PREFERRED PLAN

FOR THE REMEDIATION OF THE FORMER KILGORE MANUFACTURING SITE WESTERVILLE, DELAWARE COUNTY, OHIO

Ohio Environmental Protection Agency
Division of Environmental Response and Revitalization
Central District Office
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Ohio EPA's Division of Environmental Response and Revitalization (DERR) - Assessment, Cleanup & Reuse Section Remedial Response Program	Preferred Plan For the Remediation of the Former Kilgore Manufacturing Site Westerville, Delaware County, Ohio

THE REMEDIAL RESPONSE PROCESS					
(1) Preliminary Assessment & Site Inspection **[Completed]**	**(2)** Remedial Investigation & Feasibility Study **[Completed]**	**(3)** Remedy Selection (Preferred Plan & Decision Document)	**(4)** Remedial Design	**(5)** Remedial Action	**(6)** Remedy Operation, Maintenance & Monitoring

Ohio EPA Announces Preferred Plan

This preferred plan identifies the preferred remedial alternative for the cleanup of the contaminated soil, sediments, and ground water at the former Kilgore Manufacturing Company site and provides the rationale for this preference. The preferred plan also includes summaries of other remedial alternatives evaluated for use at this site. The primary goal is to inform the public about the background and problems posed by the site, and what the Agency proposes to do to clean up the site.

Ohio EPA will select a final remedy for the site after reviewing and considering all information submitted during the public comment period for this preferred plan. Ohio EPA may modify the preferred remedial alternative or select another alternative presented in this preferred plan based on new information or public comments. Therefore, the public is encouraged to review and comment on all the remedial alternatives presented in this preferred plan. Once the final remedial alternative is selected, it will be presented in a decision document for the project which will be available in the locations noted below.

Ohio EPA is issuing this preferred plan in a manner consistent with Section 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). It summarizes information found in detail in the remedial investigation and feasibility study reports and other documents contained in the administrative record file for this site. Ohio EPA encourages the public to review these documents to gain a better understanding of the site and the activities that have been conducted at the site.

Public Comment Period: June 8 – August 4, 2017. Ohio EPA will accept written comments on the preferred plan during the public comment period.

Public Meeting: Ohio EPA will hold a public meeting to explain the preferred plan. Oral and written comments will be accepted at this meeting, which will be held on **Monday, July 24, 2017** at **6 p.m.** at the **Austin E. Knowlton Center for Equine Science, 600 N. Spring Road, Westerville, OH 43082**.

Additional Information: Available from **(1)** Ohio EPA's Central District Office, located at 50 West Town Street, Suite 700, P.O. Box 1049, Columbus, Ohio 43216-1049 or http://www.epa.state.oh.us/derr/EnvironmentalResponseandRevitalization.aspx; and **(2)** locally from the information repository Courtright Memorial Library, 138 West Main Street, Westerville, Ohio 43081, (614) 823-1215, Spring Term: Mon-Thurs 7:45 a.m. - 2:00 a.m., Fri 7:45 a.m. - 6 p.m., Sat 12:00 p.m. - 6 p.m., Sun 12 p.m. - 2 a.m., www.otterbein.edu/public/library.

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TABLE OF ACRONYMS

ACM	Asbestos-Containing Material
AHAC	Asbestos Hazard Abatement Contractor
AOC	Area of Concern
ARARs	Applicable or Relevant and Appropriate Requirements
bgs	Below Ground Surface
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Chemical of Concern
cy	Cubic Yards
DERR	Division of Environmental Response and Revitalization
EcoSSL	Ecological Screening Level
EPA	Environmental Protection Agency
EHQ	Ecological Hazard Quotients
ERA	Ecological Risk Assessment
FS	Feasibility Study
HI	Hazard Index
HQ	Hazard Quotient
LUC	Land Use Control
MCL	Maximum Contaminant Level
MLs	Miscellaneous Locations
MPPEH	Material Potentially Presenting an Explosive Hazard
NCP	National Contingency Plan
NPW	Net Present Worth
ODH	Ohio Department of Health
O&M	Operation and Maintenance
OSWER	U.S. EPA's Office of Solid Waste and Emergency Response
PAHs	Polycyclic Aromatic Hydrocarbons
PLM	Polarized Light Microscopy
ppb	Parts Per Billion
ppm	Parts Per Million
RG	Remediation Goal
RA	Remedial Action
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RDX	Research Department eXplosive or Royal Demolition eXplosive
RG	Remediation Goal
RI	Remedial Investigation
RMD	Risk Management Decision
RMP	Risk Management Plan
RSL	Regional Screening Level
SDWA	Safe Drinking Water Act
SSL	Site Screening Level

TBCs	To Be Considered Criteria
U.S.	United States
UST	Underground Storage Tank

1.0 EXECUTIVE SUMMARY

On April 30, 2012, Otterbein University and the United States of America, United States (U.S.) Department of Defense, and the State of Ohio became subject to a judicial consent decree in the U.S. District Court for the Southern District of Ohio Eastern Division to investigate and develop remedial alternatives for a 40-acre portion of the former 110-acre Kilgore Manufacturing Company facility (also known as the Kilgore Farm) located at 600 North Spring Road, Westerville, Delaware County, Ohio, and anywhere contamination may have migrated (*i.e.*, the site). Tetra Tech, Inc. developed a remedial investigation (RI) work plan to determine where contamination existed at the site and at what concentrations. The RI work plan as amended was approved on March 5, 2013, to investigate the site for potential contamination of surface soil, subsurface soil, ground water, surface water, sediment.

On December 15, 2014, the RI report was approved by the Ohio Environmental Protection Agency (EPA). The RI report documented the existence of contamination at the approximate 40-acre site including areas of concern (AOCs) 1, 2, 3, 4, 5, 6, and 8 that will require a remedy. The primary chemicals of concern (COCs) at the site include metals (antimony, arsenic, barium, chromium, copper, iron, lead, manganese, mercury, strontium, and zinc), dioxins/dibenzofurans, polycyclic aromatic hydrocarbons (PAHs) and asbestos.

A risk assessment conducted to evaluate concentrations of contamination at the site that could impact human health and the environment was approved on December 15, 2014. The current and future human health and environmental risks at this site result from ingestion/direct contact of ground water to human receptors, ingestion/direct contact with soil to humans and ecological receptors, and releases from sediments to ecological receptors.

Based on this information, it was determined that remedial alternatives needed to be developed to address human health and ecological risks posed by the site. On July 7, 2016, Ohio EPA approved the feasibility study (FS), subject to corrections which were made in a final modified FS report submitted on July 20, 2017. The FS identified potential remedial alternatives for the site. As part of the FS, several remedial action objectives (RAOs) for the site were developed to ensure protectiveness of human health and the environment.

All the documents referenced above can be found in the public repositories noted on page 1.

This preferred plan summarizes information on the range of remedial alternatives evaluated, identifies Ohio EPA's preferred remedial alternative, and explains the reasons for selection of the preferred remedial alternative. The preferred plan, which forms the basis for the Decision Document (*i.e.*, the final remedy decision), is based on the Ohio EPA-approved RI and FS reports completed by Tetra Tech, Inc.

Ohio EPA's preferred remedial alternative should yield a permanent solution for risks associated with the contaminated media at the site. The expectations for the preferred alternative include:

- Reduction of human health risks to within acceptable limits, and protection of human health and the environment from exposure to COCs in soil and sediment (See Figures 3 and 4), which exceed acceptable limits.

- Eliminate ground water pathway by instituting a prohibition on ground water extraction.

- Short and long-term protection of public health and the environment.

- Compliance with applicable or relevant and appropriate requirements (ARARs) and to be considered criteria (TBCs).

- Cost-effectiveness and limitation of expenses to what is necessary to achieve the preferred alternative expectations.

The major components of the preferred remedial alternative include soil and sediment excavation, land use controls (LUCs) restricting the use of the property, prohibiting ground water use at the property, and requiring actions to prevent exposure to asbestos containing materials (ACM), if any, in a wetland area.

These measures will protect public health and the environment by reducing risk to acceptable levels once the remedial action objectives have been achieved. See **Appendix A Glossary of Terms** for definitions of technical terminology used in this report.

2.0 SUMMARY OF SITE CONDITIONS

2.1 Site History

The former Kilgore Manufacturing Company site is in a primarily residential and commercial area on approximately 40 acres located at 600 North Spring Road, Westerville, Delaware County, Ohio, as shown on **Figure 1 Site Location Map** and **Figure 2 Site Layout**.

A list of owners, operators and/or disposers who may have contributed to the contamination at the site property is shown in **Table 1 Owners, Operators and/or Disposers**.

TABLE 1 OWNERS, OPERATORS AND/OR DISPOSERS		
Owners, Operators and/or Disposers	**Property Usage**	**Period**
Joe Morris and Eva M. Morris	Farming.	December 18, 1941
Kilgore Manufacturing Company	Manufacturing in response to needs of the Chemical Warfare Service, also storing and disposing of explosive and incendiary materials.	December 19, 1941 – July 2, 1952
Kilgore, Inc.	Manufacturing of flares and fireworks until early 1961.	July 2, 1952 – May 24, 1962
Otterbein College (now University)	Donation of property by Commercial Credit Corporation. Some areas were decontaminated while the Kilgore Farm area was used to grow	May 24, 1962 - Current

	soy beans and corn until 1986.	

The site, currently owned by Otterbein University, is unoccupied. Previous operations that may have contributed to the contamination at the site include the use of the site by the former Kilgore Manufacturing Company for the production and storage of ordnance and pyrotechnics between the years of 1941 and 1961. This may have contributed to the release of COCs including, but not limited to, metals, (antimony, arsenic, barium, chromium, copper, iron, lead, manganese, mercury, strontium, and zinc), dioxins and dibenzofurans, and asbestos on the site. Other historical site operations may have resulted in releases of other COCs. The RI/FS process assessed for releases of contaminants to environmental media at the site. The Otterbein University and the U.S. Department of Defense are subject to a judicial consent decree in the U.S. District Court for the Southern District of Ohio, Eastern Division, effective April 30, 2012, to address the contamination at the site.

Prior activities associated with the site include:

Date	**Event**
Summer 1962	Joliet Arsenal conducted evaluation and cleanup of the Kilgore Manufacturing property.
June 1985	Otterbein College Board member, Ernest Fritsche, identified flare canisters, which were removed for disposal by the Ohio Fire Marshal's Office and Ordnance Department at Wright Patterson Air Force Base.
Summer 1986	Mr. Fritsche and U.S. Army Corp of Engineers found additional canisters, which were removed for disposal.
February 26, 1988	S.E.A. was hired by the Westerville school district to perform an environmental assessment of a portion of the Kilgore Manufacturing property (no significant problems).
Summer 1988	Otterbein College hired Lama Excavation Company (Lama) to trench property; Lama stated that the property was "clean and safe."
January 24, 1992	U.S. Army Corps of Engineers denied the property's eligibility for the Formerly Used Defense Sites Program, a U.S. Department of Defense environmental cleanup program.
October 22, 1992	Ohio EPA performed a preliminary assessment of the Kilgore Manufacturing property.
1992-1997	Lawhon & Associates conducted environmental investigations for Keethler, a residential real-estate developer.
November 1996	Wright-Patterson Air Force Base conducted demilitarization of ordnance at the Kilgore Manufacturing property followed by demolition activities.

May 1998	Metcalf & Eddy conducted a Phase I assessment for Keethler.
1999 and 2000	Various field investigations were performed, which included soil borings, ground water wells and test pits.
October 2003	Metcalf & Eddy conducted a Phase II environmental assessment (soil/groundwater sampling).
May 2, 2007	Ohio EPA issued an invitation to negotiate administrative orders to Otterbein University to conduct a cleanup at the Kilgore Manufacturing property.
July 12, 2007	Brown & Caldwell estimated Kilgore cleanup costs, totaling $3,751,688.
October 24, 2008	Ohio Attorney General Office entered a consent decree with Otterbein University and the U.S. Department of Justice (representing the U.S. Department of Defense) regarding the cleanup of the Kilgore Manufacturing site.

2.2 Site Characteristics and Investigation

Pursuant to the April 30, 2012 judicial consent decree for RI/FS, Otterbein University submitted RI and FS reports, which were approved by Ohio EPA DERR on December 15, 2014, and July 7, 2016, respectively. The RI/FS activities identified the nature and extent of contamination at the site, and as necessary, developed alternatives to address the contamination. The investigation also provided a description of site topography, geology, hydrogeology and other site characteristics.

The geologic strata at the site consists of a layer of topsoil, which overlays a brown silty clay with varying amounts of gravel/shale fragments. Beneath the brown silty clay, there is gray silty clay (glacial till) with varying amounts of silt and discontinuous sand seams, with some gravel/shale fragments. The depth to shale bedrock is estimated to be at 70 feet. The sand lenses are found to be at different depths across the site and none are laterally or vertically extensive. Regional ground water flow is to the east-southeast. Ground water in this unit does not present a concern for off-site transport due to the low permeability of the glacial till due to low yield, ground water is not considered to be of potable use. If a residence is within 300 feet of a city waterline, then it is mandatory to utilize the public water system.

The site has seasonally flowing, intermittent, relatively permanent surface water, which is an indirect tributary to Alum Creek. There has been increased stream flow onto the site due to off-site stream channelization and development upstream of the site. The site encompasses a forested/scrub-shrub federal jurisdictional wetland and an isolated wetland as well as several state emergent and forested isolated wetlands.

The RI consisted of sampling soil, ground water, sediment, and surface water for the following COCs: volatile organic compounds, PAHs, metals, strontium, explosives,

perchlorate, white phosphorus, total petroleum hydrocarbons, dioxins/dibenzofurans, pesticides/herbicides, hexavalent chromium and asbestos. Long-term, low level exposure to these compounds could cause carcinogenic (cancer-causing) and/or non-carcinogenic human health effects or harm ecological receptors.

Per the RI and FS, the site is undeveloped and is surrounded by a mix of residential and school properties. Planned site uses include recreational and educational categories; Otterbein University has no plans to develop the site for residential, commercial, or industrial uses. However, to evaluate potential future uses and to develop conservative remedial options for the FS, both residential and construction worker exposures were also evaluated in the risk assessment and FS. **Figure 3 Soil Areas of Concern (Alternative S-5)**, **Figure 4 Sediment Water Areas of Concern (Alternative SED-4)**, and **Figure 5 Ground Water Area of Concern (Alternative G-2)** show the various areas of contamination at the site that require remediation to an acceptable standard to comply with the current and future use of the site and surrounding properties.

The human health risk assessment assessed the chance of health problems occurring if no cleanup actions were taken at the site. An ecological risk assessment (ERA) was conducted to assess potential impacts of COCs on the environment (*e.g.,* animals, water bodies, plants, *etc.*) at the site. Refer to the RI and FS reports for more detailed information. These reports, along with other site-related materials, are in the information repository at the Otterbein University Library and at the Ohio EPA Central District Office.

The site is currently vacant and undeveloped. It is partially wooded and overgrown with a diverse mix of trees, dense grasses, shrubs, and wetland plants. Approximately 10 acres of the 40-acre site consist of mapped wetlands. Remnants of gravel roads are still visible; however, above-ground structures have been razed. Access to the site is controlled and limited to select Otterbein University personnel and contractors.

Environmental investigations completed to date at the site have included geophysical surveys; an ordnance survey; on-site testing to determine if the waste materials found were shock-sensitive, friction-sensitive, or flammable; trenching to visually identify the limits of waste disposal areas and assess buried geophysical anomalies; and chemical analysis of soil, ground water and surface water samples. See Section 2.1 for a listing of prior remedial actions associated with the site.

