23,499 gallons	$0.10 /gallon	$2,350
		Water Removal/Sewer Closure Subtotal:	*$34,658*
Water Removal - Pit[5]			
Water Removal	1 days	$1,000 /day	$1,000
Disposal of water[4]	7,330 gal	$0.10 /gal	$733
Importation, Placement & Compaction of Backfill	58.8 tons	$20 /ton	$1,176
		Water Removal/Pit Closure Subtotal:	*$2,909*
		Subtotal:	**$37,567**
Taxes (8%)			$3,005
Engineering Fees (10%)			$3,757
Contingency (20%)			$8,115
		Estimated Total Cost	**$52,444**

Assumptions:
1. 10 CY fill per manhole (2 manholes)
2. 3 tanks for two weeks
3. Assumes 250 linear feet of 4-foot diameter sewer piping
4. Containerized water can be discharged to the adjacent Covanta facility
5. Water removal for both tasks will occur consecutively, and tanks can be used for both tasks

TABLE 4
REMEDIAL COST ESTIMATE
Regulated Building Materials Removal and Demolition
15-Acre Praxair Site

Item	Estimated Quantity	Unit Cost	Estimated Total
Regulated Building Materials Removal - Interior			
Transite Electrical Panel	3 each	$30 each	$90
Black Pier Packing (may need excavator or tents)	50 SF	$40 /SF	$2,000
Light Fixture Gaskets	54 each	$25 /day	$1,350
		Interior Removal Subtotal:	*$3,440*
Regulated Building Materials Removal - Exterior			
Built-Up Roof	7,500 SF	$5 /SF	$37,500
Grey Roof Cement	280 SF	$5 /SF	$1,400
Black Caulk	10 LF	$10 /LF	$100
Grey Window Caulk	125.0 LF	$10 /LF	$1,250
		Exterior Removal Subtotal:	*$40,250*
Asbetos Project Air/Project Monitor			
Asbetos Project Air/Project Monitor	3 days	$425 /day	$1,275
		Asbestos Monitor Subtotal:	*$1,275*
Building Demolition			
Building Demolition	1 each	$94,500 /each	$94,500
		Building Demolition Subtotal:	*$94,500*
		Subtotal:	**$139,465**
Taxes (8%)			$11,157
Engineering Fees (15%)			$20,920
Contingency (20%)			$30,124
		Estimated Total Cost	**$201,666**