Analysis of Brownfield Cleanup Alternatives

Former Federated Metals Facility
Parcel A
300 Enterprise Avenue
Trenton, New Jersey
Block 23102, Lot 9

Prepared by BRS, Inc. for the City of Trenton

CONTENTS

ATTACHMENTS

1. INTRODUCTION

The City of Trenton (the City) has committed to preparing the former Federated Metals Facility (the Site) located at 300 Enterprise Avenue, Trenton, New Jersey for redevelopment and reuse.

The Site is part of a larger redevelopment project, which is a major effort by the City to acquire, assess, and remediate properties and transform them into useful properties for the community. The identification and remediation of environmental issues is a key factor in preparing the Site for reuse.

This Analysis of Brownfields Cleanup Alternatives (ABCA) was prepared by BRS, Inc. for the City. The purpose of the ABCA is to:

- Identify reasonable brownfields cleanup alternatives considered for addressing the contamination identified at the Site;
- Analyze the various factors influencing the selection of a preferred cleanup method, including effectiveness, ability to implement, sustainability, and costs;
- Select the preferred cleanup method, based on the analyses performed; and
- Provide information regarding remedial alternatives prior to the final selection of a remedial plan.

The City will promote and facilitate community involvement with the environmental cleanup and Site redevelopment project with the activities itemized below. The City will:

- perform targeted outreach to notify communities of the availability of this ABCA. This includes fulfillment of the New Jersey Department of Environmental Protection community notification requirements (N.J.A.C. 7:26E-1.4);
- publish a notice of availability of this ABCA in one or more major local newspapers with general circulation in the target community;
- provide opportunities for members of the public to comment, in various venues and formats, on the ABCA. Additional details regarding the public notification process will be presented in a Community Relations Plan to be prepared for the Site; and
- prepare written responses to the comments received and document any changes made to the cleanup plans and to the ABCA as a result of the comments.

A Brownfields Cleanup Decision Memo (Decision Memo) will be prepared at the end of the public comment process, which will describe the cleanup options selected by the City. The ABCA and the Decision Memo will be included with the Administrative Record.

The Administrative Record repository is available for review by appointment during business hours, Monday through Friday, between 8:30 a.m. to 4:30 p.m. and is located at:

Department of Housing and Economic Development
City of Trenton – City Hall, 3rd Floor
319 East State Street
Phone 609-989-3518

To schedule an appointment to review the file, contact Mr. J.R. Capasso, Brownfields Coordinator, at 609-989-3501.

The expected outcome of the project is the receipt of a Remedial Action Outcome (RAO) from a Licensed Site Remediation Professional (LSRP).

1.1 SITE DESCRIPTION AND LOCATION

The former Federated Metals Facility is located at 300 Enterprise Avenue in Trenton, Mercer County, New Jersey (the Site). The Site location is depicted on Figure 1 (U.S. Geological Survey Location Map). The Site is approximately 1.1 acres in area (triangular shaped) and it is identified on the City of Trenton tax maps as Block 23102, Lot 9. A location map of the Site is provided in Attachment A.

The Site was divided into two (2) individual opposing parcels of land on the southeast and northwest sides of Enterprise Avenue, known as Parcel A and Parcel B. The Site, which is the subject of this ABCA, is also referred to as Parcel A, and is referenced on the Tax Maps, City of Trenton, sheets 230 and 231.

The surface elevation at the Site ranges from approximately 48 feet above mean sea level (msl) and slopes very gently downwards to the southeast to approximately 47 feet above msl. The nearest surface water body is the Assunpink Creek, which is located approximately 200 feet to the southeast of the Site. The Site is currently vacant and surrounded by a six foot chain link fence.

1.2 SITE HISTORY

The Site was utilized primarily by Federated Metals Corporation and American Smelting & Refining Company for the refining of secondary metals to produce metallic zinc dust from approximately 1925 until operations were ceased in August 1980. The buildings were demolished in April 1995 and the lot was subsequently used for the collection and storage of demolition and construction debris until 2002, after which the lot remained undeveloped and vacant. Outside of the excavation area (discussed below), the Site is covered with a thick concrete slab.

In 1989, a 1,000-gallon gasoline UST (AOC-2) and 500-gallone kerosene UST (AOC-3) were removed from the site and did not present evidence of a release. In addition, soil within AOC-5 (where a UST was suspected) was investigated, however no evidence of a tank or oil impacts were encountered.

In 2014, removal of more than 260 tons of PCB impacted soil associated with the former electrical transformers at the Site were excavated and disposed off-site. In addition, two adjacent 20,000-gallon petroleum USTs (AOC-1), a 15,000-gallon UST (AOC-4) and a 20,000-gallon heating oil UST (AOC-12) were removed from the site. Each of the four tanks presented evidence of a release. The tanks in AOC-1 were situated within subgrade concrete vaults which were not removed. However, the impacts from AOC-4 and AOC-12 commingled into a single plume of impacted soil, from which approximately 2,500 tons were excavated and disposed off-site. During the excavation, over 36,000 gallons of petroleum impacted groundwater were evacuated from the remedial cavity and disposed off-site. An additional approximately 4,100 gallons of LNAPL and impacted groundwater was subsequently evacuated from recovery wells and disposed off-site.

These efforts did not fully remediate the impacts, so additional remedial investigation was subsequently performed. This document addresses the cleanup options available to continue remediation of the heating oil impacted soil and groundwater.

1.3 SURROUNDING LAND USE(S)

The Site is located in a heavily urbanized, densely developed section of Trenton, New Jersey and is characterized by mixed residential, commercial and industrial land usage.

The Site is surrounded by the following land uses:

- to the southwest by former Wenczel Tile facility
- to the northwest by Trenton Iron and Metals facility; and
- to the northeast by the former Cordey China facility.

1.4 FUTURE LAND USE CONSIDERATIONS

The Site is adjacent to the Conrail line that crosses Enterprise Avenue, and the site itself straddles Enterprise Avenue. Adjacent to the Assunpink Creek, a heavily contaminated small triangle of property hugs a newly constructed public trail, which separates the Site from a shovel-ready industrial site. However, due to Site layout constraints and lack of rail access into the property, the City has not yet identified a suitable developer for the entire site. Remediating the environmental impact present at Parcel A will allow for additional acreage to be added to the Enterprise Avenue site, and will allow for the existing rail spur to

be brought onto the Enterprise property, thus making the entire site more marketable for commercial and light industrial purposes.

2 SITE ENVIRONMENTAL CONDITIONS

2.1 IDENTIFICATION OF CONTAMINANTS AND CONTAMINANT SOURCES

Several investigations of Site environmental conditions have identified the following contaminants of concern in soil and/or groundwater.

Contaminants (Soil)	Contaminants (Groundwater)
EPH (Petroleum)	
VOCs: Benzene	VOCs: Benzene
Semi-VOCs: Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Dibenzo(a,h)anthracene	Semi-VOCs: Benzo(a)anthracene Benzo(a)pyrene bis(2-Ethylhexyl)phthalate
Metals: Arsenic Lead	Metals: Arsenic Lead

2.1.1 Phase I Environmental Assessment (ESA)/ Preliminary Assessment (PA) – Ransom Environmental

The Phase I ESA/PA, conducted by Ransom Environmental, identified several recognized environmental conditions (RECs) at the Site, which are depicted in Attachment B and described below:

REC	AOC*	Description	Location
REC 1A	1	Former two 20,000-gallon oil USTs	Northern portion
REC 1B	2	Former 1,000-gallon gasoline UST	Northern portion, near main gate
REC 1C	3	Former 500-gallon kerosene UST	Northern portion, near main gate

REC 1D	4	Former 15,000-gallon heating oil UST	Central portion
REC 1E	5	Suspected oil tank	Eastern corner
REC 1F	6	Former oil pump and No. 6 oil tank	Northern portion
REC 2A	7	Former electrical transformers	Northern portion
REC 2B	8	Former four electrical transformers	South-central portion
REC 3	10	Stormwater outfall	Eastern corner
REC 4	11	Historical metal refining - Site wide investigation	Entire site

* AOCs designation number during the Site Investigation, and subsequently renamed as Recognized Environmental Concerns (REC).

Based on the findings during the Phase I ESA/PA, the collection of soil borings and groundwater samples in the area of the RECs were recommended in accordance with the NJDEP Technical Requirements for Site Remediation.

2.1.2 Site Investigation (SI) – EnviroSure, Inc.

The 2008 Site Investigation (SI) conducted by EnviroSure, Inc. consisted of a geophysical survey, a test pit investigation, and collection of soil samples from RECs. A total of 56 soil samples were collected from locations throughout the Site.