The RI included a total of 59 on-site soil borings; seven off-site soil samples; and 12 background metals and hexavalent chromium soil samples. Fifty test pit excavations were completed in AOC 8. A total of 14 sediment samples were collected; nine of these samples were collected on-site and five were collected off-site. Fourteen new ground water monitoring wells were installed, and one additional ground water sample (*i.e.*, MW-9R) was collected separately from those analyzed for other parameters and analyzed for hexavalent chromium. Fourteen surface water samples were collected; six were collected on-site and eight were collected off-site. Three asbestos investigation/abatement activities also were performed at the site.

The metals contamination detected are site-related, as illumination flares were made on-site during historical activities. Antimony is used in the making of bullet tracers and to create firework glitter effects. Zinc is used to create smoke effects for fireworks and other pyrotechnical devices. Barium is used to create green colors in fireworks, and it can also help stabilize other volatile elements. Iron is used to produce sparks. Strontium salts impart a red color to fireworks and strontium compounds are also important for stabilizing fireworks mixtures.

Below is a summary of the results of the investigation for each of the eight AOCs at the site. When comparing COCs to site screening levels (SSLs), a dilution attenuation factor of 20 was used.

AOC 1 – Unidentified Rectangular Feature

Some of AOC 1 is in Wetland A. Soil data show COC concentrations clearly exceed background and screening level concentrations within AOC 1. Arsenic concentrations detected in surface (zero (0) to 1 foot below the ground surface) and subsurface (below 1 foot) soil samples exceeded the residential regional screening level (RSL) but were less than the site-specific background value. Lead concentrations detected in the near surface (0 to 2 centimeters (cm)) soil were less than the residential soil RSL. Arsenic, cobalt, iron, and thallium concentrations detected in surface and subsurface soil and manganese concentrations detected in surface soil exceeded SSLs for protection of ground water but were less than site-specific background level values. Lead concentrations detected in near surface soil and antimony, barium, copper, lead, and zinc concentrations detected in surface soil exceeded the ecological screening levels (EcoSSLs) and site-specific background values.

The COCs (principally metals) not retained within the preferred plan underwent an extensive evaluation via an ERA, whereby EcoSSLs were further refined using site-specific information, to determine whether COCs would be screened out or retained. COCs that were not retained for this AOC did not represent a significant risk to ecological receptors after considering site-specific factors such as bioavailability, sensitivity of receptor, and food chain modeling results. Discussions of this process can be found in Agency comment letters in response to the RI report. Antimony, chromium, copper, lead and zinc were retained as soil COCs, and barium and manganese were retained as sediment COCs, due to risks to ecological receptors within this AOC.

AOC 2 – Drainage Ditch Near Former Manufacturing Area

A swale containing flowing surface water runs through AOC 2. Soil data suggest that locations with concentrations clearly exceed background and screening level concentrations exist in AOC 2. Arsenic concentrations detected in surface and subsurface soil exceeded the residential soil RSL but were less than the site-specific background values. Lead concentrations were detected in the near surface soil were less than the residential soil RSL. Iron and manganese concentrations in surface soil and cobalt, iron, and manganese concentrations in subsurface soil exceeded SSLs for protection of ground water and site-specific background values. Iron concentrations in subsurface soil exceeded the SSL and

site-specific background values. Cobalt and manganese concentrations exceeded the SSL and site-specific background values. Barium, cadmium, copper, iron, lead, manganese, mercury, and zinc concentrations detected in surface soil exceeded EcoSSLs and site-specific background values. Antimony, beryllium, chromium, selenium, and vanadium concentrations detected in surface soil exceeded EcoSSLs but were less than site-specific background values.

The COCs (principally metals) not retained within the preferred plan underwent an extensive evaluation via an ERA, whereby EcoSSLs were further refined using site-specific information, to determine whether COCs would be screened out or retained. COCs that were not retained within this AOC did not represent a significant risk to ecological receptors after considering site-specific factors such as bioavailability, sensitivity of receptor, and food chain modeling results. Discussions of this process can be found in Agency comment letters in response to the RI report. Antimony, copper, lead and manganese were retained as soil COCs due to risks to ecological receptors within this AOC.

AOC 3 – Burial Area

Dioxin/furan concentrations detected in surface soil exceeded the residential soil RSL that was evaluated in the FS. Antimony, arsenic, lead, manganese, and strontium concentrations detected in surface soil exceeded residential soil RSLs and site-specific background values. Arsenic and thallium concentrations detected in subsurface soil samples exceeded the residential soil RSLs but were less than the site-specific background values. Dioxin/furan concentrations detected in surface soil exceeded the SSLs for migration to ground water. Research Department eXplosive or Royal Demolition eXplosive (RDX), formally cyclotrimethylenetrinitramine, concentrations detected in surface soil exceeded the SSL. Antimony, arsenic, barium, cobalt, copper, iron, lead, manganese, mercury, and strontium concentrations detected in surface soil exceeded SSLs and site-specific background values. Iron concentrations detected in subsurface soil exceeded the SSL and site-specific background values. Thallium concentrations detected in surface soil and arsenic, cobalt, and thallium concentrations detected in subsurface soil exceeded SSLs but were less than site-specific background values. Dioxins/furans concentrations detected in surface soil exceeded EcoSSLs. Antimony, arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, strontium, and zinc concentrations detected in surface soil exceeded EcoSSLs and site-specific background values. Selenium and vanadium concentrations detected in surface soil exceeded EcoSSLs but were less than site-specific background values.

The COCs (principally metals) not retained within the preferred plan underwent an extensive evaluation via an ERA, whereby EcoSSLs were further refined using site-specific information, to determine whether COCs would be screened out or retained. COCs not retained within this AOC did not represent a significant risk to ecological receptors after considering site-specific factors such as bioavailability, sensitivity of receptor, and food chain modeling results. Discussions of this process can be found in Agency comment letters in response to the RI report. Antimony, arsenic, barium, chromium, copper, lead, strontium and zinc were retained as soil COCs due to risks to ecological receptors within this AOC.

AOC 4 – Burn Pit

Arsenic and thallium were the only metals detected in soil at concentrations that exceeded residential soil RSLs. Thallium concentrations detected in surface soil and arsenic concentrations detected in subsurface soil were lower than site-specific background values. Arsenic concentrations detected in surface soil exceeded the residential soil RSL and the background value. Thallium concentrations detected in subsurface soil exceeded the residential soil RSL and the site-specific background value. Arsenic, cobalt, iron, and manganese concentrations detected in surface soil and thallium concentrations detected in subsurface soil exceeded SSLs and site-specific background values. The only potential human health risks were for Ohio EPA's risk goal for child residents exposed to surface soil, and lifelong residents exposed to surface soil and subsurface soil.

Antimony, arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, strontium, vanadium, and zinc concentrations exceeded the surface soil EcoSSLs and site-specific background values. Selenium and thallium concentrations detected in surface soil exceeded the EcoSSLs but were less than site-specific background values.

AOC 4 was eliminated from consideration for remediation because COC concentrations were only slightly above EcoSSL concentrations or below background values. After further refinement, COCs within this AOC did not represent a significant risk to ecological receptors after considering site-specific factors such as bioavailability, sensitivity of receptor, and food chain modeling results.

AOC 5 – Manufacturing Area Former Underground Storage Tank (UST) Location

Most of AOC 5 is located within Wetland A (e.g., no surface soil sample, primarily sediments samples). Arsenic and thallium concentrations detected in subsurface soil samples exceeded residential soil RSLs but were less than site-specific background values. The only potential human health risks were for Ohio EPA's risk goal for child and lifelong residents exposed to subsurface soil. Cobalt, iron, and manganese concentrations detected in subsurface soil exceeded SSLs and site-specific background values. Cobalt, iron, and manganese concentrations detected in ground water exceeded tap water RSLs. No oil-related constituents were detected in collected soil samples.

AOC 5 was eliminated from consideration for soil remediation because this area was very small. It was the site of an old UST. Concentrations of metals detected in subsurface soil were below site-specific background values, and no benzene, toluene, ethylbenzene or xylenes (BTEX) constituents were detected. Barium was retained as a sediment COC within this AOC.
Soil removal was not recommended in this area; therefore, there is no estimate of the size of impacted soil.

For sediments in AOC 5, the COCs (principally metals) not retained within the preferred plan underwent an extensive evaluation via an ERA, whereby EcoSSLs were further refined using site-specific information, to determine whether COCs would be screened out or

retained. COCs that were not retained within this AOC did not represent a significant risk to ecological receptors after considering site-specific factors such as bioavailability, sensitivity of receptor, and food chain modeling results. Discussions of this process can be found in Agency comment letters in response to the RI report. Barium was retained as the sediment COC within this AOC.

The potential for exposure to ACM remains at AOC 5. However, AOC 5 is in a wetland normally inundated with water, which limits the exposure to ACM.

AOC 6 – Former Experimental Area

PAH concentrations detected in surface soil exceeded the respective residential soil RSLs. The maximum naphthalene concentration detected in surface soil exceeded the SSL. Arsenic concentrations detected in surface soil and arsenic and thallium concentrations detected in subsurface soil exceeded residential soil RSLs but were less than site-specific background values. The only potential human health risks were for Ohio EPA's risk goal for child and lifelong residents exposed to surface and subsurface soil. Iron and manganese concentrations detected in surface soil and cobalt, iron and manganese concentrations detected in subsurface soil exceeded SSLs and site-specific background values. Lead concentrations detected in near-surface soil exceeded the EcoSSL and the site-specific background value. Barium, copper, iron, mercury, manganese, nickel, strontium, vanadium, and zinc concentrations detected in surface soil exceeded EcoSSLs and site-specific background values. Cadmium, chromium, lead, and selenium concentrations detected in surface soil exceeded EcoSSLs but were less than site-specific background values.

The COCs (principally metals) not retained within the preferred plan underwent an extensive evaluation via an ERA, whereby EcoSSLs were further refined using site-specific information, to determine whether COCs would be screened out or retained. COCs not retained within this AOC did not represent a significant risk to ecological receptors after considering site-specific factors such as bioavailability, sensitivity of receptor, and food chain modeling results. Discussions of this process can be found in Agency comment letters in response to the RI report. Barium and mercury were retained as soil COCs due to risks to ecological receptors within this AOC. No COCs were retained for sediments at this AOC.

Activity-based asbestos sampling in AOC 6 indicated asbestos is present in the soil.

AOC 7 – Cinder Area

Arsenic was the only metal detected in surface and subsurface soil at concentrations that exceeded the residential soil RSL; but the concentrations are less than the site-specific background value. The only potential human health risks were for Ohio EPA's risk goal for child and lifelong residents exposed to surface and subsurface soil. Iron concentrations detected in surface and subsurface soil and cobalt concentrations detected in subsurface soil exceeded SSLs for protection of ground water and site-specific background values. Cobalt and iron concentrations detected in ground water did not exceed SSLs. Antimony, barium, chromium, iron, mercury, nickel, vanadium, and zinc concentrations detected in surface soil exceeded EcoSSLs and site-specific background values.

However, AOC 7 contains only a small upland area, which represents a fraction of a total food intake area for terrestrial ecological receptors. It was determined not be a significant risk to ecological receptors and as such, this AOC was eliminated.

AOC 8 – Former Burial Trench Area

Additional soil borings were installed along the southwestern boundary of AOC 8 and additional test pits were excavated in AOC 8 to the west of Wetland C. Wetlands C, I and J are in AOC 8. PAH concentrations detected in surface soil exceeded the residential soil RSL. Antimony, arsenic, manganese, and thallium concentrations detected in surface soil and arsenic and thallium concentrations detected in subsurface soil exceeded residential soil RSLs and site-specific background values. Naphthalene and methylnaphthalene concentrations detected in surface soil exceeded SSLs. However, naphthalene and methylnaphthalene were not detected in ground water. Antimony, arsenic, cobalt, iron, manganese, and thallium concentrations detected in surface soil exceeded SSLs and site-specific background values. Arsenic, barium, cobalt, iron, manganese, and thallium concentrations detected in subsurface soil exceeded SSLs and site-specific background values. However, barium concentrations detected in ground water did not exceed the tap water RSL, and antimony, arsenic, and thallium concentrations detected in ground water did not exceed maximum contaminant levels (MCLs). Antimony, arsenic, barium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, thallium, vanadium, and zinc concentrations detected in surface soil exceeded EcoSSLs and site-specific background values.

The COCs (principally metals) not retained within the preferred plan underwent an extensive evaluation via an ERA, whereby EcoSSLs were further refined using site-specific information, to determine whether COCs would be screened out or retained. COCs not retained within this AOC did not represent a significant risk to ecological receptors after considering site-specific factors such as bioavailability, sensitivity of receptor, and food chain modeling results. Discussions of this process can be found in Agency comment letters in response to the RI report. Antimony was retained as a soil COCs and barium was retained as sediment COC due to risks to ecological receptors within this AOC.

Off-Site Soil

While COC concentrations in off-site surface soil were greater than residential soil RSLs and EcoSSLs, most concentrations were less than site-specific background values. Arsenic was the only metal detected in the off-site surface soil samples at concentrations the exceeded the residential soil RSL; however, the detected concentrations are less than the background value. The RI results do not indicate the migration of COCs from on-site source areas to off-site soil.

Ground Water

The shallow ground water zone is not considered suitable as a domestic water-supply source because the yield is very low. Additionally, the city of Westerville requires, by ordinance, that

all residents be connected to the available public water supply. Arsenic and lead were the only chemicals detected at concentrations that exceeded federal Safe Drinking Water Act (SDWA), MCLs or other action levels including tap water RSLs and vapor intrusion screening levels. Arsenic, cobalt, iron, manganese, strontium, thallium and zinc concentrations exceeded tap water RSLs but were less than federal MCLs, if one was available.

On-Site Sediment

AOCs 1, 5 and 8 were the only AOCs with sediments. There are approximately 45 cy of sediment in the Miscellaneous Locations (MLs), which are localized hot spots located near the historic limits of AOCs 3, 7 and 8 with nearby wetlands.

PAH concentrations exceeded direct contact human health screening levels in on-site sediment samples in AOC 5. Metals were also detected in on-site sediment samples. Antimony, arsenic and manganese concentrations exceeded the human health screening levels. Antimony, arsenic, barium, copper, iron, lead, manganese, nickel, silver, and zinc concentrations detected in on-site sediment samples exceeded EcoSSLs. Arsenic, iron, and nickel concentrations detected in on-site sediment were generally consistent with concentrations detected in the upstream sample. On-site detections of barium in sediment mostly exceed the upstream concentration. The upstream copper concentration is greater than copper concentrations detected in on-site sediment.

The COCs (principally metals), which are not considered further in the preferred plan, underwent an extensive site-specific ERA, whereby EcoSSLs levels were further evaluated using site-specific information, to determine whether they would be screened out or retained. COCs not retained within the sediment AOCs did not represent a significant risk to site ecological receptors after considering factors at the site, such as bioavailability, sensitivity of receptor, and food chain modeling results.

Off-Site Sediment

Arsenic concentrations detected in off-site sediment samples, including the upstream sample, exceeded the residential soil RSL. However, these results were not considered indicative of the migration from on-site sources because downstream concentrations were similar to upstream concentrations and the background value for arsenic in soil. Thallium concentrations also exceeded the residential soil RSL, but are approximately equal to the soil background value and are likely not site-related. Arsenic, barium, nickel, iron, and manganese concentrations detected in off-site sediment samples exceeded EcoSSLs. Arsenic, barium, iron, manganese, nickel, and copper concentrations detected in the upstream sample also exceeded EcoSSLs. In most cases, concentrations detected in off-site sediment samples that exceeded screening levels were either less than the upstream concentration or less than the soil background value. In general, metals detected in on-site soil that exceeded screening levels (*e.g.*, antimony, lead and strontium) were not detected or were detected at concentrations less than screening levels in off-site sediment.

