INTERIM REMEDIAL MEASURE (IRM) WORK PLAN – OPERABLE UNIT (OU) 6

For the

Spaulding Fibre Site
Tonawanda, New York

PREPARED FOR:
Erie County Industrial Development Agency

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1.0 INTRODUCTION

LiRo Engineers, Inc. (LiRo) is in contract agreement with the Erie County Industrial Development Agency (ECIDA) to provide a Site Investigation and Remedial Alternatives Report (SI/RAR) for the Spaulding Fibre Site (Spaulding) in Tonawanda, New York. The site location, 310 Wheeler Street in the City of Tonawanda, Erie County, New York, is shown on Figure 1. The property is bounded by Dodge and Enterprise Avenues and residential property to the north, Wheeler Street and a mix of commercial and residential properties to the east, Hackett Drive and commercial properties to the south, and Hinds Street and a mix of commercial and residential properties to the west.

The Spaulding Fibre SI/RAR is being conducted under a NYSDEC Environmental Restoration Program (ERP) State Assistance Contract with the City of Tonawanda, Erie County and ECIDA. The Spaulding Fibre Steering Committee (Committee) is comprised of representatives from those three groups plus the Town of Tonawanda and Empire State Development Corporation. NYSDEC is responsible for oversight of the investigation as well as review and approval of project deliverables.

In completion of the Site Investigation phase of the project, LiRo submitted Work Plans (October 17, 2007), a site Health and Safety Plan (September 14, 2007), a Citizen Participation Plan (September 21, 2007), a Site Investigation Report (May 20, 2008), and a Supplemental Investigation Report (January 30, 2009). Based on the Site Investigation results and evaluation of remedial alternatives, it was determined that most of the site contamination could be efficiently addressed through a non-emergency Interim Remedial Measure (IRM). This IRM Work Plan was prepared to identify the specific requirements for implementing the IRM work.

1.1 <u>Site Background</u>

The Spaulding Fibre site is located at 310 Wheeler Street in the City of Tonawanda, New York on approximately 46 acres of land. The former Spaulding facility primarily produced two families of products - vulcanized fiber and composite laminates. Spaulding produced vulcanized fiber in its early history by treating paper (produced in an on-site paper mill) with zinc chloride solution. During this period, a substantial plant expansion occurred in the 1920s.

By the 1940's, most of the present plant floor area had been constructed and facilities added to produce a second family of products – composite laminates. Spaulding produced these laminates by impregnating natural fibers with resins. This material was sold under the trade name

Spauldite and many of the phenolic resins used in production were manufactured on-site. The primary raw chemicals used to produce the resins include: phenol, formaldehyde, aniline, cresylic acids, phthalates, methanol, ethanol, toluene, acetone, methylethyl ketone, benzene and ammonium hydroxide. The Spauldite manufacturing operation underwent an expansion in 1981. Plant operations were organized into the following four operating Departments: Paper Mill, Fibre Sheet, Fibre Tube, and Spauldite Sheet Departments.

Approximately 20 acres of the 46-acre site were developed with former plant buildings and structures (Figure 2). The plant was decommissioned in 1992 when operations ceased. A building demolition program was initiated in 2006 by the Spaulding Fibre Steering Committee, and approximately 500,000 square feet of former plant structures have been cleaned and demolished. It is anticipated that all of the site buildings and a large portion of the plant floor slabs will be demolished by Fall of 2009.

Site-wide investigations/assessments began in the late 1980s when a Resource Conservation and Recovery Act (RCRA) Facility Audit (RFA) was performed at the facility by a United States Environmental Protection Agency (USEPA) contractor under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The RFA Report identified 38 Solid Waste Management Units (SWMUs) and additional potential areas of concern (AOCs).

The plant closed in 1992 and initially declared bankruptcy in 1993. Spaulding initiated decommissioning activities at the site in August 1992. The majority of these activities were completed from September 1992 to February 1993 with the remaining activities completed by mid-1995. These activities are documented in the Plant Decommissioning Final Report dated August 1995 and approved by the NYSDEC by letter dated August 30, 1995.

Following the closure of the plant, Spaulding and NYSDEC entered into a RCRA Corrective Action Order on Consent for the performance of a RCRA Facility Investigation/Corrective Measures Study (RFI/CMS) and into an Order on Consent for the performance of a Remedial Investigation/Feasibility Study (RI/FS) at the Site. Spaulding concurrently completed a Remedial Investigation/RCRA Facility Investigation (RI/RFI) and a Feasibility Study/Corrective Measures Study (FS/CMS) to evaluate contamination at the State Superfund portion of the Spaulding Composites Site, and to evaluate remedial alternatives to address the significant threat to human health and the environment posed by the presence of hazardous waste. This was a joint project between the State CERCLA and RCRA programs, with overall NYSDEC management, coordination and oversight provided by CERCLA staff. To satisfy both programs, Spaulding decided to conduct a single investigation of the site which was implemented by Spaulding's consultant, CRA, through the mid 1990s.

Using the RI/RFI data, potential remedial alternatives were identified, screened and evaluated in the report entitled: *Feasibility Study and Corrective Measures Study* dated December, 2000. The remedial alternatives were presented and discussed at a public meeting in 2002 and remedies for four identified operable units (OU1, OU2, OU3 and OU4) were subsequently detailed in a Record of Decision (ROD) (NYSDEC, March 2003). The RI indicated contamination of site soils and groundwater in isolated areas that resulted largely from bulk chemical and waste handling practices at the facility. These practices include: (1) historical leaks and spills (at least 17 incidents were reported between 1958 and 1994); (2) on-site waste disposal in pits excavated into native soils (the Resin Drum and Laminant Dust Landfills); and (3) the use of settling ponds (four settling lagoons were located throughout the site). In addition, a number of disposal pits were located inside plant buildings. These pits were cleaned during decommissioning activities following facility closure in 1992.

Spaulding completed a number of remedial activities over the years to address contamination at the site. The work included the following:

- In the late 1970s the four settling lagoons were excavated and backfilled with clean fill. The contaminated sludge and soils were reportedly disposed of at Seaway Landfill in Tonawanda, New York. These lagoons were utilized from 1930 to 1972 to collect and settle out wet grinding wastes.

- In August 1985 the Zinc Chloride Sludge and Drum Landfill (Site Number 915050D; delisted) was excavated. This area was a 60 cubic yard landfill located beneath the plant floor inside the main plant building and contained zinc chloride sludge contaminated with cadmium and lead, drummed lab chemicals and resin solvent mixtures. The pit was backfilled and a new concrete floor installed over it.

- In 1985 Spaulding removed lead contaminated zinc hydroxide sludge from the Zinc Hydroxide Sludge Storage Tank (SWMU 24). The sludge was disposed of at a permitted off-site secure landfill. The storage tank and surrounding area were decontaminated with high pressure water.

- In early 1993 Spaulding constructed an on-site water treatment system to treat PCB-contaminants in water from a basement sump, the on-site K-Line storm sewer and other wastewaters generated on-site. Periodic sampling and analysis of influent and effluent water was conducted to ensure compliance with discharge limits to the storm sewer. In

June 1993 a portion of the on-site K-Line storm sewer was flushed and the sediments removed in accordance with a NYSDEC approved work plan. This work was completed following the detection of PCBs in the K-Line storm sewer sediments. The removed sediments were dewatered, placed in roll-offs, and sent to Chemical Waste Management in Model City, New York for disposal.

- On October 21, 1994 it was discovered that an out-of-service transformer had been vandalized, resulting in a spill of PCB transformer oil. The transformer had been staged in a building pending off-site transfer for disposal. All visible fluids were immediately cleaned up by Spaulding personnel and the affected ground outside the building covered with plastic. This area was subsequently excavated, with the contaminated soils placed in roll-offs for off-site disposal. The floor was broken up, placed in roll-offs, and sent to Chemical Waste Management in Model City, New York for disposal.

- In 1995, Spaulding drained and dismantled the Therminol Unit which had been used as a heat exchanger for the Spauldite sheet presses. PCB oil had been released to the ground outside this building during use. A focused investigation of this area to delineate the horizontal and vertical extent of PCB contamination in subsurface soil around the Therminol Building was performed in 1995 and presented in an August 1996 report entitled: *PCB Soil Investigation Report, Therminol Building.* PCB-contaminated soil was later excavated by NYSDEC from this portion of the site as part of an Interim Remedial Measure (IRM).

- In January 2004 the NYSDEC began the remediation of Operable Unit 2 by excavating PCB contaminated soils. Approximately 6,800 tons of non-hazardous soils were transported to BFI in Niagara Falls, New York for disposal, while approximately 13,500 tons of hazardous soils were transported to CWM in Model City, New York for disposal.

Spaulding continued trying to sell the property in return for the remedial actions required at the Site. Attempts by Spaulding to sell the facility failed and in 2003 the United States Bankruptcy Court approved a recovery plan for Spaulding.

After Spaulding declared bankruptcy, NYSDEC continued environmental work to address hazardous waste sites under their Superfund Program. The NYSDEC Record of Decision for the Site defined four Superfund Program operable units (OUs) requiring remediation based on the results of the RI and other investigations. The four Superfund OUs are shown on Figure 2 and are as follows:

- OU1: Regulated Landfill Wastes - SWMU 7 Resin Drum Landfill, SWMU 8 Laminant Dust Landfill.

- OU2: PCB-Contaminated Wastes - SWMU 11, 12, 13 Sludge Settling Ponds, SWMU 23 Former Tank Farm Area, SWMU 38 Therminol Building Area, AOC 48 Transformer Explosion Area.

- OU3: Petroleum Contaminated Wastes - SWMU 13 Former Grinding Oil Tank and Sludge Settling Pond (north), SWMU 36 Former Tank Farm Area.

- OU4: Multiple Contaminant Wastes - SWMU 3 Zinc Chloride Sludge Container Storage Area, SWMU 5 Empty Drum Storage Dock, SWMU 14 Sludge Settling Pond, SWMU 26 Paper Sludge Land Application Area, SWMU 35 Lab Waste Storage Area, AOC 45 Rail Spur, AOC 46 Drum Storage Dock, AOC 47 Bulk Chemical Unloading Area.

Subsequently, the Committee entered into NYSDEC's ERP to address site contamination outside of the Superfund areas and initiated demolition and restoration programs to return the site to productive use. To facilitate the ERP site investigation, three additional distinct OUs were defined at the site. Operable Unit 5 (OU5) is the former parking lot on the east side of Wheeler Street, Operable Unit 6 (OU6), the subject of this Work Plan, is the main plant operations area, and Operable Unit 7 (OU7) is the undeveloped western portion of the site. Operable Unit 7 was not part of Spaulding's manufacturing operation and showed no contamination exceeding applicable guidance values. Therefore, OU7 was addressed in a separate "No Action" ROD issued by NYSDEC on March 27, 2009. Operable Unit 5 was also unaffected by manufacturing operations; however, the fill material used as a subbase for the parking lot was found to contain contaminants in excess of applicable guidance values. A separate IRM Work Plan has been prepared by LiRo for OU5. This IRM Work Plan addresses remediation activities within OU6.

1.2 SI Results Summary

1.2.1 Hydrology and Geology

The elevation at the site is approximately 600 feet above mean sea level (amsl) and the ground at OU5 and OU7 slopes gently to the north-northeast. Surface drainage is through a series of swales and ditches (the configuration of which has changed over the years) and storm sewers. Currently most surface water is collected through a drainage ditch present along the southern and western margin of OU6. The Niagara River is approximately one mile north of the site. The Niagara River and municipal water treatment and supply systems provide potable water to residents and industry in the vicinity and downgradient of the Site. The main plant floor is generally built at an elevation of just over 600 feet amsl, but many large pits and areas with multiple floor slabs are present.

The overburden of the region is primarily glacial in origin and consists of lake sediment deposits, sand and gravel deposits, and till. Fill and silty clay were the uppermost soil units observed during the SI. The stratigraphic units are as follows:

- Fill: Within the building footprint, fill generally consists of a black angular sandy material ranging in thickness from 1 to 10 feet. The fill thickness outside the building footprint typically ranges from 0 to 2 feet. Previous investigators have reported fill up to 17 feet thick, however. The exterior fill primarily consists of reworked silty clay with lesser amounts of sand and gravel. Concrete and brick fragments, crushed stone and cinders were encountered at several locations and at a lesser number of locations there were buttons mixed with cinders (button ash), wood debris and miscellaneous waste (i.e., plastic, litter, etc.) encountered, often mixed into the reworked silty clay.

- Glaciolacustrine silty clay: This unit consists primarily of reddish brown silty clay with thin interbeds containing sand/silt/clay. During the SI, this unit was observed in the field as characteristically dry to moist; however, the sandy layers were saturated locally. The sandy layers appeared to be discontinuous laterally. The thickness of this unit reportedly ranges from 36.4 to 45.8 feet across the site.

- Glacial till: This unit consists of dark reddish brown to gray, silty clay with abundant rock fragments and gravel. This unit reportedly ranges from 0 to 5 feet in thickness. The glacial till was not observed during the SI as the maximum boring depth was 29 feet below ground surface.

- Bedrock at the site was identified as dolomitic shale of the Camillus Formation. The depth to bedrock varies from 38.5 to 54.9 feet across the site and the uppermost bedrock consists of a 1.5 to 5-foot thick weathered zone. Below the weathered zone, numerous lightly to heavily-weathered shaly or gypsum-lined partings, rubble zones, and weathered gypsum and shale interbeds, along with weathered vertical fracturing, were recorded during the logging of previous investigation bedrock well cores. The Camillus Formation is a relatively transmissive aquifer. Groundwater flow in weathered bedrock appears to be northward to the Niagara River. Flow gradients below the weathered bedrock were undetermined due to the relatively flat nature of groundwater contours.

The site-wide groundwater table was observed in overburden wells at elevations ranging from 606 feet amsl to 586 feet amsl. In the southern portion of the site, the measured groundwater elevation was as little as two feet below the ground surface, however, physical soil observations generally showed unsaturated (dry to moist) soil to a depth of four feet or more. The apparent groundwater flow direction is to the northeast and the observed horizontal hydraulic gradient is approximately 0.011 feet per foot. Slug testing has shown very low hydraulic conductivity results (10^{-7}–10^{-8} cm/sec) for the glacial water bearing unit. As noted above, much of the unit appears to be dry suggesting that groundwater primarily migrates through vertical cracks and sandy interbeds within the unit. Groundwater transmissivity and contaminant migration is expected to be extremely limited in the glacial unit.

1.2.2 Standards, Criteria and Guidance

Standards, Criteria and Guidance (SCGs) are cleanup standards, standards of control, and other substantive environmental protection requirements, criteria or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, or location. Guidance values include non-promulgated criteria and guidelines that are not legal requirements but should be considered if determined to be applicable to the Site. For the IRM, chemical-specific soil SCGs are based on 6 NYCRR Part 375 Soil Cleanup Objectives for restricted residential use, or, where Part 375 cleanup objectives are listed as NC (No Criteria), using the respective NYSDEC Technical and Administrative Guidance Memorandum (TAGM) #4046 soil cleanup guidance value. Table 1 presents chemical-specific SCGs for the OU6.

Several soil samples were collected from the ditch which borders the southern and western margins of OU6. Because the ditch is only intermittently wet and harbors no aquatic environment, the results are compared to soil SCGs.

1.2.3 OU6 Soil Contamination

OU6 sampling for the SI included 79 soil samples from test pits and 96 samples from borings (either split-spoon samples or macrocore samples). In addition, LiRo collected 7 preliminary soil samples during the soil gas testing program, and NYSDEC collected 3 sediment samples from the ditch which borders the southern and western margins of OU6, and 7 sludge samples from the Press Room in 2004. Sample locations are shown on Figure 3. An additional 98 samples were collected from 70 locations during Supplemental SI sampling. Supplemental SI sampling was conducted using an excavator/backhoe except for basement locations which required the use of a portable pneumatic hammer (jack hammer) to drive a split-spoon sampler.

Fill material including sand, clay, slag, brick, rock, and concrete fragments was found across much of the building exterior at typical thickness of 0 to 2 feet. A relatively thin layer (generally less than 1 foot) of button ash was observed in areas southwest of the plant building. Fill beneath the building floors was generally characterized as black angular sandy soil ranging in thickness from 1 to 10 feet.

Relatively few elevated PID readings (above background) were observed in screening results from SI and Supplemental SI samples. The maximum observed PID levels were up to 350 ppm in direct soil screening and up to 1,400 ppm in headspace readings during the SI; and during the Supplemental SI were up to 50 ppm in native material in sample location BC-1.

One hundred and seventy-five OU6 SI soil samples and 98 Supplemental SI soil samples were selected for chemical analysis. Exceedances of Part 375 restricted residential criteria are summarized in Table 2 and shown on Figures 4, 5 and 6. Site contaminants that were observed at levels which exceeded criteria include: benzene, PAHs (benzo(a) anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, indeno(1,2,3)cd-pyrene, phenanthrene, pyrene), and metals (arsenic, barium, cadmium, chromium, copper, lead, manganese, mercury, nickel, zinc). PAHs and metals exceedances were relatively widespread across OU6. Few PCB exceedances were detected at locations other than the sediment and sludge samples collected by NYSDEC.

Benzene exceedances were observed only at locations 52 and 52.1 in the north-central portion of the building footprint. Based on the depth of the exceedances - in samples up to 21 feet below grade – and the proximity to OU4, the benzene contamination likely migrated from OU4 and is associated with the multiple contaminant wastes that comprise OU4.

Exceedances of TAGM #4046 RSCOs for compounds which are not listed in Part 375 were observed for dimethyl phthalate (in 2 samples) and di-n-butylphthalate (in 10 samples) as indicated on Table 2.

2.0 INTERIM REMEDIAL MEASURE

2.1 Summary of Environmental Concerns

The anticipated redevelopment plan for OU6 is for commercial use such as an office building. LiRo completed a qualitative human health exposure assessment (EA) during the Site Investigation to evaluate the presence of completed or potential exposure pathways in order to determine if site contamination poses an existing or potential hazard to current or future site users. The EA identified the potential for human exposures, if any, associated with chemical constituents detected in soil, groundwater, and air at the Site.

Site investigation data indicate that Spaulding's historic chemical use/storage, operations, spills and disposal practices within and outside of the building released contaminants to the surrounding environment. The use of historical fill material has also impacted OU6. Chemicals of potential concern for soil at OU6 were identified based on exceedances of Site SCGs.

Under the current and future use scenarios, trespassers on the Site would have a potentially complete pathway through dermal contact and ingestion of contaminated soil. Nearby residents could potentially be exposed through inhalation from wind dispersion of fugitive dust from the Site to offsite areas.

Future site redevelopment construction workers and commercial site workers would have a potentially complete pathway through dermal contact and ingestion of contaminated soil, and inhalation of volatile contaminants through soil vapor intrusion into future structures.

Under the current and future use scenarios, groundwater is not known to be used or anticipated to be used as a potable water supply; therefore the groundwater ingestion exposure pathway is considered incomplete.

2.2 Remedial Goals

The remedial action goal for OU6 is to eliminate or mitigate all significant threats to human health and/or the environment, to the extent practicable, caused by contaminants present due to former Site activities. In order to meet this goal, remedial action objectives (RAOs) were established to protect human health and the environment, provide the basis for selecting appropriate technologies, and develop remedial alternatives. RAOs are based on contaminated media (soil, air/soil vapor, and groundwater), SCGs, and the results of the qualitative human health exposure assessment.

The remedial action objectives for OU6 soil are to:

- Eliminate or reduce to the extent practicable Site contamination sources that exceed soil SCGs.
- Eliminate or reduce the potential for exposure to contaminated Site soil.

The remedial action objective for air/soil vapor is to:

- Prevent or mitigate the potential for exposure to contaminated soil vapor and fugitive dust.
- Prevent or mitigate the potential for inhalation of volatile contaminants through soil vapor intrusion into future structures.

The remedial action objective for groundwater is to:

- Prevent or mitigate the potential for exposure to contaminated groundwater.

2.3 OU6 IRM – Area and Volume

Exceedances of applicable criteria are summarized in Table 2 and shown on Figure 3. The proposed IRM excavation areas and volumes for OU6 are shown on Figure 3. The anticipated excavation volume for the combined OU6 areas is 27,411 cubic yards (cy). The remedial action objective for air/soil vapor with regards to exposure to contaminants present in soil vapor and fugitive dust would be met with soil remediation measures at the Site, since the source of contaminants in air, soil vapor and fugitive dust are due to Site soil. The objective of the IRM will be to remove contaminated soil and fill to the depth of the clay-silt native soils. Contaminated soil was identified in OU6 as described below:

2.3.1 Southern/western exterior areas (Areas C, D, E, F, G, AI, and Ditch)

Area C

Nine discrete samples were collected within Area C where PAHs and metals were previously detected in composite samples from depths of 0-2'. Fill material was found in samples up to a depth of 13". The proposed IRM excavation area includes the button ash piles, which are at a depth of generally less than 1', and fill material found at sample point locations C-1, C-2, C-4 and C-6. There was one exceedance of copper (Cu) at supplemental data location C-4 (0-1') attributable to fill.

Area D

One of the four sample locations within Area D (SI sample location 85) exceeded criteria for PAHs between 0-1’ and for a single PAH at 2’-3’. No exceedances were found during supplemental investigation sampling and analysis at a depth of 1’-2’. This limited contamination is attributed to ash found in the test pits to a depth of less than 1’. Proposed IRM excavation to a depth of 1’ within this area extending southeasterly along the access road to the adjacent NYSDEC OU would remove the ash present. Excavation to a depth of one foot will also include the drainage ditch extending from the nearby NYSDEC OU, through sample locations 66 and 67 which exceeded criteria for PAHs and PCBs, respectively, at a depth of 0-6”.

Areas E and F

No analytical samples were collected in these button ash pile areas. Proposed IRM excavation includes removal of the full extent of button ash piles to native clay, generally less than 1’ deep.

Area G

Seven samples were collected from 5 locations. Topsoil was underlain by native clay in this area except in sample G-5 where fill material was found from 0.25’-2’. Proposed IRM excavation includes removal of soil to a depth of 2’ and includes sample locations 82, 83, G-1, G-2 and G-4 which indicated individual metal exceedances. Additionally, sample location 83 exceeded the SCG for PCBs.

Area H

One area H sample exceeded criteria for PAHs and metals. The proposed IRM excavation area within Area H includes removal of soil at sample location 4 which exceeded criteria for PAHs, metals, and PCBs at a depth of 0-1’. Proposed IRM excavation will extend to the clayey silt at a depth of 3’ to remove the exceedance of arsenic (As) which occurred at the same sample location at a depth of 2’-3’.

Area AI

The one Area AI sample (TP-65) exceeded criteria for metals between 0-16”. The Area AI exceedance is attributed to button ash found in this area. Proposed IRM excavation of the button ash to native material at an estimated depth of 1’ includes sample location TP-65.

Ditch

Fourteen SI soil samples were collected from the ditch which borders the southern and western margins of OU-6. In addition, NYSDEC collected three ditch samples (SD-01, SD-02 and SD-

03) in 2004. Exceedances were detected in sample 66F for Benzo(a)pyrene, Benzo(a)anthracene and Indeno(1,2,3-cd)pyrene; in sample 67F for PCBs and di-n-butylphthalate; in sample 79N for cadmium; and in sample 83F for cadmium and PCBs. SCG exceedances for PCBs were also observed in each of the three NYSDEC ditch samples. IRM excavations are proposed west (Ditch A) and south (Ditch B) of Superfund Area OU4 to remove the upper 1-foot of sediment/soil from the ditch.

2.3.2 Eastern exterior areas (Area K, Area M, Area N)

Area K

The one Area K sample (SI location 7) exceeded criteria for PAHs. The Area K exceedance is attributed to fill containing slag which was found to be present to a depth of 18 inches. The proposed IRM excavation area includes sample point 7 to the top of native clay soil at an approximate depth of 2 feet.

Area M

One Area M composite sample (TP-27) within fill material from a depth of 0-4’ exceeded criteria for PAHs and metals. One of the three discrete samples, Sample M-1, exceeded criteria for PAHs from a depth of 0-1’. Additional samples without SCG exceedances in the area indicated no fill (M-2) and a 1’ thickness of fill (TP-27.1). Proposed IRM excavation of fill material in this area to a maximum depth of 4’ will remove soil at locations TP-27 and M-1, and contamination attributable to fill material.

Area N

One of the three samples in area N exceeded the criteria for barium (Ba). The Area N exceedance is attributed to fill containing slag which was found to be present to a depth of 1’ in TP-28. No fill was found at sample locations N-2 or N-3. Proposed IRM excavation of fill material in this area to a depth of 1’ will remove contamination attributable to fill material.

2.3.3 Main Plant Areas (Areas AA through BK)

Areas BF and EX

Metals exceeded criteria in samples from the fill and upper portion of native material. Exceedances are attributable to foundry sand which was found to a depth of 4’ in the majority of test pits in Area BF and to a depth of 2.5’ in area EX. Native clay was found below this depth. Proposed IRM excavation to a depth of 4’ within Area BF and to a depth of 3’ within Area EX will remove contamination attributable to fill material.

Area AA

One of four samples exceeded criteria for PAHs at a depth of 2.5'; two of four samples exceeded criteria for metals at depths of 2.5' and 0.5'. Fill material and ash were observed above native material found at a depth of 3'-3.5'. Proposed IRM excavation to an average depth of 3', with possible over-excavation in localized areas, will remove ash and fill materials with PAHs and metals exceeding criteria at samples locations P-60 and AA-4.

Area AB

No samples were collected in this area where the incinerator stack was located. Brick/sand/gravel fill with an oily sheen was observed in TP-34. Proposed IRM excavation will include the extent of fill present in this area. IRM excavation is proposed to an average depth of 2' over the entire area. Based upon site conditions and the presence and/or absence of fill, the depth and limits may be modified.

Area AC

SI sample P-61 exceeded criteria for cadmium (Cd) and zinc (Zn) and sample 32 marginally exceeded the criteria for Cd in Area AC. Fill with ash was found in AC-3 to a depth of 2.5'. AC-4 was advanced south of the cistern, near SI location 61. Cadmium exceeded criteria in AC-4 at a 2'-3' depth. Proposed IRM excavation to a depth of 3' would remove the ash at sample locations AC-3 and AC-4. The excavation area for AC excludes the cistern as the structure was built on native clay and no site-related contamination is anticipated based on the fresh water storage use of the cistern.

Area AD

Area AD is within the northern portion of the Main Building, an area of vats and water-filled void spaces. Sample locations 24, 25 and AD-1 had a water-filled void space that was observed to a depth of approximately 4 feet. Zinc exceeded criteria in the three samples obtained from this area (SI sample locations 24 and 25) collected below the 4' void space and a bottom 2' cement slab. Zinc also exceeded criteria in AD-2 (beneath a concrete vat) at a depth of 7.5'-8.5' relative to the main plant floor. IRM excavation of a 3' thickness of soil below the void spaces will include sample locations AD-2, 24 and 25.

Area AE

Area AE is within is the middle portion of the Main Building. The interior bagged resin dust landfill area (SWMU 10) was discovered at AE-2. The bagged waste was found (in a matrix of foundry sand) between the main plant floor and a lower slab which was located at a depth of 55" below the main floor. A sample of the bagged material was collected at AE-2 and analyzed for hazardous waste characteristics and for asbestos. The material was determined to be non-hazardous by meeting TCLP and RCRA criteria and asbestos was not detected in the material. Proposed IRM excavation of this area will include the entire extent of the former landfill.

Two samples were collected from this area where PCBs, Cd and lead (Pb) exceeded criteria at a depth of 3'-4' in SI sample 76. At AE-1, approximately 2' of fill (gravel, brick, wood) was observed overlying clayey silt; no exceedances were present in the sample from 2'-3'. Exceedances for PCBs and cadmium were present in AE-2 from 3'-5' within the landfill material.

Proposed IRM excavation in this area will include the entire extent of the former landfill area and sample locations 76 and AE-2 therein. It is estimated that excavation will extend to a depth of approximately 5' as the concrete slab was located at 55" below the main floor. Additional excavation will be conducted as necessary to remove material from the entire landfill.

Area AF

Area AF is the former process pit in southern portion of the Main Building. Two of the three samples within this area exceeded criteria for Cd and/or Zn. SI sample 22 indicated metal exceedances between depths of 2'-3'. AF-2, collected in native material beneath a thin fill layer of concrete and slag, also exceeded criteria for Cd and Zn at 1.5'-2'; AF-3 exceeded criteria for Zn at 0-2'. Proposed IRM excavation to a depth of 3' will remove the fill layer, considered to be the source of contamination, and the affected upper portion of native clay at sample locations 22, AF-2 and AF-3.

Area AG

Area AG includes the southernmost former process pit and the area north and west of that pit. Three of the four samples obtained from AG showed an exceedance for Zn (AG-3 at 1.5'-2', SI location 13 at 2'-3', AG-1 at 7'). At locations excavated west of the process pit area, 2'-2.5' of fill material including sand, gravel, clay, and re-graded clay was found overlying native clay. AG-1 was advanced through a concrete apron which crosses the former process pit and the AG-1 sample was collected approximately one foot below the lower slab which corresponds to the pit floor. Proposed IRM excavation to a depth of 3' will include fill material beneath and adjacent to the former process pit.

Area AH

Area AH includes the walkway leading to the former incinerator. The sample from AH (SI location 14) showed exceedances for metals (As, Cu Mn and Zn) and di-n-butylphthalate. Proposed IRM excavation to a depth of 3' will include fill material beneath the walkway.

Area AJ-a

Two of seven samples from six locations within Area AJ exceeded criteria (Cu and Zn in SI sample 19 at 1’-2’; Cd and Zn in AJ-3 at 1’-2’). These Area AJ exceedances are attributed to fill and reworked native clay which was found to be present to a depth of 2’. The proposed IRM excavation area includes sample locations 19 and AJ-3, and fill material to an approximate depth of 2’.

Area AJ-b

Fill and reworked native clay was found to a depth of between 2’-4’. It is believed that the large pit areas in Areas AJ and AK were constructed over clay. Cadmium and/or Zn exceeded criteria in samples. Proposed IRM excavation to a depth of approximately 3’ within the southern portion of the area and to a depth of approximately 2’ in the northern portion will remove the source of contamination.

Area AK-a

Five locations were sampled in Area AK-a within and below the depth of foundry sand present in samples AK-1 and AK-2 to 2’, and at sample locations 17 and 17.1 to 4’. PAH exceedances occurred at location 18 at a depth of between 1’-2’ and manganese (Mn) exceedances occurred at location 17 (1’-2’ and 5’-6’). PAHs exceeded criteria at location AK-2 which was sampled from 1’-2’. Proposed IRM excavation of the full extent of foundry sand, an average depth of 4’, will remove the source of contamination and sample locations with SCG exceedances.

Areas AK-b and AK-c

Foundry sand was found in this area to a depth of 6’. Exceedances of metals, attributable to the foundry sand, were found at sample location 28 (Cd at 4’-6’), location 57 (Cr and Mn at 2’-4’,Cd at 4’-6’), AK-5 (Zn at 4’-6’), and AK-6 (Cd and Zn at 4’-6’). PAHs and PCBs exceeded criteria at sample location 58 at 0-2’. Proposed IRM excavation to a depth of 6’ within AK-b will remove the localized shallow contamination at sample location 58, and the full extent of foundry sand which is the source of contamination and sample locations 28, 57, 58.1, AK-5, and AK-6. SI results for sample 58.1 showed a marginal exceedance for Zn at a depth of 12’ in native clay. Based on the limited mobility of Zn through the clay and the backfilling after the remediation excavation is conducted, residual Zn exceedance will pose no significant risk to future site users.

Pits within this area are approximately 3 to 5 feet deep. No samples were collected from below the pits. Proposed excavation within AK-c to a depth of one foot below the bottom of the pits is proposed to remove contaminants which may have migrated through the pit floor.

Area AL

Area AL is the area of the Boiler House. PAHs and PCBs exceeded criteria at sample location 58 at 0-2' and some marginal exceedances for metals (Cd, Cu, and Zn were observed in deeper soil at locations 58/58.1. Two supplemental investigation samples taken at two locations from depths of 0-2' and 2'-4' did not indicate any SCG exceedances. Foundry sand was found to a depth of 2' at AL-1 and to 4' at AL-2. Proposed IRM excavation to an average depth of 3' will remove the foundry sand present in this area.

Area AN

Area AN was dewatered and investigated in April 2009. PCBs were previously detected by NYSDEC in basement/sump areas and April 2009 sampling confirmed the presence of PCBs below the basement floor at concentrations which exceed 50 ppm. Area AN PCB contamination is being incorporated into the NYSDEC remediation of OU4.

Areas AM, BA

Manganese exceeded criteria at one (P-43) of the seven sample locations. One TAGM exceedance of a phthalate was found in native clay at sample location 56 (1'-2'). Fill material found at sample locations AM-1, AM-2, AM-3, BA-1 and BA-2 included sand and gravel, but not foundry sand, slag, or waste. Since the manganese exceedance is not likely site-related and the phthalate exceedance poses no direct contact risk, there is no proposed IRM excavation for Areas AM or BA.

Area BB

PAHs exceeded criteria in the two samples obtained from this area, SI sample 53 at 0-4' (fill and clay) and SI sample BB-1 at 0-2' (foundry sand). The Area BB exceedance is attributed to fill present to a depth of up to 4'. Proposed IRM excavation includes sample points 53 and BB-1 to the top of native clay, expected at a maximum depth of 4 feet.

Areas BC-a, BC-b, BC-c

Eleven supplemental samples were obtained from Area BC and analyzed for contaminants exceeding criteria in SI samples 52 and 52.1 (As, benzene, di-n-butylphthalate). Area BC is comprised of three adjacent rooms which showed different construction and characteristics.

Area BC-a

Area BC-a was constructed with a raised floor on concrete piers. Beneath the floor is 2.5' of void space (un-enclosed) and another 6” concrete slab. The lower slab is underlain by approximately 1’ of clay/fill then native clay. Water seeped into the excavation for location BC-4 at a depth of about 4’ below the main slab. One TAGM exceedance of a phthtalate was detected in BC-4 in fill just below the second slab. Proposed IRM excavation to a depth of 1’ below the bottom slab to native clay will remove fill material.

Area BC-b

Area BC-b has multiple floor slabs, but the lower slab is deeper (4.5’ below the main slab) than at the adjacent area and no void space was evident. Observations at location BC-1 and SI locations 52/52.1 showed fill consisting of sand with brick and concrete between the floor slabs. Abundant water (with a chemical odor) was present just beneath the lower floor slab seeping into the BC-1 test pit at approximately 4.8’ below the main plant floor. Clay was encountered at a depth of 5.5’ below the main plant floor. BC-5 (approximately 30 feet west of BC-1) was advanced to a depth of 6.5’ below the main floor slab. No lower floor was encountered and only a small amount of free water was observed. Analytical results showed no criteria exceedances except at SI locations 52/52.1 where benzene was found at depths of 5’-7’, 13’-15’, and 19’-21’. Proposed IRM excavation to a depth of 6’ will remove fill material found between the floor slabs and contamination present in the upper portion of native clay. The low permeability clay will limit contaminant migration and placement of clean fill over the area will mitigate any direct exposure from residual benzene contamination.

Area BC-c

BC-c showed only one main plant floor slab. The floor was underlain by foundry sand with some brick stone and slag to a depth of 3’ at BC-3 and to 4’ at BC-2. Clay/silt was observed at both locations below a depth of 4.5’. There were no criteria exceedances in the three samples at the three depths collected. Proposed IRM excavation of the fill material below the main floor slab, an assumed average of 4’, will remove potential sources of contamination.

Area BD

Six samples from three locations (BD-1, BD-2, BD-3 at 3’ and 6’ depths) surrounding SI sample 54, where PAHs marginally exceeded criteria between 3’-5’, did not indicate any exceedances. Fill containing some slag was present to depths of less than 2’, overlying possibly re-graded native silt and clay. Proposed IRM excavation to a depth of 3’ will remove fill material present and the upper portion of any re-graded native soil. Residual contamination below this depth is considered localized with little potential to migrate or adversely impact future site users.

Area BH

Area BH includes SI sample location 8 which indicated the presence of foundry sand to a depth of 2’. There were no SCG exceedances. Proposed IRM excavation to a depth of 2’ will remove the foundry sand present.

Areas BI, BE

Three samples were obtained from this area. SI location 30 showed exceedances of Cd at 2’-4’. SI location 51 and BI-1 showed exceedances of Cd at 3’-5’. Lead also exceeded criteria at location 51 at the same depth. Proposed IRM excavation to a depth of 5’ will remove the foundry sand.

Area BK

No fill was observed or criteria exceedances detected in the one sample from this area; however, since this was the former lab area, proposed IRM excavation is to a depth of up to 2’ to remove any potential source of contamination is proposed.

2.4 General Response Actions

General response actions are broad categories of remedial actions capable of satisfying the RAOs for OU6. Some response actions are sufficiently broad to be able to satisfy all RAOs and meet SCGs for the site as a whole. Other response actions must be combined to satisfy RAOs for all impacted media. Remedial technologies were evaluated according to the general response actions of no action, institutional controls, containment, source removal, and treatment. A brief description of the general response actions area as follows.

- **No Action –** No Action was evaluated as part of the process as a baseline alternative.
- **Institutional Controls** - The site would remain in its current state and controls implemented to reduce exposure to meet RAOs.
- **Containment –** Containment measures are those remedial actions whose purpose is to contain and/or isolate contaminants on the site. These measures provide protection to human health and the environment by reducing exposure or migration of contaminants, but do not treat or remove the contamination.

- **Source Removal –** Excavation of contaminated soil is a remedial action whose purpose is to remove contaminants from the site. Combined with offsite treatment and or disposal in an appropriate facility, source removal provides protection to human health and the environment by reducing exposure or migration of contaminants.
- **Treatment –** Treatment of contaminated media either above ground, or in the subsurface (in situ) is a remedial action whose purpose is to reduce the toxicity, mobility or volume of contaminants by directly altering, isolating, or destroying those contaminants through either biological, chemical, physical or thermal methods. Remaining contamination (residual) would no longer pose an unacceptable health risk.

2.5 Identification and Screening of Technologies for Soil and Air/Soil Vapor

This section identifies and provides a screening of remedial technologies for contaminated soil and air/soil vapor in a two-step approach. In the first step, potentially applicable remedial technologies which meet the remedial action objectives are identified. In the second step, technologies are screened with respect to their relative effectiveness, technical implementability and cost for this Site. This evaluation is based on the site characterization, which includes the types and concentrations of contaminants, and geology and hydrogeology of the area.

2.5.1 Site Management Plan

A Site Management Plan (SMP) will identify the institutional controls and engineering controls (IC/EC) such as excavation protocols, in particular, procedures for soil characterization, handling, and health and safety measures, to be undertaken during future onsite excavation activities for construction. These controls will mitigate potential exposures to contaminated groundwater, as well as residual soil and soil vapor, and identify the need for vapor intrusion monitoring and mitigation per NYSDOH air guidance for future structures.

Effectiveness: An SMP is an effective technology to mitigate potential human health exposures for current and future use scenarios.

Implementability: An SMP requiring long-term monitoring, and identifying necessary health and safety measures for future construction and soil vapor intrusion mitigation due to residual contamination, would be implementable at the Site.

Cost: The SMP would pose a relatively low cost as it would be consistent with the proposed future use of the Site.

Conclusion: A Site Management Plan will be retained for use at the Site.

2.5.2 Containment

A newly-constructed cap covering the remediation areas would reduce infiltration from precipitation, and reduce contaminant leaching and subsequent migration to the groundwater system. Further, it would prevent the potential for exposure to contaminated soil, soil vapor and fugitive dust; however it would not be suitable for the proposed future use of the Site.

Utilizing the existing surface and subsurface slabs (below grade) as caps would prevent contact with contaminated soil at depth, but would not address the majority of contaminated soil, or fugitive dust, due to contaminants present at shallow (0 -2') depths.

Effectiveness: Construction of a site cap would prevent the potential for exposure to contaminated soil, soil vapor and fugitive dust to nearby residents and limit precipitation infiltration to the subsurface. Cap technologies have been utilized at numerous remediation projects.

Implementability: A cap covering areas of contaminated surface soil would not be difficult to construct. However, a site cap would not be consistent with the future use of the Site.

Cost: The relative cost of a cap as compared to other remedial technologies would be low.

Conclusion: A cap is not retained for consideration since it would not be suitable for the future use of the site.

2.5.3 Excavation and Offsite Disposal/Treatment

Excavating contaminated soil is a proven and reliable technology for contaminant removal. Contaminated soil would be excavated by conventional equipment and transported offsite either to an appropriate treatment facility, or to a permitted disposal facility. Excavated soil would be subject to soil and waste characterization testing to identify whether it would require disposal in an appropriate landfill, or need transportation to a treatment (e.g., thermal desorption) facility. Given the relatively low levels of contaminants, including PAHs, and the results of waste characterization testing to date, it is assumed that an offsite treatment facility would not be required.

Effectiveness: Excavation of contaminated soil and offsite disposal would be effective in removing the source of contamination and meeting the remedial action objectives for soil and air/soil vapor.

Implementability: This technology is widely used for remediation and would be implementable at the Site. Shoring measures may have to be undertaken to excavate at depth, and dewatering and/or drying may be required for perched water or saturated soils. Excavation in areas with subsurface slabs, foundations, and voids will require health and safety precautions due to physical hazards.

Cost: The cost of excavating contaminated soil to an appropriate depth using proper health and safety measures, and disposing the contaminated material offsite is considered to be relatively moderate.

Conclusion: Excavation and offsite disposal of contaminated soil can be an effective and implementable technology. It will be retained.

2.5.4 In Situ Treatment

In situ treatment technologies include biological and thermal processes designed to destroy the contaminants, chemical/physical processes designed to increase the mobilization of contaminants, and stabilization/solidification processes that reduce the mobility of the contaminants.

Biological Treatment

Naturally occurring microorganisms in the soil promote the breakdown and detoxification of organic contaminants. In situ biological treatment such as bioremediation may enhance that process in soil and groundwater. Water enhanced with nutrients, oxygen, and other amendments is delivered to contaminated soil to enhance biological degradation of target contaminants. An infiltration gallery or injection wells can be utilized for the saturated and unsaturated zones.

Effectiveness: Bioremediation has been not been proven to be effective on PAHs or metals contamination. Bioremediation would require a long time period to effectively remediate site soils.

Implementability: Implementation of an effective injection system would be difficult given the non-contiguous contamination areas, the nature of the fill material, and the presence of relatively impermeable clayey silt layers in the subsurface.

Cost: The cost is considered to be moderate to high depending on the operation period.

Conclusion: Biological treatment is not retained.

Thermal Treatment

In situ thermal treatment methods employ heat to increase the mobilization of contaminants via volatilization and viscosity reduction. Available methods include heating by the addition of steam and/or hot water, electrical resistance, and radio frequency. However, high temperature thermal treatment (e.g., incineration) would be required to effectively remediate for metals.

Effectiveness: Under favorable conditions, in situ thermal treatment technologies can remediate contaminants to below clean-up criteria. The presence of groundwater may reduce temperatures in the subsurface and limit the effectiveness of the technology. Vapor collection may be required as VOCs and PAHs are heated. High temperatures would be necessary to remediate metals.

Implementability: The technology is implementable at the site assuming that adequate power sources are available. In order to increase the effectiveness of thermal treatment below the water table, groundwater containment may have to be included to reduce heat loss within the treatment zone. Off-gasses may have to be collected.

Cost: The cost is estimated to be high due to power requirements to generate high temperatures.

Conclusion: In situ thermal treatment is not retained due to the high temperatures and energy requirements for metals contamination.

Chemical Treatment

In situ chemical treatment processes such as chemical oxidation or soil flushing with surfactants have been used to remediate contaminated soil and groundwater. Chemicals and amendments are introduced into the subsurface through a series of injection wells appropriately spaced across the site to maximize contact between contaminants and injected materials. Introduced materials either destroy the organic contaminants or convert them to non-toxic compounds.

Effectiveness: Chemical treatment has not been proven to be effective on metals contamination.

Implementability: Implementation of an effective injection system would be difficult given the non-contiguous contamination areas, the nature of the fill material, and the presence of relatively impermeable clayey silt layers in the subsurface.

Cost: The cost is considered to be moderate to high depending on the operation period.

Conclusion: Chemical treatment is not retained.

Solidification

In situ solidification (ISS) introduces solidifying agents, such as cement, slag or kiln dust, or other proprietary reagents into subsurface soil to immobilize contaminants. Contaminants are immobilized primarily by binding the contaminants in a soil-cement mix and encapsulating contaminated soil with an impermeable coating. If desired, a subsurface monolith can also be developed which would create a low permeability mass, reducing groundwater flow through the soil. However, this may impact future construction at the site. While the overall mass of contaminants is not reduced, contaminant mobility through soil vapor and fugitive dust, and the dissolution of contaminants to groundwater is prevented.

Effectiveness: Solidification is effective on a wide range of contaminants including organics and metals. This technology would be effective in reducing source and exposure pathways and the mobility of all site-related contaminants in soil. Long-term monitoring is required to evaluate the effectiveness. This technology has been applied to sites nationwide. Bench-scale testing is necessary to develop a site-specific mix design which would effectively immobilize the site-specific contaminants.

Implementability: In situ solidification can be conducted below-ground using a backhoe bucket for mixing. ISS utilizing a backhoe would result in manageable particle sizes and be amenable to the proposed future use of the Site.

Dewatering and/or groundwater control would not be required during ISS. An increase in the volume of the mixture will occur and require appropriate site grading and potentially some offsite disposal of swell material if onsite re-use is not feasible. VOCs present in the subsurface may be released to the atmosphere during treatment; however, this can be managed with an air monitoring program and engineering controls. Implementation of this technology would require the removal of any remaining subsurface abandoned infrastructure (e.g., concrete slabs and foundations) within the remediation area during ISS, and existing active utilities may require relocation.

Cost: The cost is considered to be moderate depending on the operation period and the amount of swell material which must be disposed offsite if an onsite re-use is not feasible.

Conclusion: In situ solidification using the backhoe bucket technique is retained for use at the Site.

2.5.5 Excavation and Ex Situ Treatment

Utilizing this method, contaminated soil is excavated by conventional equipment, treated onsite above ground, and then replaced on the site if a site re-use is identified, or disposed offsite if onsite re-use is not feasible.

Effectiveness: Biological, thermal, and chemical treatment methods discussed above under In Situ Treatment were determined to be not effective or relatively too costly for the Site contaminants. For similar reasons, biological, thermal, and chemical treatment methods are not considered for use at the Site as ex situ treatment methods. Ex situ solidification would be effective on metals and PAHs. Solidified material could be replaced onsite for use as fill material. Bench-scale testing would be necessary to develop a site-specific mix design which would effectively immobilize the contaminants.

Implementability: Excavation and ex situ treatment through solidification would require multiple handlings of contaminated soil, first through excavation, second through treatment, and third through onsite backfilling. Adequate testing would be required to ascertain that cleanup objectives had been achieved before the treated soil was re-used onsite as fill material. This multi-staged approach would require a longer implementation time and additional measures to mitigate potential impacts to nearby receptors.

Cost: The relative cost of this technology is anticipated to be moderate to high.

Conclusion: Excavation and ex situ solidification is retained for use at the Site.

2.6 Identification and Screening of Technologies for Groundwater

2.6.1 Monitored Natural Attenuation

Monitored natural attenuation (MNA) is a technology that combines natural processes to achieve remedial action objectives with a comprehensive monitoring program. According to United States Environmental Protection Agency guidance (*A Citizen's Guide to Natural Attenuation*, EPA 542-F-96-015, October, 1996), the most important considerations regarding the suitability of MNA as a remedy include: whether the contaminants are likely to be effectively addressed by natural attenuation processes; the stability of the contaminants in groundwater; and the potential for unacceptable risks to human health or environmental resources by the contamination.

If the source is removed or isolated from the aquifer through remediation, natural attenuation will further cause contaminant concentrations to reduce assuming that no new mass is introduced. If the source of contamination remains in place, natural attenuation will require a longer period of time to reduce contaminant concentrations.

MNA consists of periodic sampling of existing monitoring wells, and analysis for a select list of contaminants of concern.

Effectiveness: MNA may indicate a continued reduction of groundwater contaminant concentrations, or, if combined with source control measures, result in a significant reduction of groundwater contaminant concentrations.

Implementability: Sampling and analysis for contaminants of concern is easy to implement.

Cost: The annual cost for sampling, analysis, and reporting would be relatively low. However, considering the length of time required to make an assessment of the effectiveness of this measure (possibly on the order of a decade or more), the present worth cost would be moderate.

Conclusion: MNA is considered to be feasible at this Site.

2.6.2 Site Management Plan

A Site Management Plan will identify the easements institutional controls and engineering controls (IC/EC) such as use of groundwater as a source of potable water, excavation protocols below the water table, and potentially require groundwater monitoring at regular intervals.

Effectiveness: An SMP is an effective technology to mitigate potential human health exposures for current and future use scenarios.

Implementability: An SMP restricting groundwater use as a potable water source and identifying necessary health and safety measures for future construction due to residual contamination would be implementable at the Site.

Cost: The SMP would pose a relatively low cost as it would be consistent with the proposed future use of the Site.

Conclusion: A Site Management Plan will be retained for use at the Site.

2.7 Summary of Retained Technologies

The following remedial technologies have been retained for use in the development of alternatives for OU6.

- No Action
- Site Management Plan
- Monitored Natural Attenuation
- Excavation and Offsite Disposal
- In Situ Solidification
- Excavation, Onsite Solidification, Replace Onsite.

3.0 ALTERNATIVE DEVELOPMENT, EVALUATION, AND RECOMMENDATION

Remedial technologies considered feasible for OU6 are combined into the following list of remedial alternatives which are described in detail and subjected to an evaluation with respect to the criteria outlined in 6 NYCRR Part 375.

Alternative 1 - No Action
Alternative 2 - Institutional Controls (SMP, MNA)
Alternative 3 – Excavation and Offsite Disposal
Alternative 4 – In Situ Solidification
Alternative 5 – Excavation and Onsite Solidification.

3.1 <u>Description of Alternatives</u>

3.1.1 Alternative 1 – No Action

Alternative 1 includes no remediation activities at the site.

Size and Configuration

- There are no remediation elements to the No Action alternative.

Time for Remediation

- There would be no time associated with this alternative.

Spatial Requirements

- There would be no spatial requirements for this alternative.

Options for Disposal

- There would be no disposal requirements for this alternative.

Permit Requirements

- There would be no permits required for this alternative.

Limitations

- The absence of remediation may impact future Site use.

Impacts on Fish and Wildlife Resources

- This alternative would not have an impact on fish and wildlife resources.

3.1.2 Alternative 2 – Institutional Controls

Alternative 2 includes no remediation activities at the site. MNA would be conducted over the long-term (assumed 30-year period), and an SMP would be developed to identify the institutional and engineering controls necessary for protection to human health and environment from contamination present at the Site.

Size and Configuration

- The SMP would be prepared by a professional engineer and include:

  1. environmental easements restricting the use and redevelopment of the Site, and restricting the use of groundwater as a source of potable water.
  2. controls and procedures necessary for soil characterization, handling, and health and safety measures, to manage residual risks present at the site including those related to contaminated soils that may be excavated from the Site during future construction activities; and
  3. an evaluation of the potential need for vapor intrusion monitoring and mitigation per NYSDOH air guidance for future structures developed on the Site.

- In the absence of remediation, MNA would include:

  1. monitoring to assess the effectiveness of natural attenuation processes in reducing the concentration of contaminants present in soil and groundwater at the Site.
  2. an annual round of water samples from the existing groundwater monitoring wells and soil samples from within each of the identified exceedance areas (i.e., Area A, Area B, etc.) would be collected and analyzed for Target Compound List and Target Analyte List (TCL/TAL) parameters.

Time for Remediation

- The easements and controls of the SMP would continue indefinitely.
- Long-term monitoring is assumed to continue for a period of 30 years.

Spatial Requirements

- There would be no spatial requirements for this alternative.

Options for Disposal

- There would be no substantial disposal requirements for this alternative. Disposal of materials collected during sampling and analysis would be minimal.

Permit Requirements

- There would be no permits required for this alternative.

Limitations

- Easements within the SMP in the absence of remediation may impact future Site use.

Impacts on Fish and Wildlife Resources

- This alternative would not have an impact on fish and wildlife resources.

3.1.3 Alternative 3 – Excavation and Offsite Disposal

Alternative 3 includes excavation of the identified remediation areas on Figure 3 to the indicated depths. An estimated 27,411 cy of soil would be excavated and transported offsite for disposal. PCB-contaminated sludge and material excavated from SWMU 10 – Resin Dust Landfill (potential asbestos-containing waste) would be disposed offsite at appropriate facilities. The majority of the proposed excavations are relatively shallow (i.e., 0-3'). However, within several areas, excavation to depths of up to 6' is proposed. Excavations greater than 3' may require excavation support such as shoring. All concrete slabs and foundations encountered in the subsurface once soil excavation activities commenced would be removed as part of the environmental remediation efforts. Confirmation samples would be collected within each excavation area from the bottom and sidewalls. Excavated soil would be subject to waste characterization testing prior to offsite disposal.

Size and Configuration

- Components of the Site Management Plan were detailed in Section 3.1.2. Following soil excavation, provisions of the SMP would be less stringent than for Alternative 2.
- Alternative 3 includes excavation and offsite disposal of approximately 27,411 cy of contaminated soil.
- All work will be performed within one construction season during non-winter months and within standard 8-hour work days, 5 days per week (22 days per month).

- Air monitoring will be performed during remediation and personal protection equipment (PPE) levels may need to be upgraded based on action levels indicated within the Health and Safety Plan. It is assumed that all work may be performed using Level D PPE.
- Water encountered during excavation, decontamination water, and any other potentially contaminated water will be collected in an onsite frac tank for solids separation and potential treatment by a carbon system prior to discharge to the Town of Tonawanda Waste Water Treatment Plant (TTWTP).
- Confirmation sampling within each excavation area will be conducted from the sidewalls and the bottom.
- Subsurface concrete slabs and foundations encountered during the course of environmental remediation will be removed to facilitate excavation activities. Concrete may be crushed onsite, stockpiled, sampled, and if it meets restricted residential soil criteria, it may be used as onsite backfill. If it does not meet criteria, it will be disposed offsite.
- Additional crushed concrete from slab and foundation removals outside the area of remediation meeting criteria may be used as backfill.
- Excavated materials from the Resin Dust Landfill within Area AE will be segregated, re-analyzed for hazardous waste characteristics and for asbestos prior to off-site disposal. During Supplemental Investigation sampled material met TCLP and RCRA criteria.
- Excavated soils would typically contain metals and/or PAHs with localized areas containing PCBs. Disposal requirements will be determined based on waste characterization testing.
- Site restoration includes backfilling and rough grading, as necessary, with onsite (i.e., OU7 clayey silt) soil. At a minimum, the top 12 inches to finished grade will consist of soil.
- The surface will be seeded for erosion control.

Time for Remediation

- The easements and controls of the SMP would continue indefinitely.
- Construction is estimated to be completed in less than 1 year.

Spatial Requirements

- Adequate space is available onsite for construction equipment and necessary stockpiling.

Options for Disposal

- Excavated soil will be characterized and disposed off-site. Concrete would be characterized prior to acceptance as onsite backfill or disposed offsite.

- Excavated materials from the Resin Dust Landfill, or other highly contaminated areas discovered during the IRM, will be disposed offsite following appropriate characterization testing.

Permit Requirements

- Permit requirements for offsite transportation and disposal would have to be met.

Limitations

- The final Site grading plan will be developed following completion of backfilling, rough grading, and a Site survey.
- Truck traffic on neighborhood roadways would have to be coordinated with the local community.

Impacts on Fish and Wildlife Resources

- This alternative would not have an impact on fish and wildlife resources.

3.1.4 Alternative 4 – In Situ Solidification, SMP

Alternative 4 includes in situ solidification of the identified areas of remediation on Figure 3 to the indicated depths. The majority of remediation areas are relatively shallow. A backhoe bucket could be used to mix soil and reagents, solidifying the contaminated soil. Fugitive dust control and monitoring would be carefully conducted for the protection of the community. All subsurface slabs and foundations would have to be removed prior to ISS activities as part of environmental remediation efforts and to facilitate the ISS process. Due to a soil volume increase resulting from the ISS process, swell material will either be re-used onsite as backfill material or disposed offsite.

Size and Configuration

- Components of a Site Management Plan were detailed in Section 3.1.2. Following soil remediation, provisions of the SMP would be less stringent than for Alternative 2.
- Alternative 3 includes in situ solidification of approximately 27,411 cy of contaminated soil.
- Bench-scale testing would be required prior to onsite solidification, utilizing site-specific in situ solidification techniques in order to develop an appropriate soil/reagent mixture.
- Excess solidified material will be disposed offsite.

Time for Remediation

- The easements and controls of the SMP would continue indefinitely.
- Construction is estimated to be completed in less than 1 year.

Spatial Requirements

- Adequate space is available onsite for construction equipment and necessary stockpiling.

Options for Disposal

- Swell material would be characterized prior to offsite disposal.
- Crushed concrete would be characterized prior to acceptance as onsite backfill.
- Excavated materials from the Resin Dust Landfill, or other highly contaminated areas discovered during the IRM, will be disposed offsite following appropriate characterization testing.

Permit Requirements

- Permit requirements for offsite transportation and disposal would have to be met.

Limitations

- The final Site grading plan will be developed following completion of backfilling, rough grading, and a Site survey.
- Truck traffic on neighborhood roadways would have to be coordinated with the local community.

Impacts on Fish and Wildlife Resources

- This alternative would not have an impact on fish and wildlife resources.

3.1.5 Alternative 5 – Excavation and Onsite Solidification, Replace Onsite, SMP

Alternative 5 combines excavation with above-ground onsite solidification. This increases the effectiveness of the solidification process by significantly reducing the mobility of contaminants from the soil matrix. Alternative 5 includes excavation of the identified areas of remediation on Figure 3 to the indicated depths. An estimated 27,411 cy of soil would be excavated and stockpiled onsite. Excavations greater than 3’ may require excavation support such as shoring. All slabs and foundations encountered in the subsurface once soil excavation activities commenced would be removed as part of environmental remediation efforts, crushed and reused onsite. As proposed, excavated soil should be screened and homogenized to a size of less than

2”. Homogenized soil, water, and solidifying reagents would be combined in a mixer onsite. Resulting material would be stockpiled while curing. Fugitive dust control and monitoring would be carefully conducted for the protection of the community. Solidified material is proposed to be used onsite as backfill in excavation areas below a depth of 1’. Solidified material for which there is no identified onsite reuse would be disposed offsite.

Size and Configuration

- Components of the Site Management Plan were detailed in Section 3.1.2. Following soil remediation, provisions of the SMP would be less stringent than for Alternative 2.
- Alternative 4 includes excavation and ex situ solidification of approximately 27,411 cy of contaminated soil with onsite reuse as backfill.

Time for Remediation

- The easements and controls of the SMP would continue indefinitely.
- Construction is estimated to be completed in less than 1 year.

Spatial Requirements

- Adequate space is available onsite for construction equipment and necessary stockpiling.

Options for Disposal

- Swell material would be characterized prior to offsite disposal.
- Crushed concrete would be characterized prior to acceptance as onsite backfill.
- Excavated materials from the Resin Dust Landfill, or other highly contaminated areas discovered during the IRM, will be disposed offsite following appropriate characterization testing

Permit Requirements

- Permit requirements for offsite transportation and disposal would have to be met.

Limitations

- The final Site grading plan will be developed following completion of backfilling, rough grading, and a Site survey.
- Truck traffic on neighborhood roadways would have to be coordinated with the local community.

Impacts on Fish and Wildlife Resources

- This alternative would not have an impact on fish and wildlife resources.

3.2 Description of Evaluation Criteria

Each of the alternatives is subjected to a detailed evaluation with respect to the criteria outlined in 6 NYCRR Part 375 and described below. This evaluation aids in the selection process for remedial actions in New York State.

3.2.1 Overall Protection of Public Health and the Environment

This criterion is an assessment of whether the alternative meets requirements that are protective of human health and the environment. The overall assessment is based on a composite of factors assessed under other evaluation criteria, particularly long-term effectiveness and performance, short-term effectiveness, and compliance with SCGs. This evaluation focuses on how a specific alternative achieves protection over time and how site risks are reduced. The analysis includes how the source of contamination is to be eliminated, reduced, or controlled.

3.2.2 Compliance with Standards, Criteria, and Guidance (SCGs)

This criterion determines whether or not an alternative complies with applicable environmental laws and SCGs pertaining to site contaminants and location.

3.2.3 Long-Term Effectiveness and Permanence

This criterion addresses the performance of a remedial action in terms of its permanence and the quantity/nature of waste or residuals remaining at the site after implementation. An evaluation is made on the extent and effectiveness of controls required to manage residuals remaining at the site and the operation and maintenance systems necessary for the remedy to remain effective.

3.2.4 Reduction of Toxicity, Mobility or Volume with Treatment

This criterion assesses the remedial alternative's use of technologies that permanently and significantly reduce contaminant toxicity, mobility, or volume (TMV) as their principal element. Preference is given to remedies that permanently and significantly reduce TMV.

3.2.5 Short-Term Effectiveness

This criterion assesses the impacts of the alternative during the construction and implementation phases with respect to the effect on human health and the environment. Factors that are assessed include protection of the workers and the community during remedial action, environmental impacts that result from the remedial action, and the time required until the RAOs are achieved.

3.2.6 Implementability

This criterion addresses the technical and administrative feasibility of implementing the alternative and the availability of services and materials required including: the feasibility of construction and operation, the reliability of the technology, the ease of undertaking additional remedial action, monitoring considerations, activities needed to coordinate with regulatory agencies, availability of adequate equipment, services and materials, offsite treatment, and storage and disposal services.

3.2.7 Cost

Capital costs and operation, maintenance and monitoring (OM&M) costs (where applicable) are estimated for each alternative and presented on a present worth basis based on a 5% discount rate.

3.2.8 Community and State Acceptance

Concerns of the State and the Community will be addressed separately in accordance with the public participation program developed for this Site.

3.3 <u>Detailed Analysis of Alternatives</u>

3.3.1 Alternative 1 – No Action

Overall Protection of Public Health and the Environment

Alternative 1 is not protective of human health or the environment.

Compliance with Standards, Criteria, and Guidance (SCGs)

Alternative 1 does not comply with the cleanup criteria developed for the Site.

Long-Term Effectiveness and Permanence

Alternative 1 is not an effective or permanent remedy for the contaminants present at the Site. Residual contamination would exist at current concentrations and levels.

Reduction of Toxicity, Mobility or Volume with Treatment

Alternative 1 does not reduce the toxicity, mobility or volume of contaminants present at the Site, except through natural attenuation processes.

Short-Term Effectiveness

Alternative 1 poses the fewest short-term impacts to workers and the community from construction activities. RAOs will not be met.

Implementability

Alternative 1 would be the most implementable due to the lack of construction activities or controls.

Cost

There is no cost associated with the No Action alternative.

3.3.2 Alternative 2 – Institutional Controls

Overall Protection of Public Health and the Environment

Alternative 2 is not protective of human health or the environment except through easements and institutional controls to reduce exposure pathways.

Compliance with Standards, Criteria, and Guidance (SCGs)

Alternative 2 does not comply with the cleanup criteria developed for the Site.

Long-Term Effectiveness and Permanence

Alternative 2 is not an effective or permanent remedy for contaminants present at the Site. Residual contamination would exist at current concentrations and levels. The SMP would include easements and institutional and engineering controls to reduce exposure pathways and protect human health and the environment from future onsite activities.

Reduction of Toxicity, Mobility or Volume with Treatment

Alternative 2 does not reduce the toxicity, mobility or volume of contaminants present at the Site, except through natural attenuation processes.

Short-Term Effectiveness

Alternative 2 poses no short-term impacts to workers and the community from construction since only monitoring is proposed. RAOs will not be met.

Implementability

Alternative 2 would be implementable due to the lack of construction activities included, but institutional and engineering controls would require regulatory approval.

Cost

The cost of the development of the Site Management Plan and long-term monitoring associated with MNA is summarized on Table 3. A discount rate of 5% is assumed to develop the present worth cost over a 30-year period.

3.3.3 Alternative 3 – Excavation and Offsite Disposal

Overall Protection of Public Health and the Environment

Alternative 3 is protective of human health and the environment and would meet SCGs for soil. There would be minimal residual contamination below a depth of 6'.

Compliance with Standards, Criteria, and Guidance (SCGs)

Soil SCGs would be met over the majority of the Site following excavation and offsite disposal of soil exceeding criteria.

Long-Term Effectiveness and Permanence

Excavating contaminated soil would be effective for the site-specific contaminants, and permanent in the long term. Additional remedial measures would not be required at the Site.

Reduction of Toxicity, Mobility or Volume with Treatment

Excavation and offsite disposal of contaminated soil would significantly reduce the volume of contaminants at the Site.

Short-Term Effectiveness

Soil excavation would pose short-term impacts on workers, the nearby community, and the environment. Health and safety measures such as air monitoring, dust control, and erosion control would be necessary during construction to mitigate any impacts. The RAOs for soil to eliminate or reduce site contamination and the potential for exposure, and for air/soil vapor to prevent or mitigate the potential for exposure, would be met upon completion of excavation activities, anticipated to be within one year. The RAO for groundwater would be met through continued enforcement of the groundwater use restrictions as part of the environmental easement..

Implementability

Excavation with onsite re-use and offsite disposal are widely-used, conventional remedial technologies. Equipment and trained personnel should be readily available. Based upon previous sampling and analysis, excavated material should be classified as non-hazardous and acceptable to transport and dispose as non-hazardous material. Adequate health and safety measures must be undertaken for the proposed remediation which will occur within a residential neighborhood.

Cost

The cost of Alternative 3 with excavation and offsite disposal is summarized on Table 4.

3.1.4 Alternative 4 – In Situ Solidification

Overall Protection of Public Health and the Environment

Alternative 4 is protective of human health and the environment as the potential for exposure to contaminants present in soil and air/soil vapor is significantly reduced.

Compliance with Standards, Criteria, and Guidance (SCGs)

Soil SCGs would not be met with solidification due to the fact that while the potential for exposure is reduced, the contaminants are not removed from the soil.

Long-Term Effectiveness and Permanence

In situ solidification of contaminated soil would be effective for the site-specific contaminants, which generally consist of metals. Solidification can be conducted to remediate contaminants at varying depths across the Site including those at greater than 6’. A (soil) cover would have to be maintained over the solidified mass to prevent erosion and potential leaching of contaminants. Additional remedial measures would not be required at the Site as long as construction restrictions in solidified areas detailed in the SMP were enforced. The RAO for groundwater would be met through continued enforcement of the groundwater use restrictions as part of the environmental easement.

Reduction of Toxicity, Mobility or Volume with Treatment

In situ solidification would bind the contaminants into a solidified mass and reduce the mobility of contaminants.

Short-Term Effectiveness

In situ solidification of the large volume of contaminated soil would pose short-term impacts on workers, the nearby community, and the environment. Health and safety measures such as air monitoring, dust control, and erosion control would be necessary during construction to mitigate any impacts. The RAOs for soil to eliminate or reduce the potential for exposure, and for air/soil vapor to prevent or mitigate the potential for exposure, would be met upon completion of solidification activities anticipated to be within one year. The RAO for groundwater would be met through continued enforcement of the groundwater use restrictions as part of the environmental easement.

Implementability

In situ solidification is a remedial technology commonly used for metal-contaminated sites. Bench-scale testing would have to be conducted to determine an adequate mixture of solidifying agents to effectively bind the site-specific contaminants to the soil matrix. Once an effective admixture was determined, equipment and trained personnel should be available. Any swell material generated during the process requiring offsite disposal should be acceptable to transport and dispose as non-hazardous material. Adequate health and safety measures must be undertaken for the proposed remediation which will occur within a residential neighborhood.

Cost

The cost of in situ solidification, as well as the cost of the development of the SMP is summarized on Table 5.

3.1.5 Alternative 5 – Excavation and Onsite Solidification, Replace Onsite

Overall Protection of Public Health and the Environment

Alternative 5 is protective of human health and the environment as the potential for exposure to contaminants present in soil and air/soil vapor is significantly reduced.

Compliance with Standards, Criteria, and Guidance (SCGs)

Soil SCGs would not be met with solidification due to the fact that while the potential for exposure is reduced, the contaminants are not removed from the soil.

Long-Term Effectiveness and Permanence

Ex situ solidification of contaminated soil would be effective for the site-specific contaminants, which generally consist of metals. A (soil) cover would have to be maintained over the areas where solidified material was placed to prevent erosion and potential leaching of contaminants. Additional remedial measures would not be required at the Site as long as construction restrictions in solidified areas detailed in the SMP were enforced. The RAO for groundwater would be met through continued enforcement of the groundwater use restrictions as part of the environmental easement.

Reduction of Toxicity, Mobility or Volume with Treatment

Ex situ solidification would bind the contaminants to the soil particles which would be replaced onsite, and reduce the mobility of contaminants.

Short-Term Effectiveness

Excavation and ex situ solidification of the large volume of contaminated soil would pose additional short-term impacts on workers, the nearby community, and the environment due to double handling of excavated material. Health and safety measures such as air monitoring, dust control, and erosion control would be necessary during construction to mitigate any impacts.

The RAOs for soil to eliminate or reduce the potential for exposure, and for air/soil vapor to prevent or mitigate the potential for exposure, would be met upon completion of remediation activities anticipated to be within one year. The RAO for groundwater would be met through continued enforcement of the groundwater use restrictions as part of the environmental easement.

Implementability

Solidification is a remedial technology used for metal-contaminated sites. Bench-scale testing would have to be conducted to determine an adequate mixture of solidifying agents to effectively bind the site-specific contaminants to the soil matrix. Once an effective admixture was determined, equipment and trained personnel should be available. Any swell material generated during the process and requiring offsite disposal will be classified as non-hazardous and acceptable to transport and dispose as non-hazardous material. Adequate health and safety measures must be undertaken for the proposed remediation which will involve both excavation and solidification processes, and occur within a residential neighborhood.

Cost

The cost of ex situ solidification of material exceeding criteria with replacement onsite, as well as the cost of the development of the SMP is summarized on Table 6.

3.4 Comparative Analysis of Alternatives

3.4.1 Overall Protection of Public Health and the Environment

Alternative 3 provides the greatest overall protection to human health and the environment as contaminated soil is removed from the Site, meets soil SCGs to the greatest extent, and the potential for exposure to contaminants present in soil and air/soil vapor is eliminated. Residual soil exceeding criteria in limited areas (i.e., at depths greater than 6’) would not present a human health risk.

3.4.2 Compliance with Standards, Criteria, and Guidance (SCGs)

Alternative 3 complies with soil SCGs to the greatest extent since contaminated soil is excavated and removed from the Site. Remaining alternatives do not comply with soil SCGs.

3.4.3 Long-Term Effectiveness and Permanence

Alternative 3 is the most effective and permanent alternative. It does not rely on engineering controls to prevent leaching of contaminants from a solidified mass, or on construction restrictions in solidified material areas.

3.4.4 Reduction of Toxicity, Mobility or Volume with Treatment

Alternative 3 significantly reduces the volume of contaminants at the Site while Alternatives 4 and 5 reduce the mobility of contaminants at the Site.

3.4.5 Short-Term Effectiveness

Alternatives 3 and 5 pose the greatest short-term impacts to workers, the community, and the environment, Alternative 5 more so than Alternative 3 due to double handling of the material. Adequate health and safety measures must be undertaken with Alternatives 3, 4 and 5 to monitor air, dust, control dust, and limit truck traffic. The RAOs for soil to eliminate or reduce the potential for exposure, and for air/soil vapor to prevent or mitigate the potential for exposure would be met to the greatest extent upon completion of excavation activities with Alternative 3. Alternatives 4 and 5 would reduce the potential for exposure by solidifying contaminants with soil, reducing the potential for exposure. The RAO for groundwater would be met through continued enforcement of the groundwater use restrictions as part of the environmental easement for all alternatives except Alternative 1.

3.4.6 Implementability

Alternative 1 would be the most implementable alternative, followed by Alternative 2. Bench-scale testing would have to be conducted to determine an adequate mixture of solidifying agents to effectively bind the site-specific contaminants to the soil matrix for Alternatives 4 and 5. A qualified vendor with a proven record would have to be selected to perform solidification for Alternatives 4 and 5. Excavation and offsite disposal for Alternative 3 are widely-used, conventional remedial technologies. Equipment and trained personnel should be readily available.

3.4.7 Cost

As shown on Tables 3 through 6, Alternative 1 has no cost associated with it. Alternative 2, which has a long-term monitoring component, has a total present worth of $592,000. Alternative 3 has a capital cost of $4,225,000. Alternative 4 has a capital cost of $5,357,000. Alternative 5 has a capital cost of $5,806,000.

3.5 Recommended Remedial Alternative

Alternative 1 - No Action, and Alternative 2 - Institutional Controls, were rejected because they do not provide protection to human health and the environment, do not meet SCGs, and do not satisfy RAOs for soil, soil vapor, or groundwater except through institutional and engineering controls and easements of the Site Management Plan.

Alternatives 3, 4 and 5 include controls and easements of the Site Management Plan; however, these controls and easements would be less stringent than for the Institutional Controls Alternative. Alternatives 3, 4, and 5 differ in their approach to remediating soil source material as discussed below.

Alternatives 3, 4 and 5 would all be protective of human health and the environment and meet Site RAOs. All three alternatives would be implementable and require health and safety measures to protect workers and the community during remediation; however, Alternatives 4 and 5 would require bench-scale testing to develop an effective site-specific mixture to immobilize contaminants. Due to the relatively shallow depth of remediation required, and the close proximity of a facility willing to accept excavated material, Alternative 3 presents a lower estimated cost than Alternatives 4 and 5.

Alternatives 3 and 5 include excavation of identified contaminated soil. Alternative 3 includes offsite disposal of excavated soil at a nearby facility thereby meeting soil SCGs and significantly reducing the volume of contaminants. Alternative 3 would result in the least amount of residual contamination as compared to Alternatives 4 and 5. Alternatives 4 and 5 include onsite soil solidification resulting in reduced contaminant mobility. Soil SCGs would not be met for Alternatives 4 and 5.

Based on the evaluation, Alternative 3 – Excavation and Offsite Disposal with an SMP is the recommended remedy for OU6. Alternative 3 is protective of human health and the environment, meets SCGs over the majority of the Site, and results in limited residual soil contamination which would be managed by an environmental easement and the SMP. By including an SMP, Alternative 3 meets RAOs for soil, soil vapor, and groundwater. This work can be conducted as an IRM in order to expedite site remediation.

4.0 <u>IRM Methods</u>

4.1.1 Excavation

All excavation and backfill work will be conducted by the IRM Contractor utilizing temporary facilities and controls outlined in the Plans and Specifications for protection of on-site workers and the off-site migration of contamination. Such controls include, but are not limited to, safety fencing, physical hazards, dewatering, erosion controls, dust suppression, and particulate and vapor monitoring.

OU6 excavation work will be conducted using a grader/bulldozer or backhoe. Excavation will remove the soil and concrete to the identified depth. Excavated soil will be characterized for landfill permit requirements and disposed off-site. Prior to disposal, soil will be staged either in roll-off boxes or in a polyethylene lined staging area. Dewatering (as discussed in Section 4.1.5) will be conducted as necessary to prevent contaminant migration to adjacent areas through surface runoff and to meet the water moisture requirements of the off-site disposal facility. The disposition of excavated concrete is discussed in Section 4.1.2.

Proposed IRM excavation areas and volumes are based upon boring information and sampling results already performed. During excavation activities, the NYSDEC may require an increase or decrease in the proposed IRM excavation depths and/or limits as determined by site conditions and confirmation sample results which will be compared to the Part 375 restricted residential soil cleanup objectives listed in Table 1. Existing active utilities will be protected.

In conjunction with removal of contaminated soil, concrete slabs, piers, foundation walls and footings, will be removed and segregated as discussed in Section 4.1.2. Confirmatory excavation endpoint samples will be collected from the sidewalls and bottom of the excavations. In shallow excavations, the confirmation samples will be collected using dedicated, disposable polyethylene sample scoops. Dedicated (i.e., disposable) sampling equipment is for one-time use and will not require decontamination. Sidewall samples collected from excavation depths greater than 4 feet will be collected using a backhoe or similar equipment.

NYSDEC DER-10 Section 5.4 specifies excavation endpoint sampling for subsurface spills at a frequency of every 30 linear feet of perimeter. However, DER-10 recognizes that the sampling frequency may be reduced for larger excavations. In consideration of the anticipated size of the planned excavations, a sampling frequency of one sidewall sample per every 100 feet of sidewall and one bottom sample per every 10,000 square feet of bottom should be protective of future site users and the environment. It is anticipated that excavation termination sidewalls and bottoms will be in native clay/silt soils. Where possible, a visual observation will be conducted prior to confirmation sampling. Sidewall/bottom sample locations will be biased toward areas of highest expected contamination as determined by visual evidence of fill characteristics, staining, odors, or photoionization detector (PID) readings. Confirmation samples will be analyzed for location-specific parameters determined by the contaminant(s) exceeding SCGs in each specific remediation Area. A summary of the expected confirmation sampling is presented on Table 7. Quality Assurance Project Plan (QAPP) requirements for confirmation sampling are described in Section 6 of this Work Plan.

The excavation will remain open until confirmation sample results are returned and it is determined that endpoints comply with the site remedial objectives. Upon completion of the excavation work, final limits and final depths of the excavation will be surveyed as will the locations of all final confirmation samples.

4.1.2 Concrete Removal and On-site Crushing

Concrete slabs, piers, foundation walls and footings encountered during excavation will be removed, crushed and characterized for potential on-site re-use as backfill material. Concrete shall be crushed in accordance with Specification 02235 Recycled Crushed Materials which indicates that:

- Crushed recycled concrete materials shall conform to the following gradation specification:

Sieve Size U.S. Standard	Percent Passing By Weight
1-1/2" square	100
3/4" square	40-75
1/4 inch	25-50
No. 40	5-20
No.200	10 max

- Recycled concrete materials used or stockpiled on site shall be uniform in quality and free from wood, steel, roots, bark or other extraneous material. In addition, the recycled concrete materials shall meet the following requirements: Los Angeles Abrasion, 500 rev. 35% max, Sand Equivalent 30 min.

Crushed concrete will be sampled and characterized prior to use as on-site backfill at a minimum frequency of one sample per 500 cy. Crushed concrete must meet Part 375 restricted residential soil criteria to be considered for onsite re-use. Crushed concrete not meeting such criteria will be appropriately disposed off-site.

4.1.3 Asbestos and/or Hazardous Waste

The interior bagged resin dust landfill area (SWMU 10) was discovered within Area AE-2. A sample of the bagged waste material was collected and analyzed for hazardous waste characteristics and for asbestos. The material was determined to be non-hazardous by meeting TCLP and RCRA criteria. Asbestos was not detected in the material.

The Health and Safety Plan and Community Air Monitoring Plan will include any additional measures and controls necessary to address the potential for asbestos and/or hazardous waste which may be present in this localized area. Additional sampling and analysis will be performed on material excavated from this area for characterization purposes. Samples will be analyzed for asbestos, and TCLP and RCRA parameters.

4.1.4 Off-Site Disposal

The IRM Contractor has the responsibility of determining the means and methods of, and providing the labor, equipment, and materials necessary for transporting both solid and liquid waste materials from the Site to the off-site disposal facilities. All materials to be transported off-site for disposal will have been properly characterized through visual observation and sampling and laboratory analysis for disposal purposes. All soil/fill excavated from remediation areas at the Site will be loaded into trucks for transport to the approved off-site disposal facilities. Disposal approvals will be obtained from the off-site facilities prior to transport.

Saturated soils will meet moisture content limits established by the disposal facility through either dewatering efforts or suitable admix material. Materials will be covered and conveyed during transportation in equipment that is properly designed, equipped, operated, and maintained to prevent leakage, spillage or airborne emissions during transport.

4.1.5 Water Management

The groundwater table is generally below the anticipated depth of excavation. It is possible that groundwater and/or perched water may be encountered during excavation activities, or that precipitation may impact excavation activities. Dewatering may be necessary to prevent contaminant migration to adjacent areas through surface runoff, and/or meet the soil moisture requirements for the off-site disposal facility. The IRM Contractor will perform dewatering as necessary during the course of the project.

On-site equipment cleaning will generate potentially-contaminated wash water. The IRM Contractor will collect wash water as provided for in the Plans and Specifications.

Water collected during dewatering and wash activities will be conveyed to an on-site frac tank for solids separation. Collected solids will be disposed off-site in the manner similar to excavated soil, potentially requiring a suitable admix material to meet moisture content requirements.

Liquids from the frac tank will be characterized for potential discharge to the Town of Tonawanda Waste Water Treatment Plant (TTWWTP). The TTWWTP requires that all water discharged to their sewer system be treated by a carbon system prior to discharge. The Contractor shall be responsible for analytical testing required by the TTWWTP prior to discharge. The IRM Contractor is responsible for maintaining the frac tank and carbon unit in order to meet appropriate influent requirements.

4.1.6 Backfill, Rough Grading and Demarcation Layer

Once excavation is completed within each area and confirmation sample locations/ excavation limits have been surveyed, excavated areas will be backfilled and rough graded. On-site soil from clean borrow areas and/or on-site crushed concrete may be used as backfill material provided it meets Part 375 restricted residential soil criteria provided in Table 1. At a minimum, 1 sample will be collected:

- From each on-site borrow area.
- From every 500 cubic yards of backfill material
- From every stockpile of crushed concrete.

It is anticipated that sufficient quantities of backfill are available within the Spaulding property. If necessary, offsite material may be imported to the Site for use as backfill providing it meets the physical properties that wil be detailed in the project backfill Specification, it meets Part 375 restricted residential soil cleanup criteria, and the off-site source must be approved by NYSDEC. Samples will be collected from each offsite borrow source at a minimum frequency of one per 500 cubic yards and analyzed for Part 375 parameters to demonstrate compliance with restricted residential criteria.

Rough grading may be performed in conjunction with, or in lieu of, backfilling using on-site soil from clean areas in order to reduce ponding and control surface water across the Site. Seeding excavated areas will be done following Final Site Grading.

Crushed concrete backfill is limited to below the top 1 foot of finished grade per NYSDEC site-specific requirements.

A demarcation layer (e.g., poly liner) will be placed in all excavated areas along the sides and bottom of excavated surfaces prior to backfilling.

4.1.7 Site Safety and Monitoring

The IRM work will be conducted in accordance with the Site-specific Health and Safety Plan (HASP) developed by LiRo for Site Investigation excavation work. The IRM Contractor conducting the site work will be required to develop a HASP as stringent as or more stringent than LiRo's HASP. A member of the field team will be designated to serve as the on-site Health and Safety Officer and will monitor Health and Safety activities throughout the IRM program.

The HASP includes a Contingency Plan that addresses potential Site-specific emergencies, and a Community Air Monitoring Plan (CAMP) that describes required particulate and vapor monitoring to protect the community during intrusive remediation activities. The HASP and CAMP will be modified as appropriate to ensure that Site remediation excavation activities are performed using procedures that are protective of workers and the community. The CAMP will be consistent with the requirements for community air monitoring at remediation sites as established by the NYSDOH and NYSDEC.

4.1.8 Permits and Approvals

The IRM Contractor is responsible for obtaining all permits and approvals for the purposes of the project.

4.2 IRM Schedule

Key milestones of the IRM schedule are detailed below:

- Complete Draft Plans and Specifications (4 wks) – Month 1
- Plan review and revisions (3 wks) – Month 2
- Issue bid documents (1 wk) – Month 2
- Bid period (3 wks) – Month 3
- Bid review and award (1 wk) – Month 3
- IRM site construction work – Month 4 through Month 12.

5.0 IRM REPORTING

5.1 Construction Monitoring

A LiRo Engineer or Scientist will be on-site on a full-time basis to document the IRM activities. Such documentation will include at a minimum, daily reports of IRM activities, community air monitoring results, photographs and sketches.

Standard daily reporting procedures will include preparation of a daily report and, when appropriate, problem identification and corrective measures reports. Information that may be included on the daily report form includes:

- Approximate confirmation sampling locations (sketches) and sample designations.
- Processes and locations of construction under way.
- Equipment and personnel working in the area, including subcontractors.
- Approximate volume and description of materials excavated (i.e., soil, fill, concrete, other).
- Number and type of truckloads of material removed from the Site.
- On-site backfill and rough grading activities.
- A description of off-site materials received.

The completed reports will be submitted to the NYSDEC as part of the Final IRM Report. Photo documentation of the IRM activities will be prepared by the Engineer or Scientist throughout the duration of the project as necessary to convey typical work activities and whenever changed conditions or unexpected circumstances are encountered.

5.2 Closeout Report

Details of completion of IRM construction will be documented in an IRM Closure Report submitted to the NYSDEC. The IRM Report will be stamped by a professional Engineer and will include (at a minimum):

- Text describing the IRM activities performed; a description of any deviations from the Work Plan and associated corrective measures taken; and other pertinent information necessary to document that Site activities were carried out in accordance with this Work Plan.

- A Site map showing the remediated areas including significant Site features and identification of backfill areas and locations of the demarcation layer.

- Tabular quantity summaries of: volume of soil/fill and concrete excavated; disposition of excavated soil/fill and concrete; and, volume/type/source of backfill.

- Tabular comparison of water characterization analytical results compared to TTWWTP influent requirements.

- Tabular comparison of backfill and disposal characterization analytical results to SCGs.

- Map showing locations of all confirmation samples and other sampling locations with sample identification.

- Tabular comparison of confirmation analytical results to SCGs.

- Documentation on the disposition of material removed from the Site.

- Copies of daily inspection reports and, if applicable, problem identification and corrective measure reports.

- Photo documentation of IRM activities.

6.0 QUALITY ASSURANCE PROJECT PLAN (QAPP)

Quality assurance procedures for IRM work and confirmation sampling will comply with the Spaulding Fibre Site Investigation QAPP prepared by LiRo (dated October 17, 2007). Table 7 specifies the sampling and analysis frequency and schedule for IRM confirmation sampling. NYSDEC Analytical Services Protocol (ASP) Category B data deliverables will be required for the IRM confirmation sampling.

7.0 PROFESSIONAL ENGINEER SIGNATURE

Martin J. Wesolowski, P.E.
Project Engineer

TABLES AND FIGURES

TABLE 1
CHEMICAL-SPECIFIC SCGs for OU6
SPAULDING FIBRE

Compound	NYSDEC Part 375 Restricted Residential	NYSDEC TAGM 4046 Value
VOCs	Concentration in mg/kg	
Benzene	4.8	NA
SVOCs	Concentration in mg/kg	
2-Methylnaphthalene	NC	36.4
Acenaphthene	100	NA
Acenaphthylene	100	NA
Anthracene	100	NA
Benzo[a]pyrene	1	NA
Benzo[g,h,i]perylene	100	NA
Benzo[a]anthracene	1	NA
Benzo[b]fluoranthene	1	NA
Benzo[k]fluoranthene	3.9	NA
bis(2-Ethylhexyl)phthalate	NC	50
dimethyl phthalate	NC	2
Chrysene	3.9	NA
Di-n-butylphthalate	NC	8.1
Dibenzofuran	59	NA
Dibenzo(a,h)anthracene	0.33	NA
Fluorene	100	NA
Fluoranthene	100	NA
Indeno(1,2,3-cd)pyrene	0.5	NA
Naphthalene	100	NA
Phenanthrene	100	NA
Pyrene	100	NA
Total SVOCs		500
PCBs	Concentration in mg/kg	
Aroclor 1016	1	NA
Aroclor 1242	1	NA
Aroclor 1248	1	NA
Aroclor 1260	1	NA
Total PCBs	1	NA
Metals	Concentration in mg/kg	
Arsenic	16	NA
Barium	400	NA
Cadmium	4.3	NA
Chromium (trivalent)	180	NA
Copper	270	NA
Lead	400	NA
Manganese	2000	NA
Mercury	0.81	NA
Nickel	310	NA
Silver	180	NA
Zinc	10000	NA

Notes:
NC - No criteria
TAGM 4046 criteria used when Part 375 is NC.
NA - not applicable

Table 2
Operable Unit 6
Restricted Residential Soil Cleanup Objective Exceedances

Sample ID	Contaminant	Concentration (mg/kg)	Criteria (mg/kg)
SI			
1F (1-2)	barium	455	400
	chromium (total)	199	110*
2F (1-2)	barium	417	400
	chromium (total)	145	110*
2N (4-5)	barium	404	400
	chromium (total)	118	110*
4F (0-1)	benzo(a)anthracene	72	1
	benzo(a)pyrene	57	1
	benzo(b)fluoranthene	73	1
	benzo(k)fluoranthene	22	3.9
	chrysene	69	3.9
	dibenzo(a,h)anthracene	4.8	0.33
	fluoranthene	150	100
	indeno(1,2,3)cdpyrene	40	0.5
	phenanthrene	150	100
	pyrene	130	100
	arsenic	47	16
	barium	810	400
	cadmium	8.96	4.3
	chromium (total)	209	110*
	copper	770	270
	lead	1190	400
	Aroclor-1254	17	1
4F (2-3)	arsenic	34.9	16
7F (1-1.5)	benzo(a)anthracene	2.3	1
	benzo(a)pyrene	1.9	1
	benzo(b)fluoranthene	2.5	1
	indeno(1,2,3)cdpyrene	1	0.5
13N (2-3)	zinc	24100	10000
14F (1-2)	arsenic	23.2	16
	copper	301	270
	manganese	2050	2000
	zinc	19800	10000
14N (3-4)	zinc	39600	10000
17F (1-2)	manganese	2020	2000

Note:

*** 110 mg/kg criteria is for hexavalent chromium only**

Table 2
Operable Unit 6
Restricted Residential Soil Cleanup Objective Exceedances

Sample ID	Contaminant	Concentration (mg/kg)	Criteria (mg/kg)
17N (5-6)	manganese	2800	2000
18F (1-2)	benzo(a)pyrene	1.2	1
	benzo(b)fluoranthene	1.4	1
	indeno(1,2,3)cdpyrene	1.1	0.5
19N (1-2)	copper	351	270
	zinc	21400	10000
22F (1-2)	cadmium	5.63	4.3
	zinc	20900	10000
22N (2-3)	cadmium	43.3	4.3
	zinc	26700	10000
24N (7-9)	zinc	24100	10000
25F (7-9)	zinc	55300	10000
28N (4-6)	cadmium	5.44	4.3
29F (1-2)	cadmium	4.37	4.3
	Aroclor-1248	1.2	1
30F (2-4)	cadmium	8.64	4.3
32N (7-9)	cadmium	4.53	4.3
34F (1-2)	copper	496	270
	mercury	1.3	0.81
44N (1.5-3)	barium	404	400
51F (3-5)	cadmium	7.38	4.3
	lead	410	400
52N (5-7)	benzene	9.8	4.8
	arsenic	21.9	16
52N (13-15)	benzene	25	4.8
52.1F (19-21)	benzene	26	4.8

Note:

*** 110 mg/kg criteria is for hexavalent chromium only**

Table 2
Operable Unit 6
Restricted Residential Soil Cleanup Objective Exceedances

Sample ID	Contaminant	Concentration (mg/kg)	Criteria (mg/kg)
53F (0-4)	benzo(a)anthracene	3.2	1
	benzo(a)pyrene	3.2	1
	benzo(b)fluoranthene	4.1	1
	indeno(1,2,3)cdpyrene	2.1	0.5
54F (3-5)	benzo(a)anthracene	1.6	1
	benzo(a)pyrene	1.2	1
	benzo(b)fluoranthene	1.5	1
	indeno(1,2,3)cdpyrene	0.84	0.5
57F (2-4)	chromium (total)	216	110*
	manganese	3580	2000
57N (4-6)	cadmium	13.4	4.3
58F (0-2)	benzo(a)anthracene	18	1
	benzo(a)pyrene	14	1
	benzo(b)fluoranthene	18	1
	indeno(1,2,3)cdpyrene	7.9	0.5
	benzo(k)fluoranthene	6.1	3.9
	chrysene	16	3.9
	Aroclor-1248	2.2	1
58F (4-6)	copper	274	270
	zinc	11100	10000
58.1F (2-4)	cadmium	4.5	4.3
58.1N (11-12)	zinc	11000	10000
66F (0-0.5)	benzo(a)anthracene	1.8	1
	benzo(a)pyrene	1.5	1
	benzo(b)fluoranthene	1.9	1
	indeno(1,2,3)cdpyrene	0.81	0.5
67F (0-0.5)	Aroclor-1248	1.7	1
76F (3-4)	cadmium	12.8	4.3
	lead	481	400
	Aroclor-1248	2	1
77N (1-2)	zinc	23200	10000
79N (3-4)	cadmium	6.3	4.3
82F (0-2)	cadmium	4.88	4.3

Note:

*** 110 mg/kg criteria is for hexavalent chromium only**

Table 2
Operable Unit 6
Restricted Residential Soil Cleanup Objective Exceedances

Sample ID	Contaminant	Concentration (mg/kg)	Criteria (mg/kg)
83F (0-2)	Aroclor-1248	2.6	1
	cadmium	4.72	4.3
84F (1-2)	arsenic	51.7	16
85F (0-1)	benzo(a)anthracene	77	1
	benzo(a)pyrene	66	1
	benzo(b)fluoranthene	75	1
	benzo(k)fluoranthene	20	3.9
	chrysene	71	3.9
	dibenzo(a,h)anthracene	3.8	0.33
	fluoranthene	230	100
	indeno(1,2,3)cdpyrene	47	0.5
	phenanthrene	270	100
	pyrene	170	100
	barium	787	400
	cadmium	6.63	4.3
	copper	1950	270
	lead	653	400
	zinc	12600	10000
85N (2-3)	indeno(1,2,3)cd-pyrene	0.63	0.5
TP-27 (0"-60")	benzo(a)anthracene	2.1	1
	benzo(a)pyrene	1.8	1
	benzo(b)fluoranthene	2.4	1
	indeno[1,2,3-cd]pyrene	0.62	0.5
	cadmium	6.38	4.3
	copper	789	270
	lead	412	400
TP-28 (0"-36")	barium	636	400
TP-59 (2"-8")	benzo(a)anthracene	1.1	1
	benzo(a)pyrene	1.1	1
	benzo(b)fluoranthene	1.6	1
	indeno[1,2,3-cd]pyrene	0.84	0.5
	arsenic	216	16
	barium	1770	400
	cadmium	108	4.3
	chromium (total)	275	110*
	copper	37200	270
	lead	3440	400
	mercury	5.8	0.81
	nickel	324	310
	zinc	49000	10000

Note:

*** 110 mg/kg criteria is for hexavalent chromium only**

Table 2
Operable Unit 6
Restricted Residential Soil Cleanup Objective Exceedances

Sample ID	Contaminant	Concentration (mg/kg)	Criteria (mg/kg)
TP-65 (0"-16")	arsenic	32.7	16
	copper	1090	270
	lead	715	400
	mercury	3.6	0.81
	zinc	20700	10000
SP-18 (comp)	arsenic	18.3	16
SP-19 (comp)	copper	2020	270
	mercury	1	0.81
SP-21 (comp)	arsenic	26.1	16
	barium	686	400
	cadmium	229	4.3
	chromium (total)	115	110*
	copper	12700	270
	lead	941	400
	mercury	3.4	0.81
	nickel	457	310
	zinc	25000	10000
SP-22 (comp)	barium	1410	400
	copper	23600	270
P-43	manganese	2330	2000
P-44	cadmium	7.23	4.3
	zinc	42700	10000
P-60	benzo(a)anthracene	41	1
	benzo(a)pyrene	39	1
	benzo(b)fluoranthene	50	1
	benzo(k)fluoranthene	18	3.9
	chrysene	38	3.9
	dibenzo(a,h)anthracene	2.4	0.56
	indeno[1,2,3-cd]pyrene	24	0.5
	arsenic	132	16
	copper	569	270
	mercury	5.3	0.81
P-61	cadmium	10.5	4.3
	zinc	73700	10000

Note:

*** 110 mg/kg criteria is for hexavalent chromium only**

Table 2
Operable Unit 6
Restricted Residential Soil Cleanup Objective Exceedances

Sample ID	Contaminant	Concentration (mg/kg)	Criteria (mg/kg)
FD1	Aroclor-1248	84	1
FD2	Aroclor-1248	12	1
FD3	Aroclor-1248	5.3	1
FD4	Aroclor-1248	12	1
Sump A	Aroclor-1248	150	1
Sump B	Aroclor-1248	430	1
SD-01	Aroclor-1248	6.49	1
SD-02	Aroclor-1248	8.48	1
SD-03	Aroclor-1248	11.7	1
Supplemental Investigation		**Concentration (mg/kg)**	**Criteria (mg/kg)**
C-4 (0-1')	copper	1580	270
G-4 (0'2')	arsenic	28.2	16
M-1 (0-6")	benzo(a)pyrene	19	1
	benzo(a)anthracene	23	1
	benzo(b)fluoranthene	28	1
	benzo(k)fluoranthene	7.7	3.9
	chrysene	20	3.9
	dibenzo(a,h)anthracene	2.3	0.33
	indeno(1,2,3-cd)pyrene	8.5	0.5
AA-4 (1'-2')	arsenic	31.2	16
AC-4 (2'-3')	cadmium	7.4	4.3
AD-2 (7.5'-8.5')	zinc	14700	10000
AE-2 (3'-5')	Aroclor 1254	1.2	1
	cadmium	15.2	4.3
AF-2 (1.5'-2')	cadmium	15.7	4.3
	zinc	18000	10000
AF-3 (0-2')	cadmium	6.16	4.3
	zinc	10400	10000

Note:

*** 110 mg/kg criteria is for hexavalent chromium only**

Sample ID	Contaminant	Concentration (mg/kg)	Criteria (mg/kg)
AG-1 (7')	zinc	96200	10000
AG-3 (1.5'-2')	zinc	57200	10000
AJ-3 (1'-2')	cadmium	4.51	4.3
	zinc	17200	10000
AK-2 (1'-2')	benzo(a)pyrene	1.5	1
	benzo(a)anthracene	1.5	1
	benzo(b)fluoranthene	1.9	1
	indeno(1,2,3-cd)pyrene	0.88	0.5
AK-5 (4'-6')	zinc	25500	10000
AK-6 (4'-6')	cadmium	7.9	4.3
	zinc	19600	10000
BB-1 (0-2')	benzo(a)pyrene	1.2	1
	benzo(a)anthracene	1.3	1
	benzo(b)fluoranthene	1.5	1
	indeno(1,2,3-cd)pyrene	0.74	0.5
BF-1 (1'-2')	barium	444	400
	chromium (total)	219	110
	chromium (trivalent)	259	180
BF-2 (1'-2')	barium	514	400
	chromium (total)	227	110
	chromium (trivalent)	258	180
BF-3 (1'-2')	barium	462	400
	chromium (total)	227	110
	chromium (trivalent)	268	180
BG-1 (0-2')	barium	477	400
	chromium (total)	232	110
	chromium (trivalent)	275	180
BG-2 (0-2')	barium	480	400
	chromium (total)	176	110
	chromium (trivalent)	215	180
BI-1 (3'-5')	cadmium	9.09	4.3

Note:

*** 110 mg/kg criteria is for hexavalent chromium only**

Table 2
Operable Unit 6
TAGM #4046 Soil Cleanup Objective Exceedances

Sample ID	Contaminant	Concentration (mg/kg)	Criteria (mg/kg)
SI			
4F (0-1)	di-n-butylphthalate	260	8.1
	dimethyl phthalate	3	2
14F (1-2)	di-n-butylphthalate	8.3	8.1
49F (0-2)	di-n-butylphthalate	530	8.1
52.1F (1-3)	di-n-butylphthalate	9.6	8.1
53F (0-4)	di-n-butylphthalate	280	8.1
56N (1-2)	di-n-butylphthalate	50	8.1
58F (0-2)	di-n-butylphthalate	210	8.1
67F (0-0.5)	di-n-butylphthalate	230	8.1
83F (0-2)	di-n-butylphthalate	440	8.1
Suplemental Investigation		**Concentration (mg/kg)**	**Criteria (mg/kg)**
G-1 (0-2')	di-n-butylphthalate	43	8.1
BC-4 (3.5')	di-n-butylphthalate	17	8.1

TABLE 3
OU6 ALTERNATIVE 2 - INSTITUTIONAL CONTROLS
COST ESTIMATE
Spaulding Fibre

ITEM NO.	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT COST	TOTAL COST
1	**Monitoring**				
1a	Labor (1 event per year)	MH	60	$55	$3,300
1b	Equipment	LS	1	$500	$500
1c	Groundwater analysis (TCL/TAL)	EA	15	$600	$9,000
1d	Soil analysis (TCL/TAL)	EA	38	$600	$22,800
1e	Reporting	LS	1	$2,500	$2,500
	Annual OM&M Cost				$38,100
	Present worth of MNA (Factor for 30 years @ 5% interest is 15.27)				$582,000
2	**Site Management Plan**	LS	1	$10,000	$10,000
	Item 2 subtotal				
	TOTAL PRESENT WORTH				**$592,000**

TABLE 4
OU6 ALTERNATIVE 3 - EXCAVATION AND OFFSITE DISPOSAL
COST ESTIMATE
Spaulding Fibre

ITEM NO.	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT COST	TOTAL COST
1	**Site Management Plan**	LS	1	$10,000	$10,000
	Item 1 subtotal				**$10,000**
2	**Health and Safety Requirements**				
2a	On-site Health and Safety Officer	DAY	90	$750	$67,500
2b	Temporary Office	Month	10	$1,000	$10,000
2c	Personal Protective Equipment (PPE) Level D	Day	90	$0	$0
2d	Personal Air-Monitoring	Day	90	$275	$24,750
2e	Project Submittals (Utilities, Schedules, Survey, HASP)	LS	1	$15,000	$15,000
	Item 2 subtotal				**$117,250**
3	**Excavation and Disposal/Treatment**				
3a	Top slab and basement wall removal within soil remediation areas	CY	6,675	$50	$333,750
3b	Foundation and foundation wall removal within soil remediation areas	CY	3,780	$100	$378,000
3c	On-site concrete crushing (80%) for 3j*	CY	8,364	$12	$100,368
3d	Off-site disposal (20%) concrete*	CY	2,091	$81	$169,371
3e	Remove and Dispose Resin Dust Landfill Material (500 cy)	Tons	750	$150	$112,500
3f	Remove and Dispose PCB-contaminated Sludge (750 cy)	Tons	1,125	$150	$168,750
3g	Excavation to a max depth of 6 feet**	CY	26,162	$10	$261,620
3h	Excavation Support (if necessary)	LS	1	$9,000	$9,000
3i	Transport and Dispose of Non - Hazardous Contaminated Soils to Tonawanda Landfill (En-Sol)	Tons	25,000	$22	$550,000
3j	Transport and Dispose of Non - Hazardous Contaminated Soils	Tons	14,243	$45	$640,935
3k	Placement of on-site backfill, compaction and grading to 1 ft. below finished grade for soil excavation areas	CY	16,042	$12	$192,499
3l	Placement of 1 ft. on-site clean soil to existing grade	CY	11,370	$7	$79,593
3m	Additional on-site backfill, compaction and grading for excavated/concrete areas	CY	2,091	$12	$25,092
3n	Seeding	SY	34,054	$1.50	$51,081
3o	Dewatering during excavation (if necessary)	Gal	15,000	$1.50	$22,500
	Item 3 subtotal				**$3,095,058**
4	**Environmental Consultant**				
4a	Air monitoring, material tracking during excavation, field oversight	Day	100	$520	$52,000
4b	Material sampling for disposal (Assume 1 test every 500 CY)	EA	128	$585	$74,914
4c	Confirmation sampling (sidewall and bottom samples from each Area, duplicates, blanks)	EA	350	$250	$87,500
	Item 4 subtotal				**$214,414**
	Capital Cost Subtotal				**$3,436,722**
	Contingency (20%)				$687,344
	Subtotal				**$4,124,067**
	Engineering Design				$100,000
			TOTAL		**$4,225,000**

Notes:

** Excavation quantity is based on Figure 3.

*** Assume that excavated soil is 1.5 tons/cy; concrete is 1.8 tons/cy.

Unit costs for concrete and soil excavation and disposal are vendor quotes

TABLE 5
OU6 ALTERNATIVE 4 - IN SITU SOLIDIFICATION
COST ESTIMATE
Spaulding Fibre

ITEM NO.	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT COST	TOTAL COST
1	**Site Management Plan**	LS	1	$10,000	$10,000
	Item 1 subtotal				**$10,000**
2	**Health and Safety Requirements***				
2a	On-site Health and Safety Officer	Day	90	$1,200	$108,000
2b	Temporary Office	Month	10	$1,000	$10,000
2c	Personal Protective Equipment (PPE) Level D	Day	90	$0	$0
2d	Personal Air-Monitoring	Day	90	$275	$24,750
2e	Project Submittals (Utilities, Schedules, Survey, HASP)	LS	1	$15,000	$15,000
	Item 2 subtotal				**$157,750**
3	**Bench-Scale Testing for Solidification**				
	On-site Bench-Scale Testing	LS	1	$30,000	$30,000
	Item 3 subtotal				**$30,000**
4	**In Situ Solidification**				
4a	Concrete slab removal (floors and basements)	CY	6,675	$50	$333,750
4b	Foundation removal	CY	3,780	$100	$378,000
4c	Concrete off-site C&D Disposal	CY	10,455	$81	$846,855
4d	Remove and Dispose Resin Dust Landfill Material (500 cy)*	Tons	750	$150	$112,500
4e	Remove and Dispose PCB-contaminated Sludge (750 cy)	Tons	1,125	$150	$168,750
4f	In Situ Solidification**	CY	26,162	$70	$1,831,340
4g	Transport and Dispose Excess Solidified Soils***	Tons	6,541	$45	$294,323
4h	Placement of 1 ft. on-site clean soil to existing grade	CY	11,370	$7	$79,593
4i	Seeding	SY	34,054	$1.50	$51,081
	Item 4 subtotal				**$4,096,191**
5	**Environmental Consultant**				
5a	Air monitoring, material tracking during excavation, field oversight	Day	90	$520	$46,800
5b	Material sampling for disposal (Assume 1 test every 500 CY)	EA	32	$585	$18,796
	Item 5 subtotal				**$65,596**
	Capital Cost Subtotal				**$4,359,538**
	Contingency (20%)				$871,908
	Subtotal				**$5,231,445**
	Engineering Design				$125,000
			TOTAL		**$5,357,000**

* Assume that excavated soil is 1.5 tons/cy; concrete is 1.8 tons/cy.
** Solidification of soil remediation volume minus 7,000 cy slabs/basements within excavation areas
*** Excess soil is from swell material (25% of volume)

TABLE 6
OU6 ALTERNATIVE 5 - EXCAVATION AND SOLIDIFICATION
COST ESTIMATE
Spaulding Fibre

ITEM NO.	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT COST	TOTAL COST
1	**Site Management Plan**	LS	1	$10,000	$10,000
	Item 1 subtotal				**$10,000**
2	**Health and Safety Requirements***				
2a	On-site Health and Safety Officer	Day	100	$1,200	$120,000
2b	Temporary Office	Month	10	$1,000	$10,000
2c	Personal Protective Equipment (PPE) Level D	Day	100	$0	$0
2d	Personal Air-Monitoring	Day	100	$275	$27,500
2e	Project Submittals (Utilities, Schedules, Survey, HASP)	LS	1	$15,000	$15,000
	Item 2 subtotal				**$172,500**
3	**Bench-Scale Testing for Solidification**				
	On-site Bench-Scale Testing	LS	1	$30,000	$30,000
	Item 3 subtotal				**$30,000**
4	**Excavation and Disposal/Treatment**				
4a	Concrete slab removal (floors and basement)	CY	6,675	$50	$333,750
4b	Foundation removal	CY	3,780	$100	$378,000
4c	Concrete off-site C&D Disposal	CY	10,455	$81	$846,855
4d	Remove and Dispose Resin Dust Landfill Material (500 cy)*	Tons	750	$150	$112,500
4e	Remove and Dispose PCB-contaminated Sludge (750 cy)	Tons	1,125	$150	$168,750
4f	Excavation to a max depth of 6 feet**	CY	26,162	$10	$261,620
4g	Excavation Support (if necessary)	LS	1	$9,000	$9,000
4h	Above-ground solidification of excavated soil	CY	26,162	$60	$1,569,720
4i	Transport and Dispose Excess Solidified Soils***	Tons	6,541	$45	$294,323
4j	Replace and compact solidified soil on-site	CY	19,622	$12	$235,458
4k	Placement of 1 ft. on-site clean soil to existing grade	CY	11,370	$7	$79,593
4l	Seeding	SY	34,054	$1.50	$51,081
4m	Dewatering during excavation (if necessary)	Gal	15,000	$1.50	$22,500
	Item 4 subtotal				**$4,363,149**
5	**Environmental Consultant**				
5a	Air monitoring, material tracking during excavation, field oversight	Day	100	$520	$52,000
5b	Material sampling for disposal (Assume 1 test every 500 CY)	EA	32	$585	$18,796
5c	Confirmation sampling (sidewall and bottom samples from each Area, duplicates, blanks)	EA	350	$250	$87,500
	Item 5 subtotal				**$158,296**
	Capital Cost Subtotal				**$4,733,946**
	Contingency (20%)				$946,789
	Subtotal				**$5,680,735**
	Engineering Design				$125,000
			TOTAL		**$5,806,000**

* Assume that excavated soil is 1.5 tons/cy; concrete is 1.8 tons/cy.
** Solidification of soil remediation volume minus 7,000 cy slabs/basements within excavation areas
*** Excess soil is from swell material (25% of volume)

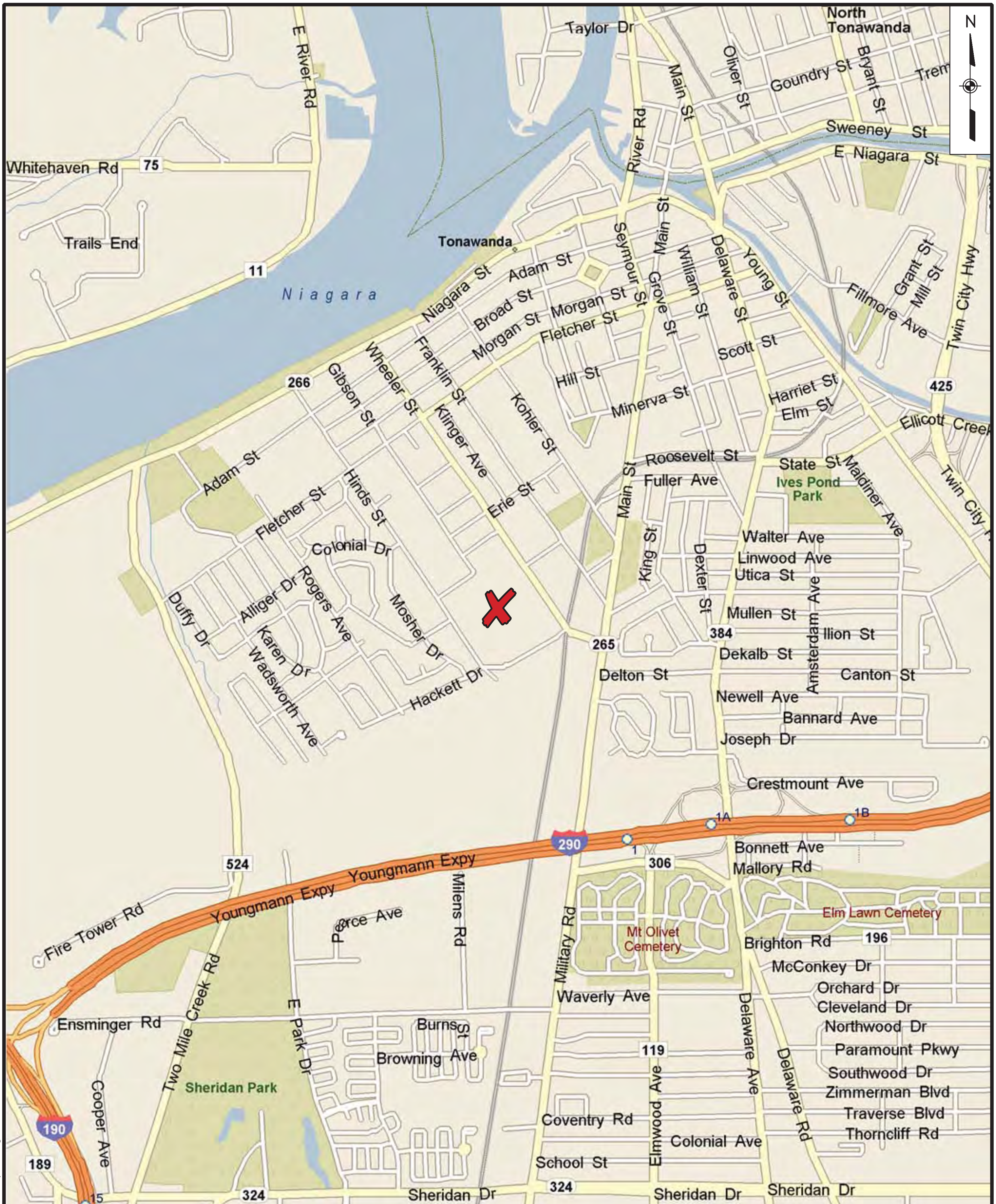
TABLE 7
SUMMARY OF CONFIRMATION SAMPLING - OU6
SPAULDING FIBRE SITE IRM

Remediation Area (Fig 3)	Anticipated Perimeter (LF)	Anticipated Depth (FT)	# Sidewall Samples	Anticipated Bottom Area (Sq Ft)	# Bottom Samples	Confirmation Analysis	Comment
Area C		1	5	20,115	3	PAHs, metals	
Area D (incl Ditch A)		1	6	17,429	3	PAHs, metals; PCBs (ditch only)	2 bottom samples in D; 1 in ditch.
Area E		1	3	5,236	2	PAHs, metals	Areas E and F will touch
Area F		1	3	3,651	2	PAHs, metals	Areas E and F will touch
Area G (incl Ditch B)	340	2	8	6,617	5	As, Cd; PCBs (ditch only)	2 bottom samples in G; 1 in ditch; no sidewall samples in ditch
Area H	60	3	3	400	1	PAHs, metals, PCBs	OU on S
Area K	180	2	4	1,689	2	PAHs	sidewall samples N, E, S, W
Area M	305	4	5	1,458	2	PAHs, Ba, Cd, Cu, Pb	sidewall samples W, N, E, S, and at inside corner of L
Area N		1	4	1,278	2	Ba, Cu	One sidewall per side
Area AA	130	3	3	7,337	2	PAHs, As, Cu, Hg	East sidewall is the only area where soil will be exposed (foundation walls or excavation to north west and south)
Area AB		2	0	4,330	2	PAHs, metals	May need extra bottom sample for overexcavation; shares side with Area AA; buildings on N and S, OU to W
Area AC	80	3	1	7,980	2	Cd, Zn	west sidewall only; east hits OU; south hits AD; north is pit
Area AD	120	3	2	5,412	2	Zn	West and east side sample only; N and S will be excavated
Area AE	90	5	2	7,950	2	PCBs, Cd, Pb	West side sample only; N and S will be excavated; E is tunnel wall
Area AF	260	3	3	7,773	2	Cd, Zn	W, E, N side samples; S hits AG
Area AG	370	3	4	17,320	2	Zn	excavations to N
Area AH	370	3	4	13,925	2	As, Cu, Mn, Zn	OU to South and AG east, sidewall samples on north and west
Area AI		1	4	7,369	2	As, Cu, Hg, Pb, Zn	One sidewall per side
Area AJ-a	230	2	3	20,735	3	Cd, Cu, Zn	Adjacent to excavated area on N, W, S; need sidewall samples only on E
Area AJ-b	800	1	8	34,187	4	Cd, Zn	Sidewall samples at southern end; other sides adjacent to deeper excavated areas
Area AK-a	120	4	2	9,820	2	PAHs, Mn	Sidewall samples at southern end; other sides adjacent to OU or excavated areas
Area AK-b	420	1	5	10,864	2	Cd, Cr, Cu, Zn	Bottom sample per pit area; W sidewall samples only
Area AK-c	180	6	2	6,575	2	Cd, Cr, Cu, Zn	W, N, E sidewall samples
Area AL	120	3	2	6,570	2	PAHs, PCBs, Cd, Cr, Zn	N, W sidewall samples
Area BB	180	4	2	5,950	2	PAHs	W and S sidewall sample only; N and E adjacent to OU
Area BC-a		1	0	2,603	2	Benzene, As	Surrounded by excavation areas and OU
Area BC-b	80	6	3	949	2	Benzene, As	No sidewalls samples; adjacent to OU on E and excavation areas W, N, S
Area BC-c	140	4	2	6,550	2	Benzene, As	Sidewall samples west and south
Area BD	180	3	2	10,760	2	PAHs	Sidewall samples west and south
Area BE	30	4	1	2,027	2	Cd, Pb, Zn	S Sidewall sample only; adjacent to excavation areas W, N, E
Area BF-a	430	4	5	12,308	2	Ba, Cr	Adjacent to excavation area on E
Area BF-b	325	3	4	11,263	2	Ba, Cr	No sample W due to to excavation area on W
Area BH	410	2	5	10,236	2	PAHs, metals	Pit within area 7.5' below floor; sidewalls samples on N, E, S
Area BI	105	5	2	3,707	2	Cd, Pb, Zn	
Area BK	40	2	1	3,880	2	PAHs, PCBs, metals	Sidewall on W
	Total # Proposed Sidewall samples		**113**	**Total # Proposed Sidewall samples**	**77**		

Anticipated # samples	190
Contingency for other are	100
QA/QC	60
Total # Potential sample	**350**

benzene, Method 8260
PAH - polycyclic aromatic hydrocarbons, Method 8270
PCBs - polychlorinated biphenyl, Method 8082
metals - Method 6010/7000
Cr - Chromium total, Chromium III and Chromium VI
As - arsenic, Ba - barium, Cd - cadmium, Cu - copper, Pb - lead, Hg - mercury, Mn - manganese, Zn - zinc

REV-1



LiRo Engineers, Inc.
690 Delaware Ave.
Buffalo, NY 14209

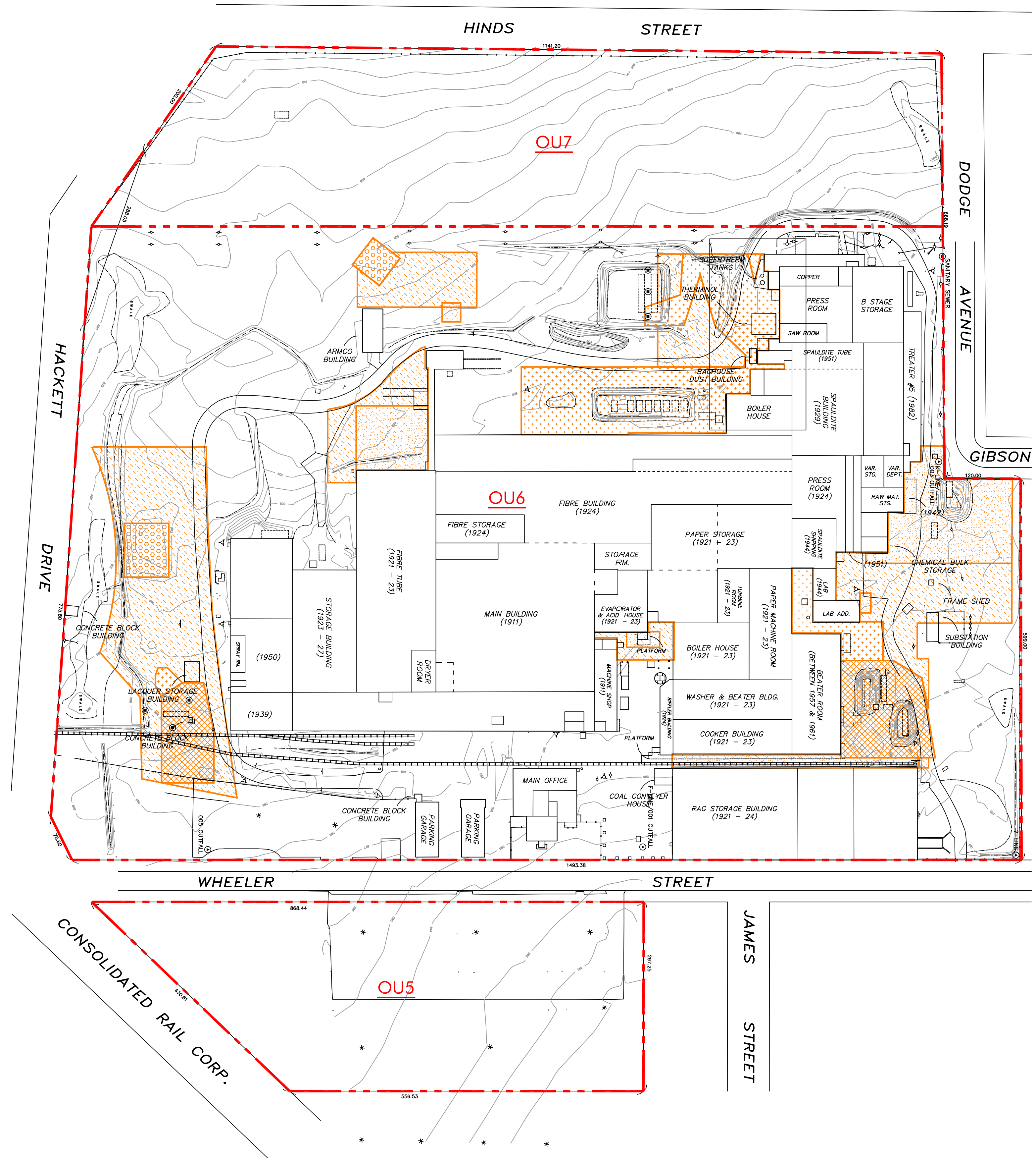
SPAULDING FIBRE SITE LOCATION MAP

FIGURE NO.

1

J:\0725306A Spaulding\CAD\Spaulding Site Loc.ai

REV-1



LEGEND

- OU1: REGULATED WASTES (STATE SUPERFUND–EXCLUDED FROM PROJECT SCOPE)
- OU2: PCB CONTAMINATED WASTES – IRM AREAS (STATE SUPERFUND–EXCLUDED FROM PROJECT SCOPE)
- OU3: PETROLEUM CONTAMINATED WASTES (STATE SUPERFUND–EXCLUDED FROM PROJECT SCOPE)
- OU4: MULTIPLE CONTAMINANT WASTES (STATE SUPERFUND–EXCLUDED FROM PROJECT SCOPE)
- EXPANDED AREA OF CONTAMINATED WASTES (STATE SUPERFUND–EXCLUDED FROM PROJECT SCOPE)
- PROPERTY LIMIT/AREA DEMARCATION

100 0 100

SCALE IN FEET

WARNING

IT IS A VIOLATION OF SECTION 7209, SUBDIVISION 2, OF THE NEW YORK STATE EDUCATION LAW FOR ANY PERSON, OTHER THAN THOSE WHOSE SEAL APPEARS ON THIS DRAWING, TO ALTER IN ANY WAY AN ITEM ON THIS DRAWING. IF AN ITEM IS ALTERED, THE ALTERING ENGINEER SHALL AFFIX TO THE ITEM HIS SEAL AND THE NOTATION "ALTERED BY" FOLLOWED BY HIS SIGNATURE AND THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NO.	DATE	DESCRIPTION

REVISIONS

LiRo Engineers, Inc.
690 Delaware Ave.
Buffalo, New York

PROJ. ENG.:	CLIENT: ECIDA (FOR THE SPAULDING FIBRE COMITTEE)	JOB TITLE AND LOCATION: SPAULDING FIBRE IRM WORKPLAN
DESIGNED BY:		LIRO JOB NO.: 07–25–306A
CHECKED BY:		SHEET OF
DRAWN BY:	DATE: MARCH 2009	SCALE: AS SHOWN
	DRAWING TITLE: SITE PLAN	FIGURE NO. 2

J:\0725306A Spaulding\CAD\IRM Plans\Spaulding Site Plan Fig 2.dwg, 3/27/2009 3:13:41 PM, ES

	SUPPLEMENTAL INVESTIGATION		
AREA ID	AREA (SF)	DEPTH (FT)	VOLUME (CY)
A	–	–	–
B	–	–	–
C	20,115	1	745
D	14,750	1	547
E	5,236	1	194
F	3,651	1	136
G	5,954	2	442
H	400	3	45
K	1,689	2	126
L	–	–	–
M	1,458	4	216
N	1,278	1	48
AA	7,337	3	816
AB	4,330	2	321
AC	7,980	3	887
AD	5,412	3	602
AE	7,950	5	1,473
AF	7,773	3	864
AG	17,320	3	1,925
AH	13,925	3	1,548
AI	7,369	1	273
AJ–a	20,735	2	1,539
AJ–b	34,187	1	1,267
AK–a	9,820	4	1,455
AK–b	10,864	1	403
AK–c	6,575	6	1,462
AL	6,570	3	730
AM	–	–	–
AN*	10,231	2	758*
BA	–	–	–
BB	5,950	4	882
BC–a	2,603	1	97
BC–b	949	6	211
BC–c	6,550	4	971
BD	10,760	3	1,196
BE	2,027	4	301
BF–a	12,308	4	1,824
BF–b	11,263	3	1,252
BH	10,236	2	759
BI	3,707	5	687
BJ	–	–	–
BK	3,880	2	288
TOTAL VOLUME (CY)			27,287
DITCH A	1,984	1	74
DITCH B	1,351	1	50
TOTAL VOLUME (CY)			124

NOTE: * AREA AN IS BEING INCRPORATED INTO NYSDEC SUPERFUND OU. VOLUME IS INCLUDED IN THIS TOTAL AS A CONTINGENCY.

LEGEND

- LIRO ADDITIONAL TEST PIT LOCATIONS
- LIRO TEST PIT LOCATION
- LIRO DRILL (HSA) LOCATION
- LIRO JACKHAMMER LOCATION
- LIRO GEOPROBE LOCATION
- LIRO MONITORING WELL LOCATION
- PREVIOUS RI OVERBURDEN WELL LOCATION
- PREVIOUS RI BEDROCK WELL LOCATION
- PREVIOUS SEDIMENT SAMPLE LOCATION
- PREVIOUS SLUDGE SAMPLE LOCATION
- LIRO PRELIMINARY SOIL SAMPLE LOCATION

RESTRICTED RESIDENTIAL CRITERIA

- METALS EXCEEDANCE
- PAH's EXCEEDANCE
- PCB's EXCEEDANCE
- TAGM SVOC's EXCEEDANCE
- BENZENE EXCEEDANCE
- COMPOSITE SAMPLE EXCEEDANCE
- OU1: REGULATED WASTES (STATE SUPERFUND–EXCLUDED FROM PROJECT SCOPE)
- OU2: PCB CONTAMINATED WASTES – IRM AREAS (STATE SUPERFUND–EXCLUDED FROM PROJECT SCOPE)
- OU3: PETROLEUM CONTAMINATED WASTES (STATE SUPERFUND–EXCLUDED FROM PROJECT SCOPE)
- OU4: MULTIPLE CONTAMINANT WASTES (STATE SUPERFUND–EXCLUDED FROM PROJECT SCOPE)
- EXPANDED AREA OF CONTAMINATED WASTES (STATE SUPERFUND–EXCLUDED FROM PROJECT SCOPE)
- APPROXIMATE EXTENT OF BUTTON ASH
- PROPERTY LIMIT/AREA DEMARCATION

100 0 100
SCALE IN FEET

WARNING

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NO.	DATE	DESCRIPTION

REVISIONS

LiRo Engineers, Inc.
690 Delaware Ave.
Buffalo, New York

PROJ. ENG.: AMM
DESIGNED BY:
CHECKED BY: SF
DRAWN BY: ES

CLIENT: The City of Tonawanda
DATE: SEPTEMBER 2008
SCALE: AS SHOWN

JOB TITLE AND LOCATION: SPAULDING FIBRE DEMOLITION
DRAWING TITLE: SAMPLE LOCATIONS AND REMEDIATION AREAS

LIRO JOB NO.: 08-49-446
SHEET OF
FIGURE NO. 3

REV–1

J:\0725306A Spaulding\CAD\IRM Plans\OU6 IRM\Spaulding Sample Locations Rem Areas.dwg, 6/24/2009 9:23:39 AM, AMK

SP-18 (comp TP-57, TP-58, TP-59)

arsenic	18.3	16

66F (0-0.5)

benzo(a)anthracene	1.8	1
benzo(a)pyrene	1.5	1
benzo(b)fluoranthene	1.9	1
indeno(1,2,3)cdpyrene	0.81	0.5

85F (0-1)

benzo(a)anthracene	77	1
benzo(a)pyrene	66	1
benzo(b)fluoranthene	75	1
benzo(k)fluoranthene	20	3.9
chrysene	71	3.9
dibenzo(a,h)anthracene	3.8	0.33
fluoranthene	230	100
indeno(1,2,3)cdpyrene	47	0.5
phenanthrene	270	100
pyrene	170	100
barium	787	400
cadmium	6.63	4.3
copper	1950	270
lead	653	400
zinc	12600	10000

85N (2-3)

indeno(1,2,3)cd-pyrene	0.63	0.5

67F (0-0.5)

Aroclor-1248	1.7	1

SP-21 (comp TP-66.1, TP-67)

arsenic	26.1	16
barium	686	400
cadmium	229	4.3
chromium (total)	115	110*
copper	12700	270
lead	941	400
mercury	3.4	0.81
nickel	457	310
zinc	25000	10000

1F (1-2)

barium	455	400
chromium (total)	199	110*

2F (1-2)

barium	417	400
chromium (total)	145	110*

2N (4-5)

barium	404	400
chromium (total)	118	110*

83F (0-2)

Aroclor-1248	2.6	1
cadmium	4.72	4.3

4F (0-1)

benzo(a)anthracene	72	1
benzo(a)pyrene	57	1
benzo(b)fluoranthene	73	1
benzo(k)fluoranthene	22	3.9
chrysene	69	3.9
dibenzo(a,h)anthracene	4.8	0.33
fluoranthene	150	100
indeno(1,2,3)cdpyrene	40	0.5
phenanthrene	150	100
pyrene	130	100
arsenic	47	16
barium	810	400
cadmium	8.96	4.3
chromium (total)	209	110*
copper	770	270
lead	1190	400
Aroclor 1254	17	1

4F (2-3)

arsenic	34.9	16

TP-59 (2"-8")

benzo(a)anthracene	1.1	1
benzo(a)pyrene	1.1	1
benzo(b)fluoranthene	1.6	1
indeno[1,2,3-cd]pyrene	0.84	0.5
arsenic	216	16
barium	1770	400
cadmium	108	4.3
chromium (total)	275	110*
copper	37200	270
lead	3440	400
mercury	5.8	0.81
nickel	324	310
zinc	49000	10000

14F (1-2)

arsenic	23.2	16
copper	301	270
manganese	2050	2000
zinc	19800	10000

14N (3-4)

zinc	39600	10000

SP-19 (comp TP-60, TP-61, TP-62)

copper	2020	270
mercury	1	0.81

TP-65 (0"-16")

arsenic	32.7	16
copper	1090	270
lead	715	400
mercury	3.6	0.81
zinc	20700	10000

19N (1-2)

copper	351	270
zinc	21400	10000

79N (3-4)

cadmium	6.3	4.3

NYSDEC PCB Sampling Results

Sludge Sample Location	Conc.
Sump A	150
Sump B	430
OSE-1	19
FD1	84
FD2	12
FD3	5.3
FD4	12

18F (1-2)

benzo(a)pyrene	1.2	1
benzo(b)fluoranthene	1.4	1
indeno(1,2,3)cdpyrene	1.1	0.5

58.1F (2-4)

cadmium	4.5	4.3

58.1N (11-12)

zinc	11000	10000

58F (0-2)

benzo(a)anthracene	18	1
benzo(a)pyrene	14	1
benzo(b)fluoranthene	18	1
indeno(1,2,3)cdpyrene	7.9	0.5
benzo(k)fluoranthene	6.1	3.9
chrysene	16	3.9
Aroclor-1248	2.2	1

58F (4-6)

copper	274	270
zinc	11100	10000

P-43

manganese	2330	2000

57F (2-4)

chromium (total)	216	110*
maganese	3580	2000

57N (4-6)

cadmium	13.4	4.3

28N (4-6)

cadmium	5.44	4.3

77N (1-2)

zinc	23200	10000

54F (3-5)

benzo(a)anthracene	1.6	1
benzo(a)pyrene	1.2	1
benzo(b)fluoranthene	1.5	1

53F (0-4)

benzo(a)anthracene	3.2	1
benzo(a)pyrene	3.2	1
benzo(b)fluoranthene	4.1	1
indeno(1,2,3)cdpyrene	2.1	0.5

52.1F (19-21)

benzene	26	4.8

29F (1-2)

cadmium	4.37	4.3
Aroclor-1248	1.2	1

52N (5-7)

benzene	9.8	4.8
arsenic	21.9	16

52N (13-15)

benzene	25	4.8

NYSDEC PCB Sampling Results

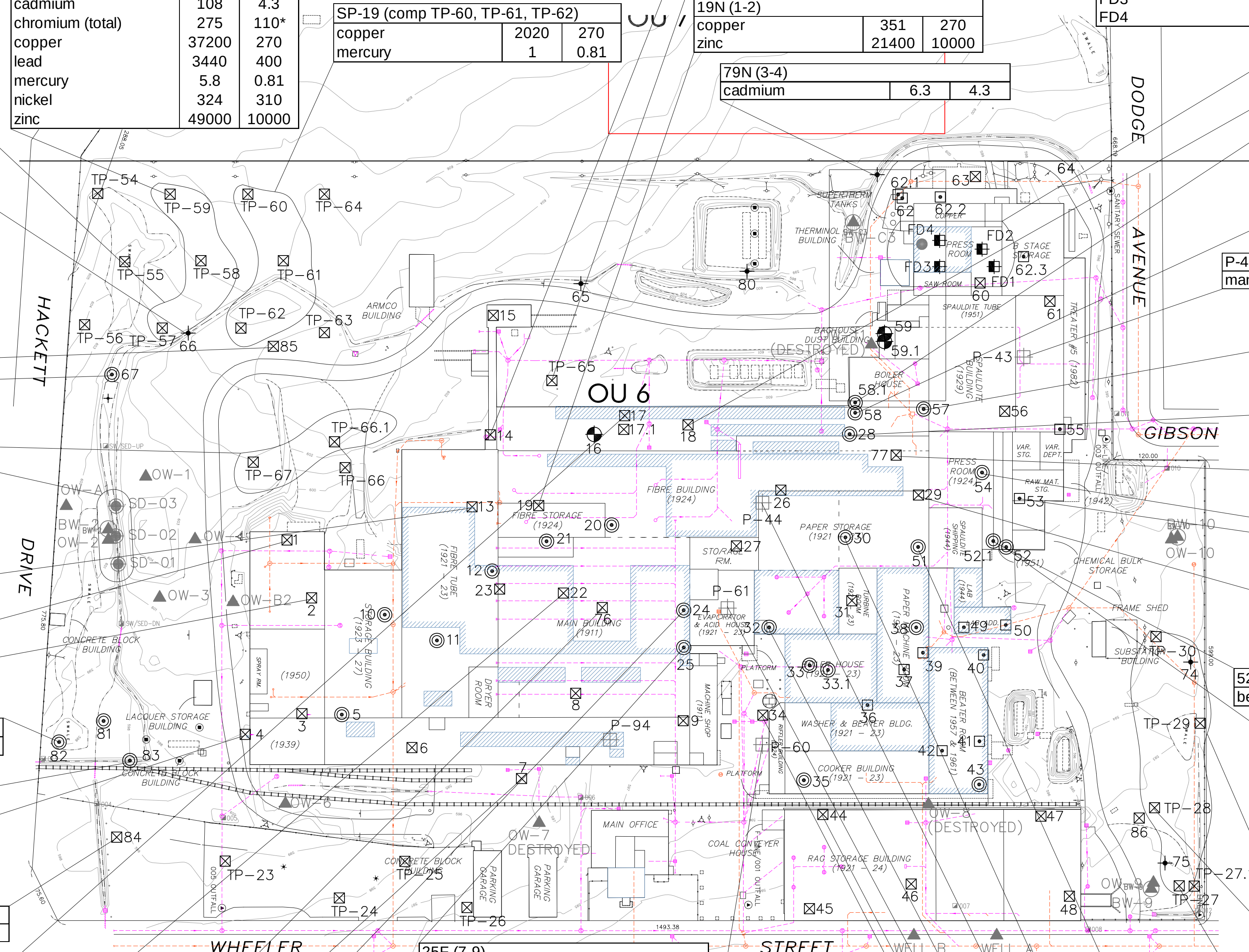
Sediment Sample Loc.	Conc.
SD-01	6.49
SD-02	8.48
SD-03	11.7

13N (2-3)

zinc	24100	10000

82F (0-2)

cadmium	4.88	4.3



SP-22 (comp TP-27,TP-28,TP-29,TP-30)

barium	1410	400
copper	23600	270

TP-28 (0"-36")

barium	636	400

TP-27 (0"-60")

benzo(a)anthracene	2.1	1
benzo(a)pyrene	1.8	1
benzo(b)fluoranthene	2.4	1
indeno'1,2,3-cd]pyrene	0.62	0.5
cadmium	6.38	4.3
copper	789	270
lead	412	400

LEGEND

- ⊠ LIRO TEST PIT LOCATION
- ◎ LIRO DRILL (HSA) LOCATION
- ⊡ LIRO JACKHAMMER LOCATION
- ✛ LIRO GEOPROBE LOCATION
- LIRO MONITORING WELL LOCATION
- ▲ PREVIOUS RI OVERBURDEN WELL LOCATION
- PREVIOUS RI BEDROCK WELL LOCATION

84F (1-2)

arsenic	51.7	16

17F (1-2)

manganese	2020	2000

17N (5-6)

manganese	2800	2000

25F (7-9)

zinc	55300	10000

24N (7-9)

zinc	24100	10000

22F (1-2)

cadmium	5.63	4.3
zinc	20900	10000

22N (2-3)

cadmium	43.3	4.3
zinc	26700	10000

76F (3-4)

cadmium	12.8	4.3
lead	481	400
Aroclor-1248	2	1

7F (1-1.5)

benzo(a)anthracene	2.3	1
benzo(a)pyrene	1.9	1
benzo(b)fluoranthene	2.5	1
indeno[1,2,3-cd]pyrene	1	0.5

P-60

benzo(a)anthracene	41	1
benzo(a)pyrene	39	1
benzo(b)fluoranthene	50	1
benzo(k)fluoranthene	18	3.9
chrysene	38	3.9
dibenzo(a,h)anthracene	2.4	0.56
indeno[1,2,3-cd]pyrene	24	0.5
arsenic	132	16
copper	569	270
mercury	5.3	0.81

34F (1-2)

copper	496	270
mercury	1.3	0.81

44N (1.5-3)

barium	404	400

P-61

cadmium	10.5	4.3
zinc	73700	10000

32N (7-9)

cadmium	4.53	4.3

51F (3-5)

cadmium	7.38	4.3
lead	410	400

30F (2-4)

cadmium	8.64	4.3

P-44

cadmium	7.23	4.3
zinc	42700	10000

18F (1-2) — SAMPLE I.D.
2-methylphenol — CONTAMINANT | 0.25 — DETECTED CONC. (mg/kg) | 0.1 — GUIDANCE CRITERIA (mg/kg)

100 0 100
SCALE IN FEET

NOTE: LISTED SCG IS RESTRICTED-RESIDENTIAL USE CRITERIA

WARNING
IT IS A VIOLATION OF SECTION 7209, SUBDIVISION 2, OF THE NEW YORK STATE EDUCATION LAW FOR ANY PERSON, OTHER THAN THOSE WHOSE SEAL APPEARS ON THIS DRAWING, TO ALTER IN ANY WAY AN ITEM ON THIS DRAWING. IF AN ITEM IS ALTERED, THE ALTERING ENGINEER SHALL AFFIX TO THE ITEM HIS SEAL AND THE NOTATION "ALTERED BY" FOLLOWED BY HIS SIGNATURE AND THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NO.	DATE	DESCRIPTION

REVISIONS

LiRo Engineers, Inc.
690 Delaware Ave.
Buffalo, New York

PROJ. ENG.: AMM
DESIGNED BY:
CHECKED BY:
DRAWN BY: ES

CLIENT:
ECIDA
(FOR THE SPAULDING FIBRE COMITTEE)

DATE: APRIL 2009
SCALE: AS SHOWN

JOB TITLE AND LOCATION:
SPAULDING FIBRE IRM WORKPLAN

DRAWING TITLE:
SITE INVESTIGATIONS
RESTRICTED RESIDENTIAL EXCEEDANCES
OPERABLE UNIT 6

LIRO JOB NO.: 07-25-306A
SHEET OF
FIGURE NO. 4

J:\0725306A Spaulding\CAD\IRM Plans\OU6 IRM\Spaulding Supplemental Inv.dwg, 5/7/2009 10:59:12 AM, AMK

AK-5 (4'-6')		
zinc	25500	10000

AJ-3 (1'-2')		
cadmium	4.51	4.3
zinc	17200	10000

AK-2 (1'-2')		
benzo(a)pyrene	1.5	1
benzo(a)anthracene	1.5	1
benzo(b)fluoranthene	1.9	1
indeno(1,2,3-cd)pyrene	0.88	0.5

AK-6 (4'-6')		
cadmium	7.9	4.3
zinc	19600	10000

C-4 (0-1')		
copper	1580	270

AE-2 (3'-5')		
Aroclor 1254	1.2	1
cadmium	15.2	4.3

AG-3 (1.5'-2')		
zinc	57200	10000

AF-3 (0-2')		
cadmium	6.16	4.3
zinc	10400	10000

AG-1 (7')		
zinc	96200	10000

AD-2 (7.5'-8.5')		
zinc	14700	10000

BB-1 (0-2')		
benzo(a)pyrene	1.2	1
benzo(a)anthracene	1.3	1
benzo(b)fluoranthene	1.5	1
indeno(1,2,3-cd)pyrene	0.74	0.5

BI-1 (3'-5')		
cadmium	9.09	4.3

BF-1 (1'-2')		
barium	444	400
chromium (total)	219	110
chromium (trivalent)	259	180

M-1 (0-6")		
benzo(a)pyrene	19	1
benzo(a)anthracene	23	5.6
benzo(b)fluoranthene	28	5.6
benzo(k)fluoranthene	7.7	3.9
chrysene	20	3.9
dibenzo(a,h)anthracene	2.3	0.33
indeno(1,2,3-cd)pyrene	8.5	0.5

BF-2 (1'-2')		
barium	514	400
chromium (total)	227	110
chromium (trivalent)	258	180

BF-3 (1'-2')		
barium	462	400
chromium (total)	227	110
chromium (trivalent)	268	180

BG-1 (0-2')		
barium	477	400
chromium (total)	232	110
chromium (trivalent)	275	180

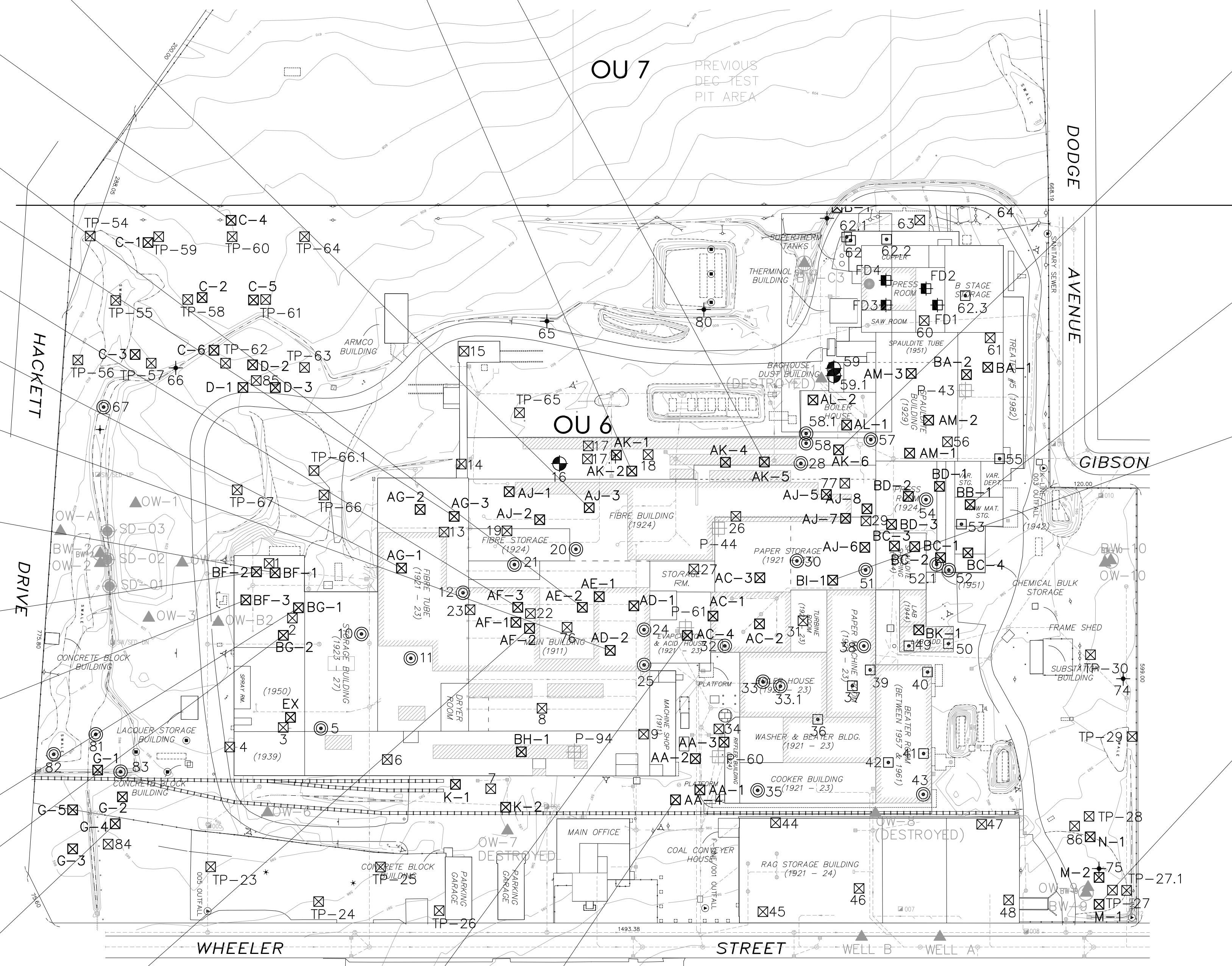
BG-2 (0-2')		
barium	480	400
chromium (total)	176	110
chromium (trivalent)	215	180

G-4 (0-2')		
arsenic	28.2	16

AC-4 (2'-3')		
cadmium	7.4	4.3

AA-4 (1'-2')		
arsenic	31.2	16

AF-2 (1.5'-2')		
cadmium	15.7	4.3
zinc	18000	10000



LEGEND

- LIRO ADDITIONAL TEST PIT LOCATIONS
- LIRO TEST PIT LOCATION
- LIRO DRILL (HSA) LOCATION
- LIRO JACKHAMMER LOCATION
- LIRO GEOPROBE LOCATION
- LIRO MONITORING WELL LOCATION
- PREVIOUS RI OVERBURDEN WELL LOCATION
- PREVIOUS RI BEDROCK WELL LOCATION

18F (1-2)		
2-methylphenol	0.25	0.1

SAMPLE I.D.
GUIDANCE CRITERIA (mg/kg)
DETECTED CONC. (mg/kg)
CONTAMINANT

NOTE: LISTED SCG IS RESTRICTED-RESIDENTIAL USE CRITERIA

100 0 100
SCALE IN FEET

WARNING
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NO.	DATE	DESCRIPTION

REVISIONS

LiRo Engineers, Inc.
690 Delaware Ave.
Buffalo, New York

PROJ. ENG.: AMM
DESIGNED BY:
CHECKED BY:
DRAWN BY: ES

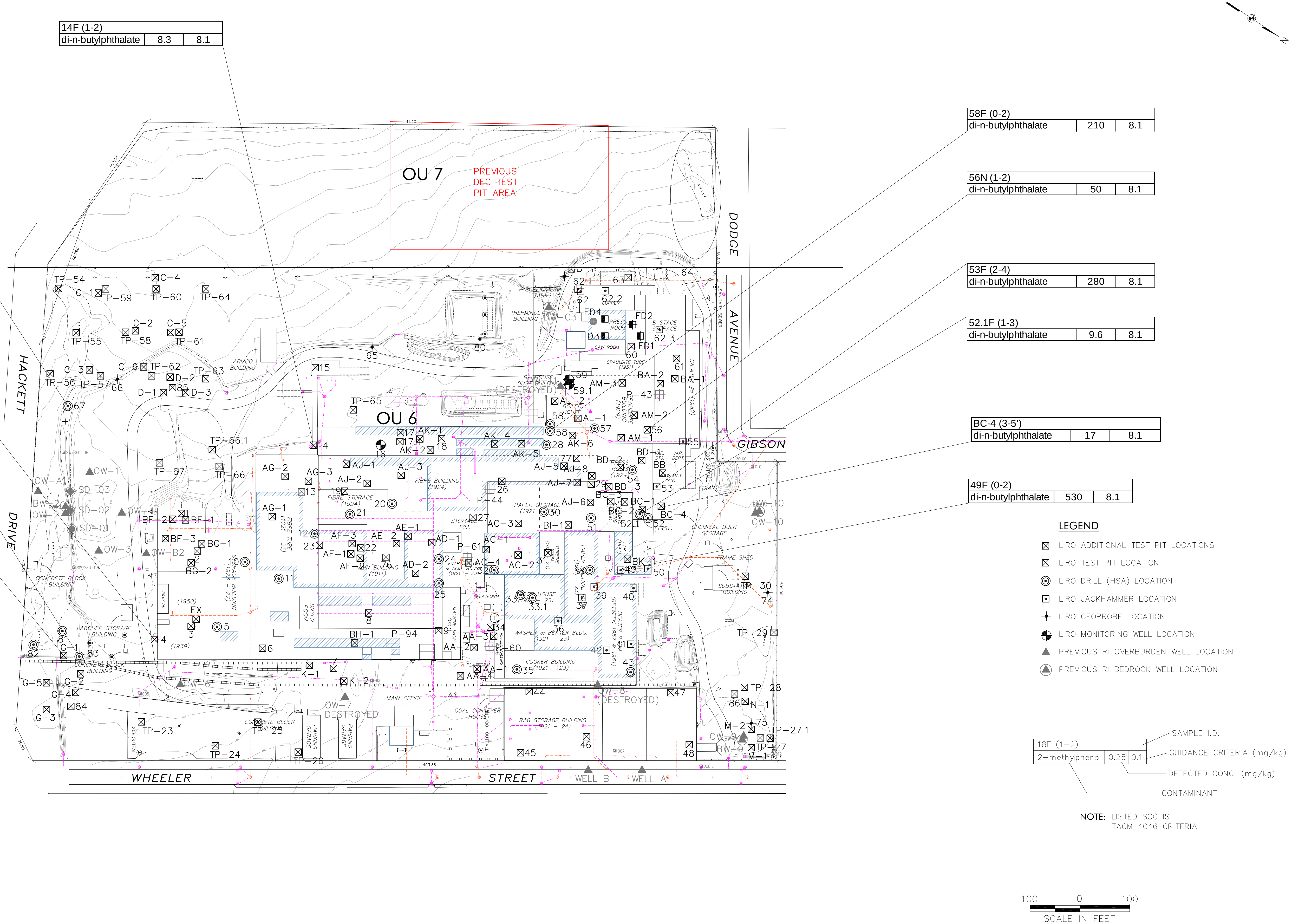
CLIENT:
ECIDA
(FOR THE SPAULDING FIBRE COMITTEE)

DATE: APRIL 2009
SCALE: AS SHOWN

JOB TITLE AND LOCATION:
SPAULDING FIBRE IRM WORKPLAN

DRAWING TITLE:
SUPPLEMENTAL INVESTIGATIONS
RESTRICTED RESIDENTIAL EXCEEDANCES
OPERABLE UNIT 6

LIRO JOB NO.: 07-25-306A
SHEET OF
FIGURE NO. 5



14F (1-2)		
di-n-butylphthalate	8.3	8.1

67F (0-0.5)		
di-n-butylphthalate	230	8.1

4F (0-1)		
di-n-butylphthalate	260	8.1
dimethyl phthalate	3	2

83F (0-2)		
di-n-butylphthalate	440	8.1

G-1 (0-2')		
di-n-butylphthalate	43	8.1

58F (0-2)		
di-n-butylphthalate	210	8.1

56N (1-2)		
di-n-butylphthalate	50	8.1

53F (2-4)		
di-n-butylphthalate	280	8.1

52.1F (1-3)		
di-n-butylphthalate	9.6	8.1

BC-4 (3-5')		
di-n-butylphthalate	17	8.1

49F (0-2)		
di-n-butylphthalate	530	8.1

LEGEND

- LIRO ADDITIONAL TEST PIT LOCATIONS
- LIRO TEST PIT LOCATION
- LIRO DRILL (HSA) LOCATION
- LIRO JACKHAMMER LOCATION
- LIRO GEOPROBE LOCATION
- LIRO MONITORING WELL LOCATION
- PREVIOUS RI OVERBURDEN WELL LOCATION
- PREVIOUS RI BEDROCK WELL LOCATION

18F (1-2)		
2-methylphenol	0.25	0.1

SAMPLE I.D.
GUIDANCE CRITERIA (mg/kg)
DETECTED CONC. (mg/kg)
CONTAMINANT

NOTE: LISTED SCG IS TAGM 4046 CRITERIA

WARNING
IT IS A VIOLATION OF SECTION 7209, SUBDIVISION 2, OF THE NEW YORK STATE EDUCATION LAW FOR ANY PERSON, OTHER THAN THOSE WHOSE SEAL APPEARS ON THIS DRAWING, TO ALTER IN ANY WAY AN ITEM ON THIS DRAWING. IF AN ITEM IS ALTERED, THE ALTERING ENGINEER SHALL AFFIX TO THE ITEM HIS SEAL AND THE NOTATION "ALTERED BY" FOLLOWED BY HIS SIGNATURE AND THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NO.	DATE	DESCRIPTION

REVISIONS

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PROJ. ENG.: AMM
DESIGNED BY:
CHECKED BY:
DRAWN BY: ES

CLIENT:
ECIDA
(FOR THE SPAULDING FIBRE COMITTEE)

DATE: APRIL 2009
SCALE: AS SHOWN

JOB TITLE AND LOCATION:
SPAULDING FIBRE IRM WORKPLAN

DRAWING TITLE:
SITE AND SUPPLEMENTAL INVESTIGATIONS
TAGM 4046 EXCEEDANCES
OPERABLE UNIT 6

LIRO JOB NO.: 07-25-306A
SHEET OF
FIGURE NO. 6

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