Based on the findings of the SI, no additional investigations were recommended for the following RECs/AOCs:

- AOC 2 (former 1,000-gallon gasoline UST);
- AOC 3 (former 500-gallon kerosene UST);
- AOC 5 (Suspected Oil Tank); and
- AOC 9 (former railroad scale).

Based on the findings of the SI, the following additional investigations were recommended:

- AOC 1 (Former Two 20,000-Gallon Oil USTs) – delineation of petroleum impacted soil and groundwater;
- AOC 4 (Former 15,000-Gallon Oil UST) - delineation of petroleum impacted soil and groundwater;

- AOC 6 (Former Oil Pump Stand and Tank) - delineation of petroleum impacted soil and groundwater;
- AOC 7 (Former Electrical Transformers) - delineation of PCB impacted soil;
- AOC 8 (Former Four Electrical Transformers) - delineation of PCB impacted soil
- AOC 10 (Stormwater Outfall) – evaluation of historical fill material and what, if any, impact there is to the surface water;
- AOC 11 (Parcel A Site-Wide Investigation) – placement of engineering control (i.e., cap) and/or institutional controls (i.e., deed notice); and
- AOC 12 (Parcel B Site-Wide Investigation) - placement of engineering control (i.e., cap) and/or institutional controls (i.e., deed notice).

2.1.3 Remedial Investigation and Remedial Action Report – USA Environmental Management, Inc.

The remedial investigations started on April 10, 2014, and consisted of petroleum tank removals, soil investigation and groundwater investigation. Based on the findings of the remedial investigation and remedial actions conducted at the site, USA Environmental Management recommended additional remedial investigations and/or remedial actions as outlined below.

- AOC 1 (Former Two (2) 20,000-Gallon Heating Oil USTs) – collection and analysis of soil borings for EPH, including the analysis of twenty five percent of the samples with EPH results above 1,000 mg/kg for 2-Methylnaphthalene and Naphthalene, and twenty five percent of the samples with EPH results above 100 mg/kg for PAH;
- AOC 4 (Former One (1) 15,000-Gallon Heating Oil UST) – collection and analysis of soil borings for EPH, including the analysis of twenty five percent of the samples with EPH results above 1,000 mg/kg for 2-Methylnaphthalene and Naphthalene, and twenty five percent of the samples with EPH results above 100 mg/kg for PAH;
- AOC 6 (Former Oil Pump Stand and Tank) - collection and analysis of soil borings for EPH, including the analysis of twenty five percent of the samples with EPH results above 1,000 mg/kg for 2-Methylnaphthalene and Naphthalene, and twenty five percent of the samples with EPH results above 100 mg/kg for PAH;
- AOC 10 (Storm Water Outfall) - placement of engineering control (i.e., cap) and/or institutional controls (i.e., deed notice);
- AOC 11 (Site-Wide Soils) – delineation of EPH in soil, and the placement of engineering control (i.e., cap) and/or institutional controls (i.e., deed notice);

- AOC 12 (One (1) 20,000-Gallon Heating Oil UST) - collection and analysis of soil borings for EPH, including the analysis of twenty five percent of the samples with EPH results above 1,000 mg/kg for 2-Methylnaphthalene and Naphthalene, and twenty five percent of the samples with EPH results above 100 mg/kg for PAH; and
- AOC 13 (Site-Wide Groundwater) – installation of groundwater monitoring well, and groundwater samples analysis for VOCs, Semi-VOCs, and Metals. Recovery of impacted groundwater.

No additional investigations and/or remedial actions were recommended for the following RECs/AOCs, and the City will seek an Unrestricted Use Response Action Outcome (RAO) for these RECs/AOCs.

- AOC 2 (former 1,000-gallon gasoline UST);
- AOC 3 (former 500-gallon kerosene UST);
- AOC 5 (Suspected Oil Tank);
- AOC 7 (Northern Electrical Transformers);
- AOC 8 (Four Electrical Transformers); and
- AOC 9 (former railroad scale).

2.1.4 Interim Remedial Measures

Interim Remedial Measures (IRMs) were conducted at the Site, and included:

- removal of two (2) 20,000-gallon heating oil underground storage tanks (UST), one (1) 1,000-gallon gasoline UST, one (1) 500-gallon kerosene UST, and one (1) 15,000-gallon heating oil UST;
- excavation and disposal of approximately 2,500 tons of contaminated soils and material encountered during UST removal activities;
- disposal of more than 36,000 gallons of petroleum impacted groundwater encountered during UST removal activities;
- removal of approximately 4,100 gallons of petroleum sheen and impacted groundwater during groundwater recovery events;
- removal of more than 260 tons of PCB impacted soil associated with the former electrical transformers at the Site.

2.2 PHYSICAL SETTING

The bedrock beneath the Site consists of fine to medium grained biotite-quartz-plagioclase schist and gneiss of Lower Cambrian and Late Proterozoic age, also known as the Wissahickon Formation. The rocks are at high metamorphic grade, and, in places, the more pelitic parts have partly melted forming veinitic migmatites. Some exposures show evidence of polymetamorphism as micaceous minerals occur both within the schistosity and as static porphyroblasts (Owens, J.P., et al.; 1998). Overlying the bedrock formation, the alluvial deposits of Holocene and late Pleistocene age consist of sand, gravel and silt with traces of clay and organic material of approximately 20 feet thick in the area.

During recent investigations, historic fill materials were encountered at the Site below surface concrete slabs to a maximum depth of 9 feet below surface. The fill materials consisted of silt, gravel, cinders, ashes, and pieces of brick and rock. Weathered bedrock was encountered at Site at depths ranging from 22 feet to 29 feet below ground surface (ft bgs).

Groundwater in the crystalline rocks occurs in a network of interconnected openings formed along joints and fractures. The openings, which contain groundwater, decrease in size and number with increasing depth below land surface. Domestic wells tapping the joints and fissures in the crystalline rocks may be expected to yield about 10 gallons per minute (gpm) from a depth of about 120 feet (Widmer 1965). Potable water in the area is provided by the Trenton Water Works, which obtains water from surface water sources.

Groundwater also occurs, in lesser quantities and under water table conditions, in the unconsolidated materials. Four monitoring wells and two recovery wells were installed in this shallow zone as part of this site investigation. In addition, groundwater was encountered in several soil borings advanced at the Site. The shallow water table in the overburden formation was encountered at depths ranging from approximately 7 to 10 ft bgs. Based on water level measurements obtained from monitoring and recovery wells, the direction of the shallow groundwater flow at the Site is generally to the south/southeast towards the Assunpink Creek.

2.3 EXPOSURE PATHWAYS

Contaminants of Potential Ecological Concern (COPECs) in soil and/or groundwater at the Site and detected at concentrations exceeding the NJDEP standards include: Benzene, EPH, Semi-VOCs, and Metals.

In order for contaminants from a site to pose a human health or environmental risk, one or more completed exposure pathway(s) must link the contaminant to a receptor (human or ecological). A completed exposure pathway consists of four elements:

- A source and mechanism of substance release;
- A transport medium;
- A point of potential human or ecological contact with the substance ("exposure point"); and
- An "exposure route", such as dermal contact, ingestion, etc.

Preliminary evaluation indicates the following potentially completed exposure pathways related to the site in its current condition (i.e., pre-remediation):

1. Direct contact with Soil. Contaminated soil may be handled by on-site construction workers or trespassers. These individuals would have potential exposure to site contaminants via dermal sorption, ingestion, and/or inhalation (dust and particulate matter). This exposure pathway will be mitigated immediately by implementation of the proposed cleanup activities, which includes excavation and offsite disposal of the source area contaminated soils. Residual risk related to this pathway will be evaluated upon completion of the cleanup, and may be managed, if needed, with on-site engineering and/or institutional controls.

2. Direct Contact with, or Ingestion of, Groundwater. Potable water is supplied to the site by the Trenton Water Works, which obtains water from surface water sources. There are no anticipated future uses of onsite groundwater.

3. Soil Vapor Intrusion. Current use of the site does not include the presence of onsite building structures or occupants. Therefore, vapor intrusion is not a concern at the Site.

3 APPLICABLE LAWS AND CLEANUP STANDARDS

The statutes of the State of New Jersey and the regulations of the New Jersey Department of Environmental Protection, particularly those administered under the Site Remediation Program (SRP) are the primary governing law concerning this project. These laws and regulations include, but are not limited to:

- The Site Remediation Reform Act, N.J.S.A. 58:10C-1 et seq. (SRRA);
- Brownfield and Contaminated Site Remediation Act, N.J.S.A. 58:10B-12;
- Spill Compensation and Control Act, N.J.S.A. 58:10-23.11 et seq.;
- Remediation Standards (N.J.A.C. 7:26D);
- Administrative Requirements for the Remediation of Contaminated Sites (ARRCS, N.J.A.C. 7:26C-3.3);
- Presumptive and Alternate Remedy Guidance Technical Guidance Document;

- Technical Requirements For Site Remediation (N.J.A.C. 7:26E;
- NJDEP Field Sampling Procedures Manual (August 2005); and
- Any applicable NJDEP Guidance Documents, including those addressing, Technical, Financial, Administrative, and Permits issues.

The reference remediation standards for soil will be NJDEP's published numeric values for:

- Non-Residential Direct Contact Soil Remediation Standards (NRDCSRS);
- Residential Direct Contact Soil Remediation Standards (RDCSRS); and
- Impact to Groundwater Soil Remediation Standard (IGWSRS).

The reference remediation standards for groundwater will be:

- Class II-A Groundwater Quality Criteria (GWQC) published in Groundwater Quality Standards (N.J.A.C 7:9C).

The effective implementation of the applicable laws and guidance will be managed and overseen by a New Jersey-Licensed Site Remediation Professional (LSRP), to be retained for the Site by the City. Upon completion of the remedial action, the Site will receive a Remedial Action Outcome document (RAO), indicating that the risk based standards set out by the State have been met. An LSRP has the authority to issue Response Action Outcomes (RAOs) for the entire Site or for particular AOCs. RAOs are equivalent to letters of No Further Action (NFA) issued by State authorities. Project reports, RAOs, and applicable deliverables will be submitted on behalf of the City to the NJDEP, which retains the authority to audit the project and/or review and potentially reject any documents submitted.

4 EVALUATION OF CLEANUP ALTERNATIVES

This section identifies various remediation alternatives that were considered to address the environmental contamination issues at the Site. The following potential remediation alternatives were considered:

- No Action
- Targeted Soil Excavation with Engineered Barriers
- Complete Soil Excavation and Off-Site Landfill Disposal

The following evaluation criteria were considered in comparing the remedial alternatives.

1. Threshold Criteria: This criterion evaluates 1) overall protection of human health and the environment and 2) compliance with NJDEP regulations and project cleanup goals.

2. Technical Criteria: These criteria form the basis of the detailed alternatives analysis and include:

   - *Long-term effectiveness and permanence* taking into account the magnitude of the residual risk and the adequacy and reliability of controls.
   - *Pollutant reduction* including the toxicity, mobility, or volume of the pollutant(s) through treatment.
   - *Short-term effectiveness* including protection of the community and workers during remediation, environmental impacts of the remediation process, and the time until the final remediation is achieved.
   - *Implementability* including the ability to construct and operate the remedial technology, the reliability of the technology, ability to monitor the effectiveness of the remedy, ability to coordinate approvals from other agencies and the availability of services and materials.
   - *Cost* including capital expenditures, operations and maintenance.
   - *Sustainability* including the degree to which the remedial alternative may reduce greenhouse gas discharges, reduce energy use, employ alternative energy sources, reduce volume of wastewater to be disposed, reduce volume of materials to taken to a landfill, and/or allow for the reuse or recycling of materials during cleanup is considered, where applicable.

3. Acceptance Criteria: This criterion includes acceptance and support by the State regulatory agency, NJDEP, and the community. These last two criteria are assessed formally after the public comment period, although to the extent they are known, they are factored into the identification of the preferred alternative.

4.1 CLEANUP ALTERNATIVES

Alternative # 1 – No Action

This alternative would involve no remedial activities at the site, leaving it in its current condition. This remedial alternative does not entail any measures to control exposure to the contaminants of concern at the Site. The contaminants may continue to pose risks to human health and the environment. This would be unacceptable from a public health standpoint and also not permissible under the remediation requirements and remediation timeframes of the New Jersey Department of Environmental Protection (NJDEP). Remediation of the site to standards fitting its reuse must be completed for redevelopment of the project to continue. For these reasons this alternative is rejected.

Alternative # 2 – Targeted Soil Excavation with Engineered Barriers

The planned future use of the site includes the expansion of the existing light industrial and commercial use in the area. Prior remedial efforts resulted in the excavation of approximately 2,500 tons of heating oil impacted soil, however additional remediation is required to achieve appropriate NJDEP standards. In this case, a program of "targeted" soil excavation meant to address the most serious areas of petroleum contamination at the site can be a cost effective means to complete the remediation. Once the horizontal and vertical extents of the contamination is known, a Licensed Site Remediation Professional (LSRP) will use engineering calculations and NJDEP remediation standards to precisely calculate the location and volume of subsurface soil that must be removed to be protective of future residents of the site, the surrounding community and the environment.

As some residual contamination may remain in the subsurface after remediation, engineering and institutional controls will be used to meet the NJDEP "Restricted-Use" standard. The engineering controls or barriers will include the installation of a site-wide cap/cover and biennial inspections and certifications. Institutional controls will include a Deed Restriction that will notify future owners of the site of the requirements to maintain the engineering control in perpetuity. The proposed site improvements would be used as engineered barriers over impacted soils to address direct contact concerns and may consist of concrete sidewalks and asphalt-paved parking areas with a minimum thickness of 6-inches, or areas of landscaping and lawn with a minimum thickness of 12-inches. In all cases, a visual barrier will demarcate the depth in the soil column where the residual contamination is located. Engineering control materials are required to be of sufficient strength to maintain cap effectiveness and integrity throughout the duration of the institutional control to protect against human exposure, infiltration, and erosion.

During and after the prior remediation activities, LNAPL and petroleum sheen were observed on the water table. As a result, further investigation may be required prior to final remediation of groundwater. This work includes collection and analysis of groundwater from 2 of the 4 on-site monitoring well. It is assumed, however, that groundwater will be remediated through a combination of contaminant source removal (i.e. petroleum contaminated soil), excavation dewatering, and establishment of a Groundwater Classification Exception Area (CEA) as a long-term institutional control. A CEA will be established by the New Jersey Department of Environmental Protection (NJDEP) in order to notify potential users that the constituent standards for a given aquifer classification are not, or will not, be met in a localized area, and that designated aquifer uses are suspended in the affected area for the term of the CEA. The intent of such action by NJDEP is to ensure that the uses of the aquifer are restricted until standards are achieved.

Alternative # 3 – Complete Soil Excavation and Off-Site Disposal

This alternative includes the excavation and off-site disposal of all impacted soil at an off-site landfill. Impacted soil would be excavated, temporarily stockpiled if necessary, loaded into trucks, and transported to a licensed disposal facility. Groundwater would be removed from the excavation cavity and disposed off-site. Backfill from off-site sources would be brought into the site to raise the grade following removal of impacted soils. This alternative is expected to result in an unrestricted use closure.

4.2 EVALUATION OF CLEANUP ALTERNATIVES

1. Threshold Criteria: Both of the feasible alternatives (Alternative # 2 and Alternative # 3) provide overall protection of human health and the environment, though by different means. Alternative #2, through the use of targeted excavation, removes the highest concentration and most highly mobile petroleum hydrocarbons in the subsurface. This alternative significantly reduces the risk of migration of the contamination to potential receptors above or below the surface, despite residual contamination remaining in place. This alternative would result in a "Restricted-Use" closure since it eliminates the potential migration of contamination to receptors by including the use of engineering and institutional controls. Alternative #3, through excavation and off-site disposal of all contaminated media, completely eliminates any future risk of migration of contamination to potential receptors and therefore would result in an "Unrestricted-Use" closure.
2. Technical Criteria:

    - *Long-term effectiveness and permanence*. Alternative #2 leaves in place a minimal amount of contamination that will be prevented in the long term from migrating to potential receptors by the use of engineering and institutional controls. The engineered barrier will be maintained in perpetuity through the requirement for biennial inspections and certifications and all future owners or users of the property may be informed of the presence of contamination and controls through use of the Deed Restriction. Alterative # 3 achieves long-term effectiveness by completely removing all contaminated media from the site thereby eliminating the risk of future migration of contamination to potential receptors.
    - *Reduction of toxicity, mobility, or volume through treatment*. Alternative #2 and Alternative #3 both entails removing contaminated soil. If necessary, and under both Alternative #2 and Alternative #3, some post-excavation groundwater treatment may be conducted to further reduce the volume and mobility of residual groundwater contamination.

- *Short-term effectiveness*. During excavation and removal of soil from the site, measures will be taken to protect the workers and the surrounding community from exposure to fugitive contaminated dust particles. Trucks and heavy equipment leaving the site will be washed on site to remove gross contamination from the tires and body of the vehicle to avoid transporting contaminated media off site. The work required to complete the remedial action is relatively quick and will not present a long-term risk to the community during the remedial process.
- *Implementability*. The technology necessary to excavate and haul away the contaminated soil and construct the final engineered barriers is very commonly used and well understood by remediation engineers and contractors that will work on the site. The effectiveness of the remediation may be verified by confirmatory sampling to be conducted at the excavation limits to ensure that the residual contamination meets remediation criteria established by the LSRP. Alternative #3 may take longer to implement due to the increased volumes of petroleum contaminated soil that would be removed and backfill emplaced at the site.
- *Cost*. The means and methods of Alternatives #2 and #3 are similar. The most significant factor driving the cost difference is the volume of contaminated soil that would be removed. Alternative #2 proposes to excavate and dispose of 1,000 tons of contaminated soil and implement institutional and engineering controls to manage the residual contamination. Alternative #3 proposes to excavate and dispose of 30,000 tons of contaminated soil, and is expected to remove all residual contamination. The estimated cost to excavate and dispose of soil is approximately $82/ton. As a result, excavation and disposal costs for Alternative #2 may total $82,000, while those costs for Alternative #3 may total $2,460,000.

  Additional costs (i.e., other than excavation and disposal) associated with Alternative #2 are estimated to be approximately $158,000, and include but are not limited to: mobilization, site preparation, concrete demolition, dewatering activities, post-excavation soil sampling, backfill/compaction, stone cap construction and grading, top soil and seed, and interim groundwater remediation and/or LNAPL removal.

  Additional costs (i.e., other than excavation and disposal) associated with Alternative #3 are estimated to be approximately $266,800, and include but are not limited to: mobilization, site preparation, concrete demolition, dewatering activities, and backfill/compaction.

  In summary, the total cost for each Alternative follows:

- Alternative #1: None.
- Alternative #2: $240,000
- Alternative #3: $2,726,800

- *Sustainability.* Remediation of a site through soil excavation is an energy intensive process that utilizes diesel-powered heavy equipment including dump trucks and excavators that are fuel-inefficient and create greenhouse gas emissions during their use. Heavy equipment must be used by their owners to pay for the cost of capital of their acquisition and maintenance, therefore it may be assumed that if the equipment is not used to complete the remediation at this site, it will be used in other work. Therefore, there is no net gain or loss of greenhouse gas emissions by this remediation. As Alternative #3 proposes to excavate and dispose of more soil, the potential impact to landfills may be greater. Some sustainable benefits may be achieved by elimination of any active groundwater remediation processes through the substitution of Monitored Natural Attenuation (MNA) in association with a long-term CEA.

3. Acceptance Criteria: As both alternatives meet the two threshold criteria and successfully meet all technical criteria, it is assumed that both alternatives will be met with acceptance by the NJDEP and community.

4.3 PREFERRED ALTERNATIVE

The recommended cleanup alternative for the Site is targeted soil excavation and use of engineering and institutional controls (Alternative #2). This alternative will provide long-term effectiveness, is easily implemented, and will be significantly less expensive than complete excavation and off-site disposal of all impacted material.

ATTACHMENT A

Site Location Map

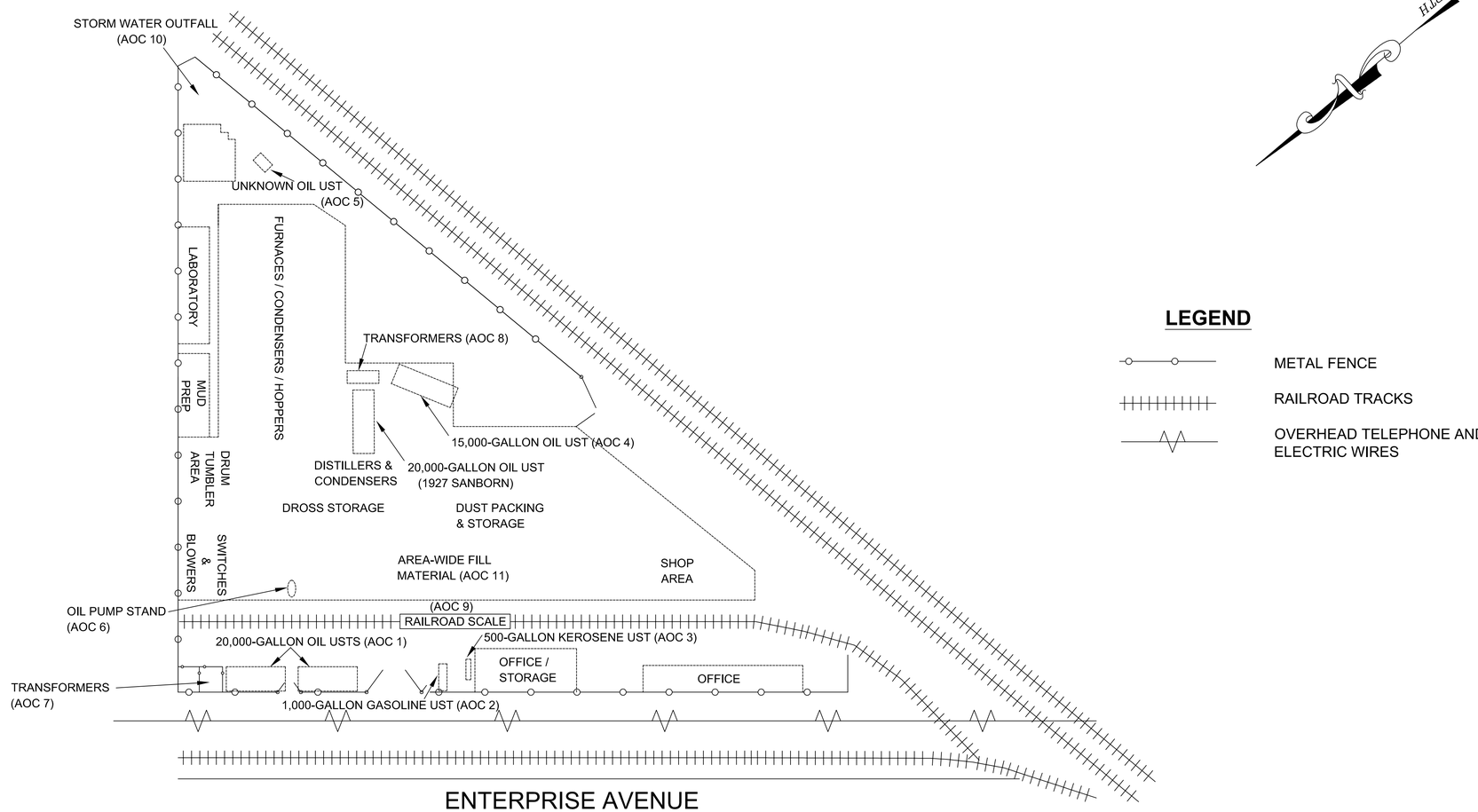
Former Federated Metals Property
300 Enterprise Avenue, Trenton, New Jersey
Block 23102, Lot 9

0 100 200 400 600
Feet

N

ATTACHMENT B

Recognized Environmental Concerns



LEGEND

- METAL FENCE
- RAILROAD TRACKS
- OVERHEAD TELEPHONE AND ELECTRIC WIRES

FORMER FEDERATED METALS (PARCEL B)

NOTE:
Approximate location of historical site features based on Parcel A Facility Map from September 7, 2006 Ransom Environmental Phase I ESA Report and observations during November 2007 field work.
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GRAPHIC SCALE

0 30 60
(IN FEET)
1 inch = 30 ft.

EnviroSure Inc.
Quality. Integrity. Reliability.
P. O. Box 731, West Chester, PA 19381-0731

APPROVED BY	S. SMITH, P.E.
DRAWN BY	MAW
PROJECT NO.	10043

TITLE
PLATE 3A - HISTORICAL FEATURES MAP
PARCEL A
FORMER FEDERATED METALS
ENTERPRISE AVENUE
TRENTON, NEW JERSEY

SCALE	DATE	DRAWING NO.
(SEE BAR SCALE)	3/23/08	10043-3A