On-Site Surface Water

Antimony and lead were the only COCs detected in on-site surface water samples at concentrations greater than federal SDWA MCLs or tap water RSLs. Arsenic, cobalt, and manganese concentrations exceeded tap water RSLs but did not exceed MCLs, if one was available. Many of the dissolved metals concentrations did not exceed the RSLs or were detected in upstream off-site samples, and do not indicate site-related contamination. For the most part, on-site arsenic was detected at relatively low levels compared with screening levels and does not appear to reflect site-related contamination based on comparison with the upstream off-site arsenic concentrations. Barium, lead, and zinc concentrations exceeded EcoSSLs.

Off-Site Surface Water

Only metals were detected in off-site surface water samples and no detected metals concentrations exceed federal SDWA MCLs. No metals concentrations in downstream samples exceeded EcoSSLs; only the copper concentrations detected in the upstream sample exceeded the EcoSSL. Arsenic concentrations exceeded tap water RSLs, but do not indicate site-related contamination. While the total and dissolved manganese concentrations exceeded the tap water RSL and the upstream concentration, it is very conservative to screen surface water concentrations against tap water RSLs, which assume domestic use of a water supply. Based on these considerations, no source of contamination is evident in off-site surface water.

2.3 Interim or Removal Actions Taken to Date

In 1962, Commercial Credit Corporation donated the 110-acre former Kilgore Farm property to Otterbein College, after manufacturing operations ceased. The college accepted the property after the U.S. Army investigated the site, removed several truckloads of waste materials and proclaimed the site “clean.” Farming, primarily of soy beans and corn, resumed after 1967 and ceased in 1986. In 1996, all remaining structures on-site were razed. From 1962 to 2007, numerous environmental investigations were conducted on-site.

In 1962, Joliet Arsenal performed a “decontamination” of the site. The work consisted of excavation of the former waste burial area (AOC 8). Trenches were uncovered and buried waste material was either destroyed on-site or taken off-site for disposal. Approximately 120 tons of explosives and flares and approximately 3,500 boosters and 200,000 fuses were disposed of off-site.

In 1996, Lawhon and Associates conducted additional trenching throughout the former trench burial area. Trenches were dug to a depth of approximately 10 feet, or until native soil was observed. Six drums of miscellaneous materials were removed. Representatives of the Wright-Patterson Explosive Ordnance Division thoroughly examined the contents of the six drums, separated the materials thought to be potentially energized, and placed them in a 5-gallon bucket. Wright-Patterson personnel also identified the following materials, which were found in the excavations: empty M112 photoflash casings, M56 projectile fuses, various pyrotechnic debris, and two 55-gallon drums of a reddish material assumed to be red phosphorous.

In 1997, Lawhon and Associates removed a 2,500-gallon heating oil UST located adjacent to the former boiler house building. Approximately 3,500 gallons of residual product and water were pumped from the UST and disposed of as petroleum-contaminated liquid. The tank was removed and observed to contain numerous holes. Visibly contaminated soil was excavated, segregated from visually "clean" soil, and stockpiled on plastic sheeting. Verification soil samples were collected from the tank cavity. During removal of the UST, 104 cy of petroleum-impacted soil were excavated.

Material potentially presenting an explosive hazard (MPPEH) was encountered at some locations during the 2013 RI field investigation. MPPEH was encountered on the ground surface of AOC 3, AOC 6, and AOC 8 and in the subsurface during the excavation of test pits in AOC 8. The Tetra Tech ordnance technicians evaluated each item of MPPEH and made a decision on the safety of the material. The MPPEH encountered included but was not limited to illumination flares, slap flares, flame thrower ignition carts, aircraft flares, and sea markers. The discovered MPPEH was determined to present no hazard and the material was relinquished to the Franklin County Sheriff's Office, Bomb Squad. The material was taken by the sheriff's office for disposal.

During the investigation of AOC 8, a piece of construction board was discovered on the ground surface. The material was taken to Mid-Atlantic Environmental Consultants for analysis by polarized light microscopy (PLM). The results of the testing revealed that the material was "transite type material" containing 38 percent asbestos. Based on this finding, Otterbein University contracted Lawhon and Associates to evaluate the entire property for the potential for ACM. An Ohio Department of Health (ODH) certified asbestos hazard evaluation specialist performed the evaluation and subsequent surface investigation of the site and sampling in accordance with U.S. EPA protocols. Samples were sent to International Asbestos Testing Laboratories, a certified laboratory for PLM testing. Approximately 5 square feet of suspect ACM was discovered in AOC 6. The results of the laboratory testing revealed the material was transite cement board containing 12 percent chrysotile. Lawhon and Associates recommended that the ACM be removed and properly disposed of by an ODH-licensed asbestos hazard abatement contractor (AHAC) and that the AHAC conduct an investigation for additional transite in the area surrounding the AOC 6 transite discovery.

Lyle Environmental (an AHAC) reviewed the Lawhon and Associates findings and recommendations. Lyle Environmental visited the site, observed the surface area in detail, and probed the shallow soil for the presence of suspect ACM. Several pieces of suspected ACM were found in what appeared to be roofing tiles and pieces of wall board material. The materials were placed in two garbage bags and removed from the site for property disposal. Because of the small amount of suspected ACM found, it was decided to forgo sampling and dispose of all the material as ACM.

Following Ohio EPA's review of the Lyle Environmental report, additional testing for asbestos at the site, consisting of activity-based air sampling in AOC 6, was conducted. The testing was performed in 2014 by Lyle Environmental following U.S. EPA Office of Solid Waste and Emergency Response (OSWER) Directive #8200.0-68, Framework for Investigation Asbestos-Contaminated Superfund Sites and SOP 2084, Activity-Based Air Sampling for Asbestos and the approved work plan. Samples were submitted to McCall and Spero

Environmental, Inc. for analysis using TEM Method ISO 10312. The AOC 6 data were compared to generic and project-specific risk-based action levels calculated for asbestos in air to determine the appropriate next step. The arithmetic mean concentration detected at the site was compared to action levels for the Ohio EPA target cancer risk level. The AOC 6 data exceeded the generic action level; therefore, the data were compared to project-specific action levels calculated for the potential current/future receptors. Except for hypothetical future residents, the comparison of "high end" asbestos air concentrations detected at AOC 6 to project-specific action levels suggested that risk estimates for current/future receptors at AOC 6 would not exceed the $1x10^{-5}$ cancer risk level.

2.4 Summary of Site Risks

As part of the RI/FS, a baseline risk assessment was conducted to evaluate current and potential future risks to human and ecological receptors as the result of exposure to COCs present at the site. The results demonstrated that the existing COCs in environmental media pose or potentially pose unacceptable risks and/or hazards to human and/or ecological receptors sufficient to trigger the need for remedial actions. Additional information on the primary COCs can be found in **Appendix B Primary Contaminants of Concern**.

2.4.1 Risks to Human Health

The risk assessment for human health is an estimate of the likelihood of potential health problems occurring if no remedial actions were taken at the site. To estimate baseline risk, a four-step process is conducted.

Step 1. Data Collection and Evaluation (of Contamination): The COC concentrations at the site as well as any past scientific studies on the effects these COCs have had on people are reviewed. Comparisons of site-specific concentrations of COCs and concentrations reported in past studies help determine which COCs are most likely to pose the greatest threat to human health.

Step 2. Exposure Assessment: The different ways that people might be exposed to the COCs, the concentrations that people might be exposed to, and the potential frequency and duration of exposure are evaluated. A reasonable maximum exposure scenario is calculated, which portrays the highest level of human exposure that could reasonably be expected to occur.

Step 3. Toxicity Assessment (of Potential Health Dangers): The information from Step 2 is combined with data on the toxicity of each COC to assess potential health risks. Two types of risk are considered, cancer risk and non-cancer hazard. The likelihood of cancer resulting from a site is expressed as a probability of 1 in 100,000, or $1x10^{-5}$. In other words, for every 100,000 people that could be exposed, one extra case of cancer may occur because of exposure to site COCs. For non-cancer health effects, a hazard index (HI) and hazard quotient (HQ) is calculated (quotient refers to the effects of an individual COC, whereas index refers to the combined effects of all the COCs). The key concept here is that a "threshold level" (measured as an HQ or HI

of 1) exists below which non-cancer health effects are not expected to occur to exposed populations or individuals.

Step 4. Risk Characterization: A determination is made as to whether site risks are substantial enough to cause potential health problems for people at or near the site. The potential risks from the individual pathways (*e.g.,* inhalation, direct contact, ingestion, *etc.*) and individual chemicals as appropriate, are added together to determine the total cumulative risk to human health.

A human health risk assessment for the site was prepared to evaluate potential harm to human health posed by COCs in ground water and soil for the following exposure pathways: ingestion/direct contact. If site-specific data were not available or were insufficient to modify standard default values, then the standard defaults provided in U.S. EPA guidance were used.

Soil

Analysis of soil sampling data indicates probable maximum exposure concentrations of COCs listed in the table below. These concentrations are associated with excess lifetime cancer risk levels due to ingestion of contaminated soil of $4x10^{-5}$, respectively for current residents, which triggers the need for remedial actions. The maximum HQ of 48 for all chemicals, above the HQ of 1, also triggers the need for remedial actions.

Media	COC(s)	Maximum Exposure Concentrations (mg/kg)
Soil	Lead	100-1,600 (near surface-surface)
	Dioxins/Dibenzofurans	1.8
	Aluminum	17,000
	Antimony	1,000
	Arsenic	40
	Barium	9,100
	Cobalt	23
	Copper	2,100
	Iron	46,000
	Manganese	2,200
	Strontium	94,000
	Thallium	1.1
	Vanadium	43
	PAHs	0.029

Ground Water

The maximum concentration of arsenic in ground water (3 parts per billion (ppb)), exceeds the adjusted U.S. EPA RSL for tap water of 0.045 ppb (carinogenic risk of 1.4E-4) and triggers the need for evaluation of remedial alternatives. In addition, this concentration is associated with an excess lifetime cancer risk of $4x10^{-4}$ for future residential use. An HI of 21 was determined with contributions from aluminum, antimony, arsenic, cobalt, iron, manganese, strontium, and zinc to a target organ HI of greater than 1, also triggers the need

for remedial actions for potable water. The LUC restricting ground water extraction and use will effectively eliminate this potential exposure pathway.

These risks and hazard levels indicate that there is significant potential risk to children and adults from direct exposure to contaminated soil and ground water, if direct exposure was to occur. These risk and hazard estimates are based in part on reasonable maximum exposure scenarios developed by considering various conservative assumptions about the frequency and duration of an individual's lifetime exposure to the soil and ground water, as well as the toxicity of the COCs.

2.4.2 Risks to Ecological Receptors

An ERA was conducted as part of the RI at the site. The ERA was conducted to assess potential impacts of COCs on ecological receptors (*e.g.,* animals, water bodies, plants, *etc.*) at the site. The ERA was completed pursuant to Ohio EPA guidance. Specifically, a Level I scoping ERA determined that based on the history of activities at the site and the surrounding land use, the site had the potential to pose a risk to the environment. Therefore, a Level II screening ERA was conducted. The Level II ERA for the site included a comparison of site-specific data to screening benchmark values and the identification of relevant and complete exposure pathways between each source medium of concern and ecologically significant receptors for the potential ecological COCs. COCs that exceeded the screening levels and where a completed exposure pathway existed, a Level III baseline ERA was conducted. The approach for the Level III baseline ERA consisted of the calculation of ecological hazard quotients (EHQs) using site-specific exposure factors, chemical-specific and species-specific toxicity values and representative endpoint species.

Upon completion of the baseline ERA for the site, the following COCs in various media (soil and sediment) were determined to pose a potential risk to ecological receptors*:*

Media	COC(s)	Receptor(s)	Refined EHQ(s)[1]
Soil	Antimony	Plants/Soil Invertebrates/ Mammals	12,849
	Arsenic	Plants	3.2
	Barium	Plants/Soil Invertebrates	27.6
	Chromium	Plants/Soil Invertebrates/Birds and Mammals	6,938
	Copper	Plants/Soil Invertebrates/Birds and Mammals	294
	Lead	Plants	18.6[2]
	Manganese	Plants/Soil Invertebrates	49.5
	Mercury	Soil Invertebrates	17.4
	Strontium	Plants/Soil Invertebrates/	392

[1] EHQ = Maximum concentration of COC found in soil or sediment (from Table 8-3 of RI Report dated September 2014) divided by the ecological remedial goal (EcoSSL) from Table 3. Example for arsenic:3.2 EHQ = 57.6 mg/kg (maximum concentration) divided by 18 mg/kg (EcoSSL).
[2] Background for lead was used instead of a standard.

		Mammals	
	Zinc	Plants/Soil Invertebrates/Birds and Mammals	1,083
Sediment	Antimony	Sediment Invertebrates and Wetland Invertivorous Mammal	70
	Barium	Sediment Invertebrates	25
	Manganese	Sediment Invertebrates	4.3

3.0 REMEDIAL ACTION OBJECTIVES

An FS, to define and analyze appropriate remedial alternatives, was completed with Ohio EPA oversight and was approved on July 20, 2016.

As part of the RI/FS process, RAOs were developed in accordance with Section 300.430 of the NCP, pursuant to the federal Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), 42 U.S.C. §9601 et seq., as amended, and U.S. EPA guidance (*i.e.,* RI/FS Guidance EPA/540/G-89/004, and others). The RAOs are goals that a remedy should achieve to ensure protection of human health and the environment.

The RAOs for the site include those listed in **Table 2 Remedial Action Objectives**:

TABLE 2 REMEDIAL ACTION OBJECTIVES	
Ground Water	
Human Health Risk	RAO 1: Prevent ingestion/direct contact of ground water across the site having a carcinogen (arsenic) more than a total excess lifetime cancer risk for the contaminant greater than $1x10^{-5}$.
Human Health Risk	RAO 2: Prevent ingestion/direct contact of ground water across the site having non-carcinogens (aluminum, antimony, arsenic, cobalt, iron, manganese, strontium, and zinc) more than a hazard index (HI) greater than 1.
Soil	
Human Health Risk	RAO 3: Prevent ingestion/direct contact with soil located in AOCs 3, 4, and 8 having carcinogens (dioxins/furans and arsenic) more than a total lifetime cancer risk greater than $1x10^{-5}$.
Human Health Risk	RAO 4: Prevent ingestion/direct contact with soil located in AOCs 1, 2, 3, 4, 6, and 8 having non-carcinogens (antimony, arsenic, copper, iron, lead, manganese, and zinc) more than an HI greater than 1.
Human Health Risk	RAO 5: Prevent ingestion/direct contact with soil located in AOCs 5, 6, and 8 having potentially containing asbestos-containing material (ACM) more than a total lifetime cancer risk greater than $1x10^{-5}$.
Environmental Risk	RAO 6: Prevent ingestion/direct contact with soil located in AOCs 1, 2, 3, 6, and 8 having COCs (antimony, arsenic, barium, chromium, copper, lead, manganese, mercury, strontium, and zinc) more than an environmental hazard quotient (EHQ) greater than 1.

Sediment	
Environmental Risk	RAO 7: Prevent releases of COCs (antimony, barium, and manganese) from sediments in AOC 1, 5, 8, the OC-SO-6 sample location, the OC-SO-8 sample location, and the OC-SO-10 sample location that would result in levels more than ecological reference values or more than an EHQ greater than 1.

In the process of scoping and conducting the RI, generic preliminary remediation goals were established. These goals are given as $1x10^{-5}$ (*i.e.*, 1 in 100,000) excess lifetime cancer risk and an HQ or HI of 1, and were established using the default exposure parameters provided by U.S. EPA or site-specific information.

The COCs and the remediation goals (RGs) for the site are shown in **Table 3 Contaminants of Concern / Remediation Goals**.

TABLE 3 CONTAMINANTS OF CONCERN / REMEDIATION GOALS			
Medium	**COC**	**RG**	**RG Basis**
Soil: Human Direct Contact	Dioxins/dibenzofurans	0.00005 mg/kg	US EPA Residential[3] Target Organs - Reproductive, Respiratory
	Antimony	16 mg/kg	Lifelong Residents Risk-based Target Organ – Blood (HI=0.5)
	Arsenic	23.1 mg/kg	Background
	Copper	1,550 mg/kg	Lifelong Residents Risk-based Target Organs – Gastrointestinal System (HI=0.5[4])
	Iron	27,500 mg/kg	Lifelong Residents Risk-based Target Organs – Gastrointestinal System (HI=0.5[5])
	Lead	400 mg/kg	OSWER Screening Level
	Manganese	1,800 mg/kg	Lifelong Residents Risk-based Target Organs – Central Nervous System (HI=1)
	Strontium	47,000 mg/kg	Child Residents Risk-based Target Organs

[3] U.S. EPA Regional Screening Levels for Chemical Contaminants at Superfund Sites, May 2013, [Incremental lifetime cancer risk (ILCR) = 1E-06, Hazard index (HI) = 1].
[4] Value is for child resident.
[5] Value is for child resident.

			– Bone (HI=1)
	Zinc	11,500 mg/kg	Lifelong Residents Risk-based Target Organ – Blood (HI=0.5)
Soils: Ecological	Antimony	35.8 mg/kg	Eco SSL[6]
	Arsenic	18 mg/kg	Eco SSL
	Barium	330 mg/kg	Eco SSL
	Chromium	16 mg/kg	Background[7]
	Copper	70 mg/kg	Eco SSL
	Lead	120 mg/kg	Eco SSL
	Manganese	220 mg/kg	Eco SSL
	Mercury	0.1 mg/kg	ORNL[8]
	Strontium	240 mg/kg	Background[9]
	Zinc	120 mg/kg	Eco SSL
Ground Water: to Potable	Aluminum	20,000 ug/L	US EPA HI
	Antimony	6 ug/L	US EPA MCL
	Arsenic	10 ug/L	US EPA MCL
	Cobalt	6 ug/L	US EPA HI
	Iron	14,000 ug/L	US EPA HI
	Manganese	430 ug/L	US EPA HI
	Strontium	12,000 ug/L	US EPA HI
	Zinc	6,000 ug/L	US EPA HI
Sediments: Ecological	Antimony	2 mg/kg	Region 3, ER-L[10]
	Barium	48 mg/kg	NOAA, AET[11]
	Manganese	460 mg/kg	Region 3, LEL[12]

[6] EPA Ecological Soil Screening Levels (USEPA, 2005a-d, 2007a-c).
[7] Calculated Site Specific Background Soil Values as presented in Appendix B of the Risk Assessment Assumptions Document (Tetra Tech, 2013).
[8] Oak Ridge National Laboratory Toxicological Benchmarks for plants and invertebrates (Efroymson, et al., 1997a, 1997b.
[9] Background concentrations of 120 ppm (Buchman, 2008) and 240 ppm (ATSDR, 2004) have been determined from data collected across the United States.
[10] USEPA Region 3 Biological Technical Assistance Group Freshwater Sediment Screening Levels (USEPA, 2006). Effective Range Low, equivalent to the lower 10th percentile of the analyzed data in Long and Morgan (1990) as cited in USEPA (2006).
[11] National Oceanic and Atmospheric Administration Freshwater or Marine Sediment Screening Value (Buchman, 2008). Apparent Effects Threshold.
[12] USEPA Region 3 Biological Technical Assistance Group Freshwater Sediment Screening Levels (USEPA, 2006). Lowest Effect Level from Persaud, et al. 1993 as cited in USEPA (2006).

4.0 SUMMARY OF REMEDIAL ALTERNATIVES

The Agency's preferred remedial alternative consists of S-5 for soil, SED-4 for sediment and G-2 for ground water. A total of 21 remedial alternatives were considered in the FS, as identified in **Table 4 Summary of Site Remedial Alternatives**. A brief description of the major features of each of the remedial alternatives follows. More detailed information about these alternatives can be found in the FS report.

TABLE 4 SUMMARY OF SITE REMEDIAL ALTERNATIVES		
Media	**Alternative**	**Description of Remedial Alternative**
Soil		
	S-1	No Action
	S-2	LUCs Only
	S-3	Excavation of AOCs 1, 2, and 3
	S-4	Excavation of AOCs 2 and 3
	S-5	Excavation of AOCs 1, 2, 3, 6, and 8
	S-6	Excavation of AOCs 2, 3, 6, and 8
	S-7	Cover AOCs 1, 2, and 3
	S-8	Cover AOCs 2 and 3
	S-9	Cover AOCs 1, 2, 3, 6, and 8
	S-10	Cover AOCs 2, 3, 6, and 8
	S-11	Excavation of AOCs 1, 2, 3, 4, 5, 6, and 8
Sediment		
	SED-1	No Action
	SED-2	RMD for AOCs 1, 5, 8, and MLs
	SED-3	Excavation of AOC 1
	SED-4	Excavation of AOCs 1, 5, 8 and MLs
	SED-5	Excavation AOCs 5 and 8 and MLs
	SED-6	Cover AOC 1
	SED-7	Cover AOCs 1, 5, and 8 and MLs
	SED-8	Cover AOCs 5 and 8 and MLs
Ground Water		
	G-1	No Action
	G-2	LUCs

LUCs –land use controls, such as activity and use limitations under an environmental covenant, and/or engineered controls, such as fences and signs. Specific types of LUCs are to be determined for each alternative during FS.
MLs – Miscellaneous Locations OC-SO-06, OC-SO-08, and OC-SO-10.
RMD – Risk management decision.

4.1 No Action Alternatives (S-1, SED-1 and G-1)

The "no action alternatives" for soil, sediment and ground water have been included in a single section for efficiency. The NCP requires evaluation of a no action alternative to establish a baseline for the comparison of other remedial alternatives. Under this alternative, no remedial actions or monitoring are conducted at the site to prevent exposure to contaminated media.

Capital Costs	$0
Annual Cost (average)	$0
Five-Year Review Cost	$11,000
NPW (30 years)	$52,000

The only cost of the "no action alternatives" would be for periodic compliance inspections. The net present worth (NPW) is based on 30 years with a 1.4 percent annual discount rate.

The "no action alternatives" would not be protective of human health or the environment and would not meet any RAOs; however, these alternatives are retained, in accordance with the NCP, for further evaluation.

4.2 LUCs Only Alternatives (S-2, SED-2 and G-2)

The administrative LUCs only alternatives for soil, sediment and ground water are included in a single selection for efficiency. LUCs consist of administrative or legal mechanisms (*e.g.*, activity and use limitations, deed or zoning restrictions, permits, *etc.*) designated as institutional controls and/or engineered or physical barriers (*e.g.*, fencing, signs, *etc.*) designated as engineering controls. LUCs are not applicable to ecological receptors. Alternative SED-2 includes an operation and maintenance plan and a proposed risk management plan (RMP).

Site-specific LUCs are formalized as activity and use limitations under an environmental covenant pursuant to ORC 5301.80-.92, typically developed following issuance of the decision document and filing of the remedial design/remedial action consent decree. Depending on the site-specific conditions, LUCs can be used alone or in conjunction with other remedial actions.

<u>Alternative S-2: LUCs Only</u>

Alternative S-2

Capital Costs	$39,000
Annual Cost (average)	$3,300
Five-Year Review Cost	$19,800
NPW (30 years)	$198,000
Estimated Time to Achieve RAOs	6 months to 1 year

Otterbein University would monitor and report compliance with LUCs and the O&M plan implementation would be conducted as part of the existing site operations and maintenance program. Otterbein University would enter into an environmental covenant to establish the several activity and use limitations for the site. One of the limitations may provide for operation and maintenance plan implementation. Five-year review costs are standard for the remaining site alternatives. The NPW is based on 30 years with a 1.4 percent annual discount rate.

<u>Alternative SED-2: RMD for AOCs 1, 5, 8 and MLs</u>

Alternative SED-2

Capital Costs	$39,000
Annual Cost (average)	$1,100
Five-Year Review Cost	$17,600
NPW (30 years)	$144,000
Estimated Time to Achieve RAOs	6 months

Five-year review costs of $17,000 are standard for the remaining site alternatives. The NPW is based on 30 years with a 1.4 percent annual discount rate.

Alternative G-2: LUCs

Alternative G-2

Capital Costs	$39,000
Annual Cost (average)	$1,100
Five-Year Review Cost	$17,600
NPW (30 years)	$144,000
Estimated Time to Achieve RAOs	6 months

Five-Year Review Costs of $17,000 are standard for the remaining site alternatives. The NPW is based on 30 years with a 1.4 percent annual discount rate.

LUCs would be implemented to prohibit the extraction and use of ground water; provide for long-term inspection of LUCs; and provide requirements for dealing with changes in land use or site features. LUCs for ground water would be coordinated with LUCs for soil and sediment. Signs would be placed as needed to note the presence of impacted ground water. The areas to which the LUCs apply would be identified, surveyed, mapped and recorded in the appropriate legal documents.

4.3 Soil Alternatives (S-3, S-4, S-5, S-6, S-7, S-8, S-9, S-10 and S-11)

Alternative S-3: Excavation of AOCs 1, 2 and 3

Excavation of the impacted soil would be performed using excavators. After excavation is completed, the excavation would be filled and graded with clean material. Vegetation would be restored, and disturbed wetlands would be mitigated. Excavated materials would be transported off-site for disposal in a licensed and permitted disposal facility.

Capital Cost	$933,000
Annual Cost (average)	$3,300
Five-Year Review Cost	$19,800
NPW (30 years)	$1,091,000
Estimated Construction Time	4 months
Estimated Time to Achieve RAOs	6 months

The NPW is based on 30 years with a 1.4 percent annual discount rate. A total of 2,700 cy of impacted soil would be excavated from AOCs 1, 2 and 3 from an approximate area of 30,000 feet squared (ft^2) from depths ranging from 1 to 5 feet below ground surface (bgs). The estimated costs include a five-year review cost of $19,800.

Alternative S-4: Excavation of AOCs 2 and 3

See description of excavation under Alternative S-3.

Capital Cost	$739,000
Annual Cost (average)	$3,300
Five-Year Review Cost	$19,800
NPW (30 years)	$897,000
Estimated Construction Time	4 months
Estimated Time to Achieve RAOs	6 months

The NPW is based on 30 years with a 1.4 percent annual discount rate. A total of 2,400 cy of impacted soil would be excavated from AOCs 2 and 3 from an approximate area of 22,000 ft^2 from depths ranging from 1 to 5 feet bgs. The estimated costs include a five-year review cost of $19,800.

Alternative S-5: Excavation of AOCs 1, 2, 3, 6 and 8

See description of excavation under Alternative S-3.

Capital Cost	$1,224,000
Annual Cost (average)	$3,300
Five-Year Review Cost	$19,800
NPW (30 years)	$1,383,000
Estimated Construction Time	5 months
Estimated Time to Achieve RAOs	6 months

The NPW is based on 30 years with a 1.4 percent annual discount rate. A total of 3,800 cy of impacted soil would be excavated from AOCs 1, 2, 3, 6 and 8 from an approximate area of 61,000 ft^2 from depths ranging from 1 to 5 feet bgs. The estimated costs include a five-year review cost of $19,800.

Alternative S-6: Excavation of AOCs 2, 3, 6 and 8

See description of excavation under Alternative S-3.

Capital Cost	$1,061,000
Annual Cost (average)	$3,300
Five-Year Review Cost	$19,800
NPW (30 years)	$1,220,000
Estimated Construction Time	4 months

Estimated Time to Achieve RAOs	6 months

The NPW is based on 30 years with a 1.4 percent annual discount rate. A total of 3,500 cy of impacted soil would be excavated from AOCs 2, 3, 6 and 8 from an approximate area of 53,000 ft^2 from depths ranging from 1 to 5 feet bgs. The estimated costs include a five-year review cost of $19,800.

Alternative S-7: Cover AOCs 1, 2 and 3

Covers would consist of placing approximately 1 to 2 feet of clean soil over impacted soil to eliminate the exposure pathway.

Capital Cost	$459,000
Annual Cost (average)	$6,600
Five-Year Review Cost	$23,100
NPW (30 years)	$698,000
Estimated Construction Time	4 months to 1 year
Estimated Time to Achieve RAOs	6 months

The NPW is based on 30 years with a 1.4 percent annual discount rate. The total area of approximately 30,000 ft^2 of impacted soil would be covered with 1 to 2 feet of clean soil at AOCs 1, 2 and 3. The estimated costs include a five-year review cost of $23,100.

Alternative S-8: Cover AOCs 2 and 3

See description of cover installation under Alternative S-7.

Capital Cost	$331,000
Annual Cost (average)	$6,600
Five-Year Review Cost	$23,100
NPW (30 years)	$570,000
Estimated Construction Time	4 months
Estimated Time to Achieve RAOs	6 months

The NPW is based on 30 years with a 1.4 percent annual discount rate. The total area of approximately 22,000 ft^2 of impacted soil would be covered with 1 to 2 feet of clean soil at AOCs 2 and 3. The estimated costs include a five-year review cost of $23,100.

Alternative S-9: Cover AOCs 1, 2, 3, 6 and 8

See description of cover installation under Alternative S-7.

Capital Cost	$611,000
Annual Cost (average)	$6,600
Five-Year Review Cost	$23,100
NPW (30 years)	$850,000

Estimated Construction Time	4 months
Estimated Time to Achieve RAOs	6 months

The NPW is based on 30 years with a 1.4 percent annual discount rate. The total area of approximately 61,400 ft^2 of impacted soil would be covered with 1 to 2 feet of clean soil at AOCs 1, 2, 3, 6 and 8. The estimated costs include a five-year review cost of $23,100.

Alternative S-10: Cover AOCs 2, 3, 6 and 8

See description of cover installation under Alternative S-7.

Capital Cost	$499,000
Annual Cost (average)	$6,600
Five-Year Review Cost	$23,100
NPW (30 years)	$738,000
Estimated Construction Time	4 months
Estimated Time to Achieve RAOs	6 months

The NPW is based on 30 years with a 1.4 percent annual discount rate. The total area of approximately 53,400 ft^2 of impacted soil would be covered with 1 to 2 feet of clean soil at AOCs 2, 3, 6 and 8. The estimated costs include a five-year review cost of $23,100.

Alternative S-11: Excavation of AOCs 1, 2, 3, 4, 5, 6 and 8 (Residential and Ecological RGs)

See description of excavation under Alternative S-3.

Capital Cost	$4,530,000
Annual Cost (average)	$0
Five-Year Review Cost	$0
NPW (30 years)	$4,530,000
Estimated Construction Time	10 months
Estimated Time to Achieve RAOs	10 months

The NPW is the same as the one time capital cost for this alternative. A total of 20,800 cy of impacted soil would be excavated from AOCs 1, 2, 3, 4, 6 and 8 from an approximate area of 149,000 ft^2 from depths ranging from 1 to 5 feet bgs. There would be no five-year reviews; therefore, no estimated costs for a five-year review.

4.4 Sediment Alternatives (SED-3, SED-4, SED-5, SED-6, SED-7 and SED-8)

Alternative SED-3: Excavation of AOC 1

Excavation of the impacted sediment would be performed using excavators. Native vegetation would be restored, monitored and managed to ensure establishment. Excavated materials would be transported off-site for disposal in a licensed and permitted disposal facility.

Capital Cost	$277,000
Annual Cost (average)	$1,100
Five-Year Review Cost	$17,600
NPW (30 years)	$382,000
Estimated Construction Time	2 months
Estimated Time to Achieve RAOs	6 months

The NPW is based on 30 years with a 1.4 percent annual discount rate. A total of 15 cy of impacted sediment would be excavated from AOC 1 to meet ecological RGs from an approximate area of 400 ft^2 from a depth of 1 foot bgs. The estimated costs include a five-year review cost of $17,600.

Alternative SED-4: Excavation of AOC 1, 5, 8 and the MLs

See description of excavation under Alternative SED-3.

Capital Cost	$1,366,000
Annual Cost (average)	$1,100
Five-Year Review Cost	$17,600
NPW (30 years)	$1,470,000
Estimated Construction Time	4 months (1 year)
Estimated Time to Achieve RAOs	6 months

The NPW is based on 30 years with a 1.4 percent annual discount rate. A total of 2,575 cy of impacted sediment would be excavated from AOCs 1, 5, 8 and the MLs to meet ecological RGs from an approximate area of 71,000 ft^2 from a depth of 1 foot bgs. The estimated costs include a five-year review cost of $17,600.

Alternative SED-5: Excavation of AOCs 5, 8 and the MLs

See description of excavation under Alternative SED-3.

Capital Cost	$1,312,000
Annual Cost (average)	$1,100
Five-Year Review Cost	$17,600
NPW (30 years)	$1,417,000
Estimated Construction Time	4 months
Estimated Time to Achieve RAOs	6 months

The NPW is based on 30 years with a 1.4 percent annual discount rate. A total of 2,560 cy of impacted sediment would be excavated from AOCs 1, 5, 8 and the MLs to meet ecological

RGs from an approximate area of 71,000 ft^2 from a depth of 1 foot bgs. The estimated costs include a five-year cost of $17,600.

Alternative SED-6: Cover AOC 1

This option involves filling a wetland. Covers would consist of placing approximately 1 to 2 feet of clean soil over impacted sediment to prevent direct exposure. The maintenance of a soil cover would need to accommodate growth of woody plants through the cover in submerged areas over time, to prevent breach of a cover.

Capital Cost	$232,000
Annual Cost (average)	$3,300
Five-Year Review Cost	$19,800
NPW (30 years)	$390,000
Estimated Construction Time	2 months to 1 year
Estimated Time to Achieve RAOs	6 months

The NPW is based on 30 years with a 1.4 percent annual discount rate. The total area of approximately 400 ft^2 of impacted soil would be covered with clean soil at AOC 1. The estimated costs include a five-year review cost of $19,800.

Alternative SED-7: Cover AOCs 1, 5, 8 and the MLs

See description of excavation under Alternative SED-6.

Capital Cost	$816,000
Annual Cost (average)	$3,300
Five-Year Review Cost	$19,800
NPW (30 years)	$974,000
Estimated Construction Time	3 months
Estimated Time to Achieve RAOs	6 months

The NPW is based on 30 years with a 1.4 percent annual discount rate. The total area of approximately 71,000 ft^2 of impacted soil would be covered with clean soil at AOCs 1, 5, 8 and the MLs. The estimated costs include a five-year review cost of $19,800.

Alternative SED-8: Cover AOCs 5, 8 and the MLs

See description of excavation under Alternative SED-6.

Capital Cost	$812,000
Annual Cost (average)	$3,300
Five-Year Review Cost	$19,800
NPW (30 years)	$970,000

Estimated Construction Time	3 months
Estimated Time to Achieve RAOs	6 months

The NPW is based on 30 years with a 1.4 percent annual discount rate. The total area of approximately 70,600 ft^2 of impacted soil would be covered with clean soil at AOCs 5, 8 and the MLs. The estimated costs include a five-year review cost of $19,800.

5.0 COMPARISON AND EVALUATION OF ALTERNATIVES

5.1 Evaluation Criteria

Ohio EPA considers eight criteria, as outlined in the NCP, to evaluate the various remedial alternatives individually and compare them with each other to select a remedy. A more detailed analysis of the remedial alternatives can be found in the FS report. The eight evaluation criteria, including the threshold, balancing and modifying criteria, are shown below in **Table 5 Remedial Alternative Evaluation Criteria**.

TABLE 5 REMEDIAL ALTERNATIVE EVALUATION CRITERIA
Threshold Criteria (2)
1. **Overall Protection of Public Health and the Environment** - determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, treatment, *etc.*
2. **Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)** - evaluates whether the alternative meets federal and state environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified.
Balancing Criteria (5)
3. **Long-Term Effectiveness and Permanence** – evaluates the ability of an alternative to maintain protection of human health and the environment over time.
4. **Reduction of Toxicity, Mobility, or Volume of Contaminants Through Treatment** – evaluates the amount of contamination present, the ability of the contamination to move in the environment, and the use of treatment to reduce harmful effects of the principal contaminants.
5. **Short-Term Effectiveness** – evaluates the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation. Considers the amount of time until remedy protects human health and the environment.
6. **Implementability** – evaluates the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.
7. **Cost** – includes estimated capital and annual operation and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.
Modifying Criterion (1)
8. **Community Acceptance** – considers whether the local community agrees with Ohio EPA's analyses and preferred alternative. Comments received on the preferred plan are an important indicator of community acceptance.

Evaluation Criteria 1 and 2 are threshold criteria required for acceptance of an alternative. Any acceptable remedy must comply with both criteria. Evaluation Criteria 3 through 7 are the balancing criteria used to select the best remedial alternative(s) identified in the preferred plan. Evaluation Criteria 8, community acceptance, is evaluated through public comment on the alternatives received during the comment period.

5.2 Analysis of Evaluation Criteria

This section examines how each of the evaluation criteria is applied to each of the remedial alternatives listed in Table 5 of Section 4.0 and compares how the alternatives achieve the evaluation criteria.

THRESHOLD CRITERIA

1. Overall Protection of Human Health and the Environment

Evaluation of the overall protectiveness of the alternatives focused on whether each alternative achieves adequate protection of human health and the environment and identifies how site risks posed through each pathway being addressed are eliminated, reduced or controlled by the alternative. This evaluation also includes consideration of whether the alternative poses any unacceptable short-term or cross-media impacts.

Soil Alternatives: Alternative S-2 satisfies RAOs 3, 4, and 5 for human health risks. Implementation of an RMD does not satisfy RAO 6 at AOCs 1, 2, 3, 6, and 8 for environmental risk and is excluded from further evaluation.

Alternative S-3 satisfies RAOs 3, 4 and 6 at AOCs 1, 2 and 3.

Alternative S-4 partially satisfies RAOs 3, 4 and 6, because several AOCs 1, 6 and 8 are not actively remediated.

Alternative S-5 satisfies RAOs 3, 4, 5 and 6 at AOCs 1, 2, 3, 6 and 8.

Alternative S-6 satisfies RAOs 3, 4, 5 and 6 at AOCs 2, 3, 6 and 8, but not at AOC 1.

Alternative S-7 satisfies RAO 6 at AOCs 1, 2 and 3, but not at AOCs 6 and 8.

Alternative S-8 satisfies RAOs 3, 4, 5, and 6 at only AOCs 2 and 3.

Alternative S-9 satisfies RAOs 3, 4 and 5 at AOCs 1, 2, 3, 6 and 8.

Alternative S-10 satisfies RAO 6 at AOCs 2, 3, 6 and 8, but not at AOC 1.

Alternative S-11 satisfies RAOs 3, 4, 5 and 6 immediately.

With an environmental covenant limiting property use to recreational and educational uses, an active remedy at AOC 4, such as excavation or cover,

will not be necessary due to a prohibition on residential use of the site.

Alternatives S-3 through S-11 provide overall protection of human health and the environment. Alternative S-11 is the most protective because COCs with concentrations greater than residential and ecological RGs are removed and there are no site use restrictions. Alternatives S-5 and S-6 are the next most protective because they remove similar amounts of contaminated soil that exceed ecological RGs and rely on LUCs and RMDs for the balance of the AOCs. Alternatives S-9 and S-10 provide a similar level of protectiveness as Alternatives S-5 and S-6.

Alternatives S-3 and S-4 are less protective than the preceding alternatives because a smaller amount of contaminated soil is removed and protectiveness is provided by LUCs and RMDs over a larger area.

Alternatives S-7 and S-8 provide a similar level of protectiveness as Alternatives S-3 and S-4.

Alternative S-1 provides no protection of human health and the environment because risks are not addressed. Alternative S-2 is protective of human health and the environment, but is less protective than the other soil alternatives because there are only LUCs and RMDs, and no active remedy components.

The combination of the “LUCs only” alternative(s) is protective of human health if properly implemented and maintained and satisfies all RAOs for human health risk. RMDs are required to address the ecological risk for AOCs 1, 2, 3, 5, 6, 8 and the MLs, which do not meet RAOs for risk to the environment.

Ground Water Alternatives: Alternative G-1 provides no protection of human health and the environment because the elevated COC concentrations in ground water at the site are not addressed.

Alternative G-2 provides protection to human health by restricting access to contaminated ground water. Although COC concentrations are unchanged, LUCs will prevent unacceptable exposure to COCs and routine use. Routine inspections will verify that LUCs are being enforced.

Alternative G-2 satisfies RAOs 1 and 2. Therefore, Alternative G-2 is retained for further evaluation.

The combination of the “LUCs only” alternative(s) is protective of human health if properly implemented and maintained and satisfies all RAOs human health risk. RMDs are required to address ecological risk for AOCs 1, 2, 3, 5, 6, 8 and the MLs, which do not meet RAOs for risk to the environment.

Sediment Alternatives: Alternative SED-2 does not satisfy RAO 7 at AOCs 1, 5, 8 and the MLs for environmental risk and is excluded from further evaluation.

Alternative SED-3 satisfies RAO 7 at AOC 1.

Alternative SED-4 satisfies RAO 7 at AOCs 1, 5, and 8 and the MLs.

Alternative SED-5 satisfies RAO 7 at AOCs 5, 8 and the MLs.

Alternative SED-6 satisfies RAO 7 at AOC 1.

Alternative SED-7 satisfies RAO 7 at AOCs 1, 5, 8 and the MLs.

Alternative SED-8 satisfies RAO 7 at AOCs 5, 8 and the MLs.

Alternatives SED-3 through SED-8 provide overall protection of the environment. No unacceptable risk was identified for human health receptors. Alternative SED-4 is the most protective because COCs with concentrations greater than ecological RGs are removed from all AOCs. Alternative SED-5 is the next most protective because it removes smaller amounts of contaminated sediment that exceed ecological RGs and relies on an RMD for the balance of the AOCs. LUCs will prevent incidental human exposure to COCs during intrusive activities and will prohibit residential use. Alternatives SED-7 and SED-8 provide a similar level of protectiveness as Alternatives SED-4 and SED-5.

Alternatives SED-3 and SED-6 are less protective than the preceding sediment alternatives because a smaller amount of contaminated sediment is removed or covered and protectiveness is provided by an RMD over a larger area.

Alternative SED-2 is protective of the environment, but is less protective that the other alternatives because there is only an RMD, and there would be no active remedy components.

The combination of the “LUCs only” alternative(s) is protective of human health if properly implemented and maintained and satisfies all RAOs human health risk. RMDs are required to address ecological risk for AOCs 1, 2, 3, 5, 6, 8 and the MLs, which do not meet RAOs for environmental risk.

Alternative SED-1 provides no protection to the environment because risks are not addressed. There is no monitoring to detect changes in COC concentrations.

2. Compliance with ARARs

This threshold criterion is evaluated based on whether the alternative meets federal and state environmental statues and rules that strictly apply to remedial activities at the site, or those statutes and rules whose requirements would help achieve the remedial goals for the site, or whether a waiver is justified. See **Appendix C ARAR and TBC Table** for additional detail.

Soil Alternatives: Alternatives S-3 through S-11 partially to fully comply with all chemical-, location- and action-specific ARARs and TBCs, depending on the alternative. Alternative

S-11 fully meets the chemical-specific ARARs by removing COCs with concentrations greater than RGs. Alternatives S-3 through S-6 partially meet the chemical-specific ARARs by removing COCs from some AOCs, depending on the alternative. Alternatives S-7 through S-10 partially meet chemical-specific ARARs by covering the exceedances of COCs and eliminating the exposure routes through LUCs.

Excavation removes contaminated soils from the site.

The use of a cover by itself does not remove soil COCs or reduce their toxicity.

Alternative S-1 does not comply with chemical-specific ARARs and compliance with location-specific ARARs is incidental. Location-specific and action-specific ARARs or TBCs do not apply.

Alternative S-2 does not meet the chemical-specific and location-specific ARARs and does not eliminate exposure routes to ecological receptors. Therefore, Alternative S-2 is removed from further evaluation.

Ground Water Alternatives: Alternative G-2 complies with location- and action-specific ARARs and TBCs. By eliminating the human exposure routes, there are no chemical-specific ARARs.

LUCs alone do not effectively reduce COCs concentrations; however, LUCs are an effective tool to prevent future exposure to COCs in ground water. A LUC is effective in preventing ground water use and once established under a recorded environmental covenant will continue to apply to the property even if transferred.

Alternative G-1 does not comply with chemical-specific ARARs or TBC because no action is taken to reduce COC concentrations. Chemical-specific ARARs may be eventually met by natural attenuation, but there is no monitoring to verity the changes. Compliance with location-specific ARARs or TBCs is incidental. Action-specific ARARs or TBCs are not applicable.

Sediment Alternatives: Alternatives SED-3 through SED-8 partially to fully comply with all chemical-, location-, and action-specific ARARs and TBCs, depending on the alternative. Alternatives SED-3 through SED-5 partially to fully comply with the chemical-specific ARARs by removing COCs and applying LUCs to the site. Alternatives SED-6 and SED-8 comply with the chemical-specific ARARs by covering the sediment COCs and eliminating the exposure routes through LUCs.

Alternative SED-1 does not comply with chemical-specific ARARs, and compliance with location-specific ARARs is incidental. Location-specific and action-specific ARARS or TBCs do not apply.

Alternative SED-2 does not meet the chemical-specific and location-specific ARARs, because SED-2 does not eliminate exposure routes to ecological receptors. Therefore, Alternative SED-2 is removed from further evaluation.

Although the “no action alternatives” (*i.e.*, S-1, G-1 and SED-1) do not fully meet the two threshold criteria (overall protection of human health and the environment and compliance with ARARs), they were retained for comparison under the remaining criteria in accordance with the NCP.

BALANCING CRITERIA

3. Long-Term Effectiveness and Permanence

Soil Alternatives: The most effective alternative is Alternative S-11 because essentially all the contaminated soil is permanently removed to meet residential (unrestricted) use standards. Alternatives S-5 and S-6 are the next most effective because they remove the next greatest quantities of COCs, with more COCs removed by Alternative S-5 compared to Alternative S-6. Alternatives S-3 and S-4 follow in effectiveness because less contaminated soil is removed compared to Alternatives S-5 and S-6. Alternative S-3 is more effective than Alternative S-4 because more contaminated soil is removed. Alternatives S-7 and S-8 follow in effectiveness because clean soil cover (an engineered barrier) is less effective than removal, and Alternative S-7 is more effective than Alternative S-6 because it addresses more contaminated soil. Alternatives S-7 and S-8 use a cover that requires long-term maintenance.

Long-term maintenance of a cover through an O&M plan ensures continued effectiveness. The effectiveness of cover depends on the strict maintenance of its integrity, which is under a single ownership (Otterbein University). LUCs may also provide for cover maintenance and O&M plan implementation.

Alternatives S-9 and S-10 are the next most effective because although cover is less effective than removal, the two alternatives actively address more contaminated soil than the remaining soil alternatives. Alternative S-9 is more effective than Alternative S-10 because Alternative S-9 covers more contaminated soil. Alternatives S-9 and S-10 use a cover that requires long-term maintenance.

The long-term effectiveness and permanence of Alternative S-1 has no potential impacts due to implementation because there is no action.

Ground Water Alternatives: Alternative G-2 provides long-term effectiveness and permanence. The LUCs that prevent ground water use will effectively and permanently prevent direct human exposure to contaminated ground water. Routine inspections performed under the environmental covenant and the O&M plan, as applicable, will confirm that LUCs are maintained and will verify the condition and upkeep of any signs.

The long-term effectiveness and permanence of Alternative G-1 has no potential impacts due to implementation because there is no action.

Sediment Alternatives: The most effective alternative is Alternative SED-4 because

essentially all COCs would be permanently removed. Alternative SED-5 is the next most effective because it removes the next greatest quantities of COCs. Alternatives SED-7 and SED-8 are considered the next most effective because although cover is less effective than removal, the two alternatives actively address more contaminated sediment than the remaining alternatives. Alternative SED-7 is more effective than Alternative SED-8 because Alternative SED-7 covers more contaminated sediment.

The use of a cover does not remove COC contamination or reduce toxicity, but is effective in preventing direct exposure to contaminated sediment. Long-term maintenance of the cover through an O&M plan will ensure continued effectiveness.

Alternatives SED-7 and SED-8 use a cover that requires long-term maintenance. The effectiveness of a cover depends on the strict maintenance of its integrity, which is under a single ownership (Otterbein University).

Alternative SED-3 follows in effectiveness because less contaminated sediment is removed compared to Alternatives SED-4 and SED-5. Alternative SED-6 follows in effectiveness because cover is less effective than removal, and requires long-term maintenance.

The long-term effectiveness and permanence of Alternative SED-1 has no potential impacts due to implementation because there is no action.

4. Reduction of Toxicity, Mobility or Volume by Treatment

Soil Alternatives: None of the soil alternatives provide reductions in toxicity, mobility, or volume through treatment, and are therefore equally ranked for this criterion.

Ground Water Alternatives: None of the ground water alternatives provide reductions in toxicity, mobility, or volume through treatment, and are therefore equally ranked for this criterion.

5. Short-Term Effectiveness

Soil Alternatives: Active alternatives will immediately remove contaminated soils from impacted areas and will reduce exposure to human and terrestrial ecological receptors, although excavation will temporarily disturb the immediate upland area around the excavation. Risk reduction is proportional to the volume of contaminated soil removed under each alternative. The process of regrowth of upland species will start over the short-term, although regrowth of trees and formation of a climax community will take longer. There will be a short-term impact to the environment and community due to excavation activities. The impact is proportional to the amount of soil removed under each alternative.

Alternative S-11 has the highest potential short-term effectiveness, because contaminated soil removal will immediately address risk to any human or ecological receptors. It will

impact the community due to excavation activities.

Implementation of Alternative S-1 has no potential impacts due to implementation because there is no action.

Excavation will remove contaminated soils from the site and is an effective means for addressing soil with COC concentrations greater than RGs, to reduce the level of LUCs required, and to open the site to broader land use.

Using covers is a well-established and proven technology that is effective in preventing direct exposure to impacted soil.

The excavation and cover alternatives will have a short-term impact on the environment because vegetation in the immediate area of the excavation or cover alternatives will be removed. Disturbed vegetation will be restored. Disturbance is proportional to the amount of area excavated or covered.

Remedial actions for Alternatives S-3, S-4, S-7, and S-8 are comparable in size and will be completed in approximately four months, plus preparation and implementation of LUCs. Activities for Alternatives S-6, S-9, and S-10 are comparable in size, but larger than Alternatives S-3, S-4, S-7, and S-8, and will be completed in approximately four months, plus preparation and implementation of LUCs. Alternative S-5 will be completed in approximately five months, plus preparation and implementation of LUCs.

Alternative S-11 will meet the RAOs in the longest amount of time because it has the largest area and volume being remediated. Excavation will be completed in ten months.

For the active alternatives, remedial workers will be protected by the enforcement of a health and safety plan and the use of personal protective equipment (PPE). The potential for risk is a function of the quantities of contaminated soil that will be exposed and managed for each alternative. Alternatives S-7 and S-8 have the least potential for worker exposure because no contaminated soil is being exposed or managed except for the incidental amounts that may be exposed during grading prior to cover placement. The smallest areas will be covered in these alternatives. Alternatives S-9 and S-10 have the next lowest potential for worker exposure, except for the incidental amounts that may be exposed during grading prior to cover placement. Alternatives S-9 and S-10 have larger areas being covered compared to Alternatives S-7 and S-8. Alternatives S-3 and S-4 have the next greatest potential for worker exposure because they have the lowest quantities of contaminated soil being excavated for off-site disposal. Alternative S-3 has a greater potential for worker exposure compared to Alternative S-4 due to the larger volume of contaminated soil. After that, Alternatives S-5 and S-6 have the next greatest potential for worker exposure due to the larger volume of contaminated soil. Alternative S-5 has a greater potential for worker exposure compared to Alternative S-6 due to the larger volume of contaminated soil.

Alternative S-11 has the highest potential for worker exposure because it has the largest volume of contaminated soil excavated and transported off-site for disposal.

Alternative S-2 has no construction effort, and the implementation of the LUCs will take approximately six months.

The short-term effectiveness of Alternative S-1 has no potential impacts due to implementation because there is no action.

Ground Water Alternatives: Implementation of Alternative G-2 does not adversely impact the surrounding community because there is no active remediation.

Implementation of Alternative G-2 has no potential impacts on the environment because no active remedial actions are performed. However, any unacceptable ecological risks from existing contamination will not be addressed.

Alternative G-2 will meet the RAOs upon completion and implementation of the LUCs, which will take approximately six months.

Implementation of Alternative G-2 has no potential exposure to remedial workers because there is no active remediation. The only potential for exposure will be during site inspections, which are expected to be non-intrusive. For implementation of Alternative G-2 in combination with other remedial alternatives, remedial workers will be protected by the enforcement of a health and safety plan and the use of PPE.

The short-term effectiveness of Alternative G-1 has no potential impacts due to implementation because there is no action.

Sediment Alternatives: Excavation alternatives will have immediate short-term effectiveness because contaminated sediments are removed from impacted wetland areas. The effectiveness is proportional to the amount of contaminated sediment removed within each option. The excavations will temporarily disturb the sediments – however, short term benefits will be quickly realized, because clean sediments will be available for recolonization. Ecosystem function of the jurisdictional wetland will be immediately improved by providing increased water holding capacity and water filtration to the area. Regrowth of wetland species will occur over three to ten years for many species, with regrowth of trees and formation of a climax community taking longer. Such regrowth will be guided by active management after excavation.

There will be a short-term impact to the environment and community due to excavation activities. The impact is proportional to the amount of sediment removed under each alternative.

Remedial actions for Alternatives SED-3 and SED-6 are comparable in size and will be completed in approximately two months, plus the preparation and implementation of LUCs. Activities for Alternatives SED-4, SED-5, SED-7, and SED-8 are comparable in size, but larger than the preceding alternatives. Alternatives SED-7 and SED-8 will be completed in approximately three months, plus the preparation and implementation of LUCs. Alternatives SED-4 and SED-5 will be completed in approximately four months, plus

preparation and implementation of LUCs.

Alternative SED-2 has no construction effort; development and implementation of the LUCs will take approximately six months.

The short-term effectiveness of Alternative SED-1 has no potential impacts due to implementation because there is no action.

Excavation will remove contaminated sediments from the site and will be an effective means for addressing sediment with COC concentrations greater than RGs to reduce the level of LUCs required, or to open the site to broader land use.

6. Implementability

Soil Alternatives: Alternatives S-4 and S-8 are the easiest to implement because of the small quantities and small areas being remediated. Alternative S-4 is more difficult to implement because of the management and disposal of contaminated soil. Alternatives S-6 and S-10 are the next easiest to implement because of the largest quantities and area to be remediated. Alternative S-6 is more difficult because of the management and disposal of contaminated soil.

For excavation and cover soil alternatives, construction equipment and contractors and disposal locations for contaminated soil are readily available. Soil for capping can be readily secured. Storm water permitting is required but can be easily obtained.

Alternatives S-3 and S-7 are more difficult to implement because, although the quantities and areas are not exceptionally large, both alternatives require restoration and replacement of forested wetlands. Restoration services are readily available. Forested wetlands replacement is difficult due to mortality rates of new plantings.

Installation of and maintenance of a soil cover will be relatively easy to implement. If forested wetlands are eliminated by a soil cover, additional wetlands will be constructed at the site or other approved locations to meet the 3:1 requirement for forested wetland replacement.

Alternatives S-5 and S-9 are more difficult to implement than the preceding alternatives because in addition to the large volumes and areas to be remediated, the alternatives require restoration and replacement of forested wetlands. Restoration services are readily available. Forested wetlands replacement is difficult due to mortality rates of new plantings.

Alternative S-11 is the most difficult alternative to implement because of the large volume of excavation and the large area of wetland replacement, both forested and herbaceous. Restoration services are readily available. Forested wetlands replacement is difficult due to mortality rates of new plantings.

Alternative S-2 has no potential impacts due to implementation because there is no active remediation and it is the easiest to implement.

The implementability of Alternative S-1 has no potential impacts due to implementation because there would be no action.

LUCs will include the performance of regular site inspections to verify continued implementation of activity and use limitations and engineering controls.

Current site use is controlled by Otterbein University. Future site uses will be controlled, and LUCs will be easily implemented.

Ground Water Alternatives: Alternative G-2 is easy to implement because there are only LUCs. There are no further technical or administrative considerations because there are no field or permitting activities. Otterbein University owns the property and is willing to file an environmental covenant to establish a ground water use prohibition.

LUCs will include the performance of regular site inspections to verify continued implementation of an activity and use limitation for ground water.

Current site use is controlled by Otterbein University. Future site uses will be controlled, and LUCs will be easily implemented.

The implementability of Alternative G-1 has no potential impacts due to implementation because there is no action.

Sediment Alternatives: Alternatives SED-3 and SED-6 are the easiest to implement because of the small areas being remediated. Alternative SED-3 is more difficult to implement because of the management and disposal of contaminated sediment. Both alternatives require restoration and replacement of forested wetlands, which could be accomplished by on-site restoration and/or purchase of credits from a wetland bank. Forested wetlands replacement is difficult due to mortality rates of new plantings.

Because the depth of impacted sediment is relatively shallow, excavation of sediment using conventional equipment is implementable, and the necessary resources, equipment, and contractors are readily available. Disposal locations for contaminated sediment are available. Soil for capping can be readily secured. Storm water permitting is required, but can be easily obtained.

Installation of a soil cover within the wetlands will be more difficult to implement than upland soil placement, due to saturated soils and mature trees within the wetlands.

Alternatives SED-4 and SED-7 are the most difficult to implement, because they have the largest volumes and areas to be remediated, in addition to the restoration and replacement of forested wetlands. Alternatives SED-3, SED-4, SED-5, SED-6, SED-7, and SED-8 require a greater administrative effort than SED-2, because of the need for wetlands permits and on-site wetland inspection and reporting. Restoration services are readily

available. Forested wetlands replacement is difficult due to mortality rates of new plantings.

Alternative SED-2 has no potential impacts due to implementation because the excavation of impacted sediment involves no active remediation. Following the excavation, the planting of native wetland species will require oversight for three to ten years for many species, with regrowth of trees and formation of a climax community potentially taking longer. Such regrowth will be guided by active management.

The implementability of Alternative SED-1 has no potential impacts due to implementation because there is no action.

LUCs will include the performance of regular site inspections to verify continued implementation of any activity and use limitations applicable to sediment.

Current site use is controlled by Otterbein University. Future site uses will be controlled, and LUCs will be easily implemented.

7. Cost

Soil Alternatives: The estimated net present worth of the most expensive soil alternative S-11 is $4,530,000, and the least expensive soil alternative is S-1 at $52,000. The remaining soil alternatives from highest to lowest cost are as follows: S-5 at $1,383,000, S-6 at $1,220,000, S-3 at $1,091,000, S-4 $897,000, S-9 at $850,000, S-10 at $738,000, S-7 at $698,000, and S-8 at $570,000.

Groundwater Alternatives: The estimated net present worth of Alternative G-1 is $52,000, and Alternative G-2 is $144,000.

Sediment Alternatives: The estimated net present worth of the most expensive sediment alternative SED-4 is $1,470,000, and the least expensive sediment alternative is SED-1 at $52,000. The remaining sediment alternatives from highest to lowest cost are as follows: SED-5 at $1,417,000, SED-7 at $974,000, SED-8 at $970,000, SED-6 at $390,000, and SED-3 at $382,000.

MODIFYING CRITERIA

8. Community Acceptance

Community acceptance of the preferred alternative will be evaluated after the public comment period ends. Comments will be summarized and responded to by the Agency in a responsiveness summary, which will be attached to the decision document issued by the Director of Ohio EPA (after the preferred plan) that provides the final remedy selection.

5.3 Summary of Evaluation Criteria

A summary of the evaluation of the site remedial alternatives is included in **Table 6 Evaluation of Site Remedial Alternatives**.

TABLE 6 EVALUATION OF SITE REMEDIAL ALTERNATIVES								
Remedial Alternatives	**Threshold Criteria**		**Balancing Criteria**					**Modifying Criteria**
	1. Protects Human Health & Environment	2. Compliance with ARARs	3. Long Term Effectiveness	4. Reduces T, M and/or V by Treatment	5. Short Term Effectiveness	6. Implementable	7. Costs[13]	8. Community Acceptance
Soil								
S-1	□	□	□	□	□	□	$52	TBD
S-2	◘	◘	◘	□	□	□	$198	TBD
S-3	◘	◘	◘	□	■	□	$1,091	TBD
S-4	◘	◘	◘	□	■	■	$897	TBD
S-5	■	◘	■	□	■	◘	$1,383	TBD
S-6	■	◘	■	□	■	◘	$1,220	TBD
S-7	◘	◘	◘	□	■	◘	$698	TBD
S-8	◘	◘	◘	□	■	■	$570	TBD
S-9	■	◘	◘	□	■	◘	$850	TBD
S-10	■	◘	◘	□	■	◘	$738	TBD
S-11	■	■	■	□	■	◘	$4,530	TBD
Groundwater								
G-1	□	□	□	□	□	□	$52	TBD
G-2	■	■	◘	□	■	■	$144	TBD
Sediment								
SED-1	□	□	□	□	□	□	$52	TBD
SED-2	◘	□	□	□	□	□	$144	TBD
SED-3	◘	◘	◘	□	■	■	$382	TBD
SED-4	■	■	■	□	■	◘	$1,470	TBD
SED-5	■	◘	■	□	■	◘	$1,417	TBD
SED-6	◘	■	□	□	■	■	$390	TBD
SED-7	■	■	◘	□	■	◘	$974	TBD
SED-8	■	■	◘	□	■	◘	$970	TBD

[13] Cost in thousands of dollars using the NPW value unless one time cost (e.g. S-11).

6.0 OHIO EPA'S PREFERRED ALTERNATIVE

Ohio EPA's preferred remedial alternative for the former Kilgore Manufacturing site is a combination of:

- Soil Alternative S-5, Excavation of AOCs 1, 2, 3, 6, and 8 in conjunction with a LUC restricting the property from residential (unrestricted) land use but allowing for recreational and educational uses through commercial land uses.
- Ground Water Alternative G-2, a LUC prohibiting ground water extraction and use; and
- Sediment Alternative SED-4, Excavation of AOCs 1, 5, 8 and the MLs, with oversight of replantings until established.

This preferred remedial alternative may change in response to Ohio EPA's consideration of public comment or new information.

Soil Alternative S-5 was selected over the other soil alternatives because it fully meets the two threshold criteria (protection of human health and the environmental and compliance with ARARs) and the highest balancing criteria, long-term effectiveness, for the reasonably-anticipated land use. Soil cover alternatives do not provide permanent remediation and require on-going and indefinite monitoring over time. Additionally, cover is subject to disturbance within flowing wetland systems, so permanence is not assured.

Ground Water Alternative G-2 was selected over the other no-action ground water alternative because it fully meets the two threshold criteria.

Sediment Alternative SED-4 was selected because it fully meets the two threshold criteria (protective of future ecological receptors) and long-term effectiveness for the most AOCs. Whereas Sediment Alternative SED-4 has a greater estimated cost than Sediment Alternative SED-7 Cover AOCs 1, 5, and 8 and the MLs, it is the most permanent alternative.

The preferred alternative will be effective in the short-term by immediately addressing contamination within media that are exposing ecological receptors to COC concentrations above RGs, and achieving protection to human receptors. Although such an alternative will result in short-term disruption of the wetland ecosystem, it will result in a more resilient ecosystem by enhancing the potential for more diverse plant and animal communities over time.

Based on information presently available, the preferred remedial alternative best satisfies the criteria defined in **Table 6 Evaluation of Site Remedial Alternatives**. The elements of the preferred remedial alternative are:

6.1 Soil Remedial Alternative (S-5)

S-5 Excavation of AOCs 1, 2, 3, 6, 8 and the MLs was selected because it satisfies the two threshold criteria and meets the reasonably anticipated land use.

Alternative S-5 will satisfy RAO 6 with excavation and satisfy RAOs 3, 4 and 5 with the use of LUCs and an O&M plan. No RMD will be required for soil. Excavation will be completed in approximately 10 months.

Performance Standards:

1) The excavation of soil in AOCs 1, 2, 3, 6, and 8 will continue until the remaining soil meets human health based standards and ecological RGs in **Table 3**. Confirmatory samples will be collected per an approved work plan to ensure removals are complete. The performance standard is met when the RGs (see tables in Sections 2.4.1 and 2.4.2) are met through excavation and the risk to human health and ecological receptors is eliminated, and RAOs 3 through 6 are achieved without meeting Performance Standards 2 and 3.

2) RAOs 3 and 4 will be achieved when the environmental covenant describing the applicable activity and use limitations for the property is recorded and maintained, until such time that LUCs are no longer necessary. The activity and use limitations will prescribe the allowable land use, which will apply to the property, inclusive of AOC 4.

3) Native vegetation will be restored, monitored and managed to ensure establishment. The performance standard is met when the post remediation restoration activities are completed and approved by Ohio EPA.

6.2 Groundwater Remedial Alternative (G-2)

Ground Water Alternative G-2 was selected because it satisfies the two threshold criteria.

Implementation of G-2 will achieve RAOs 1 and 2. LUCs will be prepared and implemented within one year, but will need to be enforced indefinitely. Current and future owner of these parcels will need to adhere to the activity and use limitations. Ohio EPA will conduct periodic inspections to monitor compliance with the environmental covenant. There may be a potential cost savings in annual review and/or five-year review costs if one environmental covenant and O&M plan, as applicable, addresses multiple media components of the preferred remedy.

Performance Standard:

1) An environmental covenant to prohibit ground water extraction and use will be filed with the Delaware County Recorder's Office within 90 days of the initiation of the remedial action. The performance standard is met by continued compliance with the prohibition, such that the RAOs 1 and 2 are met. However, the prohibition is no longer necessary when the ground water underlying the property may be demonstrated to meet human health based standards in **Table 3**.

6.3 Sediment Remedial Alternative (SED-4)

Sediment Alternative SED-4 was selected because it satisfies the two threshold criteria and long term effectiveness. It is a permanent remedy.

Implementation of SED-4 will achieve RAO 7 at AOCs 1, 5, and 8. Excavation could be completed within in one year.

Performance Standards:

1) The excavation of sediment in AOCs 1, 5, 8, and the MLs will continue until the remaining sediments meet RGs in **Table 3**. Confirmatory samples will be collected per an approved work plan to ensure removals are complete. The performance standard is met when confirmatory sample analyses demonstrates that the remaining sediment concentrations meet the remediation levels (see table in Section 2.4.2) or as modified during remedial design, and the construction completion report is approved by Ohio EPA.

2) Native vegetation will be restored, monitored and managed to ensure establishment. The performance standard is met when the post remediation restoration activities are completed and approved by Ohio EPA.

Based on available information, the preferred alternative best satisfies the criteria in Table 6, Evaluation of Site Remedial Alternatives. The environmental covenant will provide the legal mechanism necessary to satisfy or implement requirements for soil, ground water and sediments. Ohio Revised Code (ORC) § 5301.85 and ORC § 5301.90 will prohibit the unilateral removal of the environmental covenant or any activity and use limitations by current or future property owners.

APPENDICES

Appendix A Glossary of Terms

Administrative Record: All documents that Ohio EPA considered or relied on in selecting a remedial action for a site.
Aquifer: An underground geological formation capable of holding and yielding water.
Applicable or Relevant and Appropriate Requirements (ARARs): Those rules that strictly apply to remedial activities at the site or those rules whose requirements would help achieve the remedial goals for the site.
Baseline Risk Assessment: An evaluation of the risks to humans and the environment posed by a site in the absence of any remedial action, which also determines the extent of cleanup needed to reduce potential risk levels to within acceptable ranges.
Carcinogen: A chemical that causes cancer.
CERCLA: Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended, 42 U.S.C. 9601 et seq. A federal law that regulates cleanup of hazardous substances sites under the U.S. EPA Superfund Program.
Contaminants of Concern (COCs): Chemicals identified at the site that are present in concentrations that may be harmful to human health or the environment.
Decision Document: A statement issued by the Ohio EPA giving the director's selected remedy for a site and the reasons for its selection.
Ecological Receptor: Animals or plant life exposed or potentially exposed to chemicals released from a site.
Ecological Risk Assessment (ERA): An assessment that evaluates the likelihood that adverse ecological effects may occur or are occurring because of exposure to one or more ecological stressors.
Environmental Covenant: A servitude arising under an environmental response project that imposes activity and use limitations and that meets the requirements established in ORC Section 5301.82.
Exposure Pathway: Route by which a chemical is transported from the site to a human or ecological receptor.
Feasibility Study: A study conducted to ensure that appropriate remedial alternatives are developed and evaluated such that relevant information concerning the remedial action options can be presented to a decision-maker and an appropriate remedy can be selected.
Hazardous Substance: A chemical that may cause harm to humans or the environment.
Hazardous Waste: A waste product listed or defined by RCRA that may cause harm to humans or the environment.
Human Receptor: A person/population exposed to chemicals released at a site.
Land Use Controls (LUCs): LUCs are administrative or legal instruments (institutional controls) that minimize potential for exposure to contamination and/or protect the integrity of a response action. LUCs typically limit land and/or resource use by providing information that modifies or guides human behavior at a site. LUCs include engineering and physical barriers, such as fences and security guards, as well as institutional controls.

Maximum Contaminant Level (MCL): The highest level of a contaminant that is allowed in a public drinking water supply. The level is established by U.S. EPA and incorporated into OAC 3745-81-11 and 3745-81-12.
Monitoring Well: A well installed to collect ground water samples for physical, chemical, or biological analyses to determine the amounts, types, and distribution of contaminants in ground water beneath a site.
NCP: National Oil and Hazardous Substances Pollution Contingency Plan, codified at 40 C.F.R. Part 300 (1990), as amended. A framework for remediation of hazardous substance sites specified in CERCLA.
Operation and Maintenance (O&M): Long-term measures taken at a site, after the initial remedial actions, to assure that a remedy remains protective of human health and the environment.
Performance Standard: Measures by which Ohio EPA determines if RAOs are being met.
Preferred Plan: The plan that evaluates the preferred remedial alternative chosen by Ohio EPA to remediate the site in a manner that best satisfies the evaluation criteria.
Remediation Goal (RG): Clean-up goals that (1) are protective of human health and the environment and (2) comply with ARARs. They are modified from preliminary remediation goals to reflect the results of the baseline risk assessment, and are were used during the analysis of remedial alternatives in the RI/FS.
Present Worth Cost: Estimated current cost, or value, of the future remedial costs to be expended, typically discounted at the current market rate. Provides a solid basis for comparing costs of each of the remedial alternatives.
Project Action Level: A concentration for a COC that has been determined by regulation or through a risk assessment to be protective of human health or ecological receptors. This concentration value could be based on a preliminary remediation goal (RG); a drinking water maximum contaminant level (MCL); or a background concentration (background).
RCRA: Resource Conservation and Recovery Act of 1976, as amended, 42 U.S.C. 6901 et seq. A federal law that regulates the handling of hazardous wastes.
Remedial Action Objectives (RAOs): Specific remedial goals for reducing risks posed by the site.
Remedial Investigation: A study conducted to collect information necessary to adequately characterize the site for developing and evaluating effective remedial alternatives.
Responsiveness Summary: A summary of all comments received concerning the preferred plan and Ohio EPA's response to the comments.
Risk Management Decision (RMD): A management decision that addresses ecological RAOs for soil or sediment by recognizing that active remediation may cause more harm than the existing conditions. Exposure and potential release would not be prevented. A management decision to discount the soil or sediment contamination of lentic or lotic water bodies without performance of a complete Level IV Field Baseline ERA.
Sediment: Topsoil, sand and minerals washed from the land into water, usually after rain or snow melt.

Water Quality Criteria: Chemical, physical and biological standards that define whether a body of surface water is unacceptably contaminated. These standards are intended to ensure that a body of water is safe for fishing, swimming and as a drinking water source. These standards can be found in OAC Chapter 3745-1.

Appendix B Primary Contaminants of Concern

A total of 12 primary contaminants of concern (COCs) have been identified that pose the greatest potential risk to human health and the environment at this site. Additional details on each primary COC (from the Agency for Toxic Substances and Disease Registry (ATSDR Toxicological Profiles) are provided below.

Antimony is a semi-metallic chemical element which can exist in two forms: the metallic form is bright, silvery, hard and brittle; the non-metallic form is a grey powder. Antimony is a poor conductor of heat and electricity; it is stable in dry air and is not attacked by dilute acids or alkalis. Antimony and some of its alloys expand on cooling. Antimony has been known since ancient times. It is sometimes found free in nature, but is usually obtained from the ores stibnite (Sb_2S_3) and valentinite (Sb_2O_3). Very pure antimony is used to make certain types of semiconductor devices, such as diodes and infrared detectors. Antimony is alloyed with lead to increase lead's durability. Antimony alloys are also used in batteries, low friction metals, type metal and cable sheathing, among other products. Antimony compounds are used to make flame-proofing materials, paints, ceramic enamels, glass and pottery. The ancient Egyptians used antimony, in the form of stibnite, for black eye make-up. Read more: http://www.lenntech.com/periodic/elements/sb.htm#ixzz3i9TOndPO
Arsenic is a naturally occurring element widely distributed in the earth's crust. In the environment, arsenic can combine with oxygen, chlorine and sulfur to form inorganic arsenic compounds. The main use of inorganic arsenic compounds is to preserve wood. Organic arsenic compounds are used primarily as pesticides. Breathing high levels of inorganic arsenic can cause throat and lung irritation. Ingesting high levels of arsenic can result in death, while at lower levels it can result in nausea, decreased red and white blood cell production, and damage to blood vessels. Skin contact can cause redness and swelling. Arsenic is a known human carcinogen.
Asbestos is the name given to a group of 6 different fibrous minerals (amosite, chrysotile, crocidolite, tremolite, actinolite and anthrophyllite) that occur naturally in the environment. Asbestos minerals are long, strong, flexible and heat-resistant, and are used in a wide range of products, primarily in building materials, friction products, and heat-resistant fabrics and coatings. Asbestos mainly affects the lungs and the lining of the lungs. Breathing high levels of asbestos for a long period may result in the formation of a scar-like tissue on the lungs and the lining of the lungs, a disease called asbestosis. This disease can eventually lead to disability and death. Asbestos is a known human carcinogen.
Barium is a silvery-white metal which exists in nature only in ores containing mixtures of elements. It combines with other chemicals such as sulfur or carbon and oxygen to form barium compounds. Barium compounds are used by the oil and gas industries to make drilling muds. Drilling muds make it easier to drill through rock by keeping the drill bit lubricated. They are also used to make paint, bricks, ceramics, glass, and rubber. Barium sulfate is sometimes used by doctors to perform medical tests and to take x-rays of the gastrointestinal tract.

Chromium is an odorless, tasteless naturally occurring element found in rocks, animals, plants and soils. It can be liquid, solid or gas. The most common forms are chromium (0), also known as elemental chromium, used for steel-making; chromium (III), also known as trivalent chromium, and an essential nutrient that helps the body use sugar, protein and fat; and chromium (VI), also known as hexavalent chromium, used for chrome plating, dyes, pigments, leather tanning and wood preserving. Breathing high levels of chromium (VI) can cause irritation to the lining of the nose, nose ulcers and breathing problems. Ingestion of chromium (VI) can cause irritation and ulcers in the stomach and small intestine, and anemia. Damage to the male reproductive system has been seen in animals exposed to chromium (VI). In workers, inhalation has been shown to cause lung cancer. U.S. EPA has determined that chromium (VI) compounds are a known human carcinogen.

Copper is a reddish material that occurs naturally in the environment in rocks, soil, water, and at low levels in air, and is an essential element in plants and animals. Copper is used to make wire, plumbing pipes and sheet metal, and is combined with other metals to make brass and bronze pipes and faucets. Long-term exposure to copper dust can irritate the nose, mouth and eyes, and cause headaches, dizziness, nausea and diarrhea. Ingestion of high levels can cause nausea, diarrhea, vomiting and stomach issues. Very high levels can cause kidney and liver damage, and even death. U.S. EPA has not classified copper as a human carcinogen because there are no adequate human or animal cancer studies.

Dioxins/dibenzofurans is the abbreviated or short name for a family of toxic substances that all share a similar chemical structure. Dioxins, in their purest form, look like crystals or a colorless solid. Most dioxins and furans are not man-made or produced intentionally, but are created when other chemicals or products are made. Of all the dioxins and furans, one, 2,3,7,8-tetrachloro-p-dibenzo-dioxin (2,3,7,8 TCDD) is considered the most toxic.

Iron is one of the most plentiful resources and accounts for 5 percent of the Earth's crust. As rainwater infiltrates the soil and underlying geologic formations it dissolves iron, causing it to seep into aquifers that serve as sources of ground water for wells. Iron can be a troublesome chemical in water supplies. Iron is mainly present in water in two forms: either the soluble ferrous iron or the insoluble ferric iron. Soluble ferrous iron is found in groundwater, in anaerobic reservoirs, in dead-ends in water distribution systems, and in scale (hard mineral coatings) within pipes. Water containing ferrous iron is clear and colorless because the iron is completely dissolved. When soluble ferrous iron is exposed to oxygen or to a disinfectant during water treatment, it oxidizes, causing to the water to turn cloudy and forming a reddish-brown substance (insoluble ferric iron). Iron in ground water, is often associated with other metals, such as manganese and arsenic.

Ingesting iron from drinking water is not directly associated with adverse health effects; although, trace impurities and microorganisms that are absorbed by iron solids may pose health concerns. Iron is considered a secondary or aesthetic contaminant. Iron is an essential mineral for human health in small concentrations (iron deficiency can lead to anemia).

Lead is a naturally occurring bluish-gray metal found in small amounts in the earth's crust. Lead can be found in all parts of the environment, but much of it comes from human activities including the burning of fossil fuels, mining and manufacturing. Lead is used in the production of batteries, ammunition, metal products (solder and pipes), and devices to shield X-rays, and was a common additive to gasoline in the U.S. until it was banned in 1996. The effects of lead are the same whether exposure is through ingestion or inhalation. It affects almost every organ in the body, though the main target is the nervous system. Long term exposure can result in decreased nervous system functionality, and it may cause weakness in fingers, wrists and ankles. Exposure to high levels can severely damage the brain and kidneys, and ultimately cause death. U.S. EPA

has determined that lead is a probable human carcinogen.
Manganese is a naturally occurring metal that is found in many types of rocks. Pure manganese is silver-colored, but does not occur naturally. It combines with other substances such as oxygen, sulfur, or chlorine. Manganese occurs naturally in most foods and may be added to some foods. Manganese is used principally in steel production to improve hardness, stiffness, and strength. It may also be used as an additive in gasoline to improve the octane rating of the gas.
Mercury is a naturally occurring metal which has several forms. The metallic mercury is a shiny, silver-white odorless liquid. If heated, it is an odorless, colorless gas. Metallic mercury is used to produce chlorine gas and caustic soda, and is also used in thermometers, dental fillings, and batteries. The nervous system is very sensitive to all forms of mercury. High level exposure to metallic, organic and inorganic mercury can permanently damage the brain, kidneys and developing fetuses. Effects on brain functioning may result in irritability, tremors, vision or hearing changes, and memory problems. There are inadequate human cancer data available for all forms of mercury. U.S. EPA has determined that mercury chloride and methylmercury are possible human carcinogens.
Polycyclic Aromatic Hydrocarbons (PAHs) are a group of over 100 different chemicals that are formed during the incomplete burning of coal, oil and gas, garbage, or other organic substances. Some PAHs are manufactured. PAHs are primarily found in coal tar, crude oil, creosote, and roofing tar, but a few are used in medicines or to make dyes, plastics, and pesticides. Animal studies have shown that PAHs can cause harmful effects on the skin, body fluids, and the immune system after both short and long term exposure. Some PAHs have caused lung, stomach and skin cancer in laboratory animals during inhalation, ingestion or direct contact. The U.S. Department of Health and Human Services has determined that some PAHs may reasonably be expected to be human carcinogens.
Strontium is a naturally occurring element found in rocks, soil, dust, coal, and oil. Naturally occurring strontium is not radioactive and is either referred to as stable strontium or strontium. Strontium in the environment exists in four stable isotopes, ^{84}Sr (read as strontium eighty-four), ^{86}Sr, ^{87}Sr, ^{88}Sr. Strontium compounds are used in making ceramics and glass products, pyrotechnics, paint pigments, fluorescent lights, and medicines. Strontium can also exist as several radioactive isotopes; the most common is ^{90}Sr. ^{90}Sr is formed in nuclear reactors or during the explosion of nuclear weapons. Radioactive strontium generates beta particles as it decays. One of the radioactive properties of strontium is half-life, or the time it takes for half of the isotope to give off its radiation and change into another substance. The half-life of ^{90}Sr is 29 years.
Zinc, a bluish-gray shiny metal, is one of the most common elements in the earth's crust. It is found in air, soil, water and in all foods. Zinc has many commercial uses as coatings to prevent rust, in dry cell batteries, and mixed with other metals to make alloys like brass and bronze. Zinc combines with other elements to form zinc compounds including zinc chloride, zinc oxide, zinc sulfate and zinc sulfide. Zinc compounds are widely used in industry to make paint, rubber, dyes, wood preservatives, and ointments. While zinc is an essential element of the human diet, it can become harmful at levels 10-15 times the amount needed for good health. The ingestion of large amounts in a short period can cause stomach cramps, nausea, and vomiting. Taken longer term, zinc can cause anemia. Inhaling large amounts of zinc can cause a specific short-term disease called metal fume fever, but long-term effects of breathing zinc are unknown. Based on incomplete information from human and animal studies, U.S. EPA has determined that zinc is not classifiable as to its human carcinogenicity.

CATEGORY	USC/CFR	ORC	OAC	PARAGRAPH	CAPTION	TEXT	APPLICATION	S-1	S-2	S-3, S-5, S-11	S-4, S-6	S-7, S-9	S-8, S-10	SED-1	SED-2	SED-3, SED-4, SED-5	SED-6, SED-7, SED-8	G-1	G-2	NOTES
								No act	LUCs	Exc; WL	Exc	Cov; WL	Cov	No act	LUCs	Exc; WL	Cov; WL	No act	LUCs	
ODNR		1518.02			ENDANGERED PLANT SPECIES	PROHIBITS REMOVAL OR DESTRUCTION OF ENDANGERED PLANT SPECIES (SOME PRIVATE PROPERTY EXCEPTIONS).	APPLIES TO REMEDIATION SITES WHERE CHEMICALS MAY HARM ENDANGERED SPECIES. CLEARLY ESTABLISHES THAT RECEPTOR PLANT SPECIES MUST BE CONSIDERED IN RISK ASSESSMENTS. THIS ACT MAY REQUIRE CONSIDERATION OF ENDANGERED SPECIES IN REMEDIATIONS THAT INVOLVE MOVEMENT OR DISPLACEMENT OF LARGE VOLUMES OF SURFACE SOIL.														No endangered plants present.
ODNR		1531.25			ENDANGERED ANIMAL SPECIES	PROHIBITS REMOVAL OR DESTRUCTION OF ENDANGERED ANIMAL SPECIES	APPLIES TO REMEDIATION SITES WHERE CHEMICALS MAY HARM ENDANGERED SPECIES. CLEARLY ESTABLISHES THAT RECEPTOR ANIMAL SPECIES MUST BE CONSIDERED IN RISK ASSESSMENTS. THIS ACT MAY REQUIRE CONSIDERATION OF ENDANGERED SPECIES IN REMEDIATIONS THAT INVOLVE MOVEMENT OR DISPLACEMENT OF LARGE VOLUMES OF SURFACE SOIL.			X	X	X	X			X	X			
APC		3704.05		A-I	PROHIBITS VIOLATION OF AIR POLLUTION CONTROL RULES	PROHIBITS EMISSION OF AN AIR CONTAMINANT IN VIOLATION SEC. 3704 OR ANY RULES, PERMIT, ORDER OR VARIANCE ISSUED PURSUANT TO THAT SECTION OF THE ORC.	MAY PERTAIN TO ANY SITE WHERE EMISSIONS OF AN AIR CONTAMINANT OCCURS EITHER AS A PRE-EXISTING CONDITION OF THE SITE OR AS A RESULT OF REMEDIAL ACTIVITIES. SHOULD BE CONSIDERED FOR VIRTUALLY ALL SITES THAT REQUIRE THE MANAGEMENT OF SOLID/HAZARDOUS WASTES.			X	X					X				
HW		3734.02		(H)	"DIGGING" WHERE HAZ OR SOLID WASTE FACILITY WAS LOCATED	FILLING, GRADING, EXCAVATING, BUILDING, DRILLING OR MINING ON LAND WHERE HAZARDOUS WASTE OR SOLID WASTE FACILITY WAS OPERATED IS PROHIBITED WITHOUT PRIOR AUTHORIZATION FROM THE DIRECTOR OF THE OHIO EPA.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS OR SOLID WASTE HAS COME TO BE LOCATED. CERTAIN ALTERNATIVES INCLUDE EXCAVATION ACTIVITIES WHICH MAY UNCOVER SOLID AND/OR HAZARDOUS WASTE. SHOULD THOSE ACTIVITIES REQUIRE THE MANAGEMENT OF SOLID/HAZARDOUS WASTES ON-SITE, AN EXEMPTION TO PERMITTING AND OTHER REQUIREMENTS MAY BE WARRANTED.			X	X	X	X			X	X			
HW APC		3734.02		(I)	AIR EMISSIONS FROM HAZARDOUS WASTE FACILITIES	NO HAZARDOUS WASTE FACILITY SHALL EMIT ANY PARTICULATE MATTER, DUST, FUMES, GAS, MIST, SMOKE, VAPOR OR ODOROUS SUBSTANCE THAT INTERFERES WITH THE COMFORTABLE ENJOYMENT OF LIFE OR PROPERTY OR IS INJURIOUS TO PUBLIC HEALTH.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE WILL BE MANAGED SUCH THAT AIR EMISSIONS MAY OCCUR. CONSIDER FOR SITES THAT WILL UNDERGO MOVEMENT OF EARTH OR INCINERATION.														No HW present
APC DSW		3767.13			PROHIBITION OF NUISANCES	PROHIBITS NOXIOUS EXHALATIONS OR SMELLS AND THE OBSTRUCTION OF WATERWAYS.	PERTAINS TO ANY SITE THAT MAY HAVE NOXIOUS SMELLS OR MAY OBSTRUCT WATERWAYS.		X	X	X	X	X		X	X	X		X	
DSW		3767.14			PROHIBITION OF NUISANCES	PROHIBITION AGAINST THROWING REFUSE, OIL, OR FILTH INTO LAKES, STREAMS, OR DRAINS.	PERTAINS TO ALL SITES LOCATED ADJACENT TO LAKES, STREAMS, OR DRAINS.		X	X	X	X	X		X	X	X		X	
DERR		5301.00		.80 to .92	UNIFORM ENVIRONMENTAL COVENANTS ACT	STANDARDS FOR ENVIRONMENTAL COVENANTS	CONSIDER FOR SITES WITH INSTITUTIONAL CONTROLS OR USE RESTRICTIONS		X	X	X	X	X		X	X	X		X	
DSW		6111.04			ACTS OF POLLUTION PROHIBITED	POLLUTION OF WATERS OF THE STATE IS PROHIBITED.	PERTAINS TO ANY SITE WHICH HAS CONTAMINATED ON-SITE GROUND OR SURFACE WATER OR WILL HAVE A DISCHARGE TO ON-SITE SURFACE OR GROUND WATER.													No SW contamination or discharge.
DSW		6111.07		A,C	WATER POLLUTION CONTROL REQUIREMENTS - DUTY TO COMPLY	PROHIBITS FAILURE TO COMPLY WITH REQUIREMENTS OF SECTIONS 6111.01 TO 6111.08 OR ANY RULES, PERMIT OR ORDER ISSUED UNDER THOSE SECTIONS.	PERTAINS TO ANY SITE WHICH HAS CONTAMINATED GROUND WATER OR SURFACE WATER OR WILL HAVE A DISCHARGE TO ON-SITE SURFACE OR GROUND WATER.													No SW contamination or discharge.
ODNR			1501:31-23	01, A-B	LIST OF ENDANGERED ANIMAL SPECIES	LIST OF OHIO ANIMAL SPECIES CONSIDERED ENDANGERED.	MAY APPLY TO REMEDIATION SITES WHERE LISTED SPECIES ARE THREATENED BY CHEMICAL RELEASES. MAY ALSO APPLY AT SITES WHERE REMEDIAL ACTIVITIES COULD DISTURB EXISTING HABITATS.			X	X	X	X			X	X			

CATEGORY	USC/CFR	ORC	OAC	PARAGRAPH	CAPTION	TEXT	APPLICATION	S-1	S-2	S-3, S-5, S-11	S-4, S-6	S-7, S-9	S-8, S-10	SED-1	SED-2	SED-3, SED-4, SED-5	SED-6, SED-7, SED-8	G-1	G-2	NOTES
								No act	LUCs	Exc; WL	Exc	Cov; WL	Cov	No act	LUCs	Exc; WL	Cov; WL	No act	LUCs	
ODNR			1501-18-1	03, A	LIST OF ENDANGERED PLANT SPECIES	PLANT SPECIES CONSIDERED ENDANGERED IN OHIO	MAY APPLY AT REMEDIATION SITES WHERE CHEMICAL RELEASE THREATENS LISTED SPECIES. SHOULD ALSO BE CONSIDERED WHERE REMEDIAL ACTIVITIES MAY DISRUPT HABITATS.													No endangered plants present.
DSW			3745-1-04	A,,B,C,D,E	THE "FIVE FREEDOMS" FOR SURFACE WATER	ALL SURFACE WATERS OF THE STATE SHALL BE FREE FROM: A) OBJECTIONABLE SUSPENDED SOLIDS. B)FLOATING DEBRIS, OIL AND SCUM. C) MATERIALS THAT CREATE A NUISANCE. D) TOXIC, HARMFUL OR LETHAL SUBSTANCES. E) NUTRIENTS THAT CREATE NUISANCE GROWTH	PERTAINS TO BOTH DISCHARGES TO SURFACE WATERS AS A RESULT OF REMEDIATION AND ANY ON-SITE SURFACE WATERS AFFECTED BY SITE CONDITIONS.			X	X	X	X			X	X			
DSW			3745-1-05	A-C	ANTIDEGRADATION POLICY FOR SURFACE WATER	PREVENTS DEGRADATION OF SURFACE WATER QUALITY BELOW DESIGNATED USE OR EXISTING WATER QUALITY. EXISTING IN STREAM USES SHALL BE MAINTAINED AND PROTECTED. THE MOST STRINGENT CONTROLS FOR TREATMENT SHALL BE REQUIRED BY THE DIRECTOR TO BE EMPLOYED FOR ALL NEW AND EXISTING POINT SOURCE DISCHARGES. PREVENTS ANY DEGRADATION OF STATE RESOURCE WATERS	REQUIRES THAT BEST AVAILABLE TECHNOLOGY (BAT) BE USED TO TREAT SURFACE WATER DISCHARGES. DSW USES THIS RULE TO SET STANDARDS WHEN EXISTING WATER QUALITY IS BETTER THAN THE DESIGNATED USE.													No SW contamination or discharge.
DSW			3745-1-09		WATER USE DES FOR SCIOTO RIVER	ESTABLISHES WATER USE DESIGNATIONS FOR STREAM SEGMENTS WITHIN THE SCIOTO RIVER BASIN.	PERTINENT IF STREAM OR STREAM SEGMENT IS ON-SITE AND IS EITHER AFFECTED BY SITE CONDITIONS OF IF REMEDY INCLUDES DIRECT DISCHARGE. USED BY DSW TO ESTABLISH WASTE LOAD ALLOCATIONS													No SW contamination or discharge.
DSW			3745-1-34		WATER QUALITY CRITERIA FOR OHIO RIVER DRAINAGE BASIN	ESTABLISHES CRITERIA FOR SURFACE WATER IN OHIO RIVER DRAINAGE BASIN.	PERTINENT IF STREAM OR STREAM SEGMENT IS ON-SITE AND IS EITHER AFFECTED BY SITE CONDITIONS OF IF REMEDY INCLUDES DIRECT DISCHARGE. USED BY DSW TO ESTABLISH WASTE LOAD ALLOCATIONS													No SW contamination or discharge.
APC			3745-15-07	A	AIR POLLUTION NUISANCES PROHIBITED	DEFINES AIR POLLUTION NUISANCE AS THE EMISSION OR ESCAPE INTO THE AIR FROM ANY SOURCES(s)) OF SMOKE, ASHES, DUST, DIRT, GRIME, ACIDS, FUMES, GASES, VAPORS, ODORS AND COMBINATIONS OF THE ABOVE THAT ENDANGER HEALTH, SAFETY OR WELFARE OF THE PUBLIC OR CAUSE PERSONAL INJURY OR PROPERTY DAMAGE. SUCH NUISANCES ARE PROHIBITED.	PERTAINS TO ANY SITE WHICH CAUSES, OR MAY REASONABLY CAUSE, AIR POLLUTION NUISANCES. CONSIDER FOR SITES THAT WILL UNDERGO EXCAVATION, DEMOLITION, CAP INSTALLATION, METHANE PRODUCTION, CLEARING AND GRUBBING, WATER TREATMENT, INCINERATION AND WASTE FUEL RECOVERY.			X	X	X	X			X	X			
FEDERAL	33 USC 1341				CLEAN WATER ACT (CWA) 401	REQUIRES PERMIT FOR ANY ACTIVITIES THAT MAY RESULT IN DISCHARGE INTO WATERS OF THE UNITED STATES, COMPLY WITH ALL APPLIABLE REQUIREMENTS	PERTAINS TO ANY SITE WHERE LICENSE OR PERMIT IS REQUIRED TO CONDUCT ACTIVITIES THAT MAY RESULT IN DISCHARGES TO NAVIGABLE WATERS WHILE COMPLYING WITH ALL OTHER WATER REGULATIONS			X	x*	X	x*			X	X			* these alts will avoid wetlands.
FEDERAL	33 USC 1344 40 CFR PART 230, 40 CFR PART 231, 40 CFR PART 232, 40 CFR PART 233,				CWA SECTION 404(b)(1) - GUIDELINES FOR SPECIFICATION OF DISPOSAL SITES FOR DREGED OR FILL MATERIAL; SECTION 404(c) PROCEDURES; 404 PROGRAM DEFINITIONS; EXEMPT ACTIVITIES NOT REQUIRING 404 PERMITS AND 404 STATE PROGRAM REGULATIONS	PERMITS FOR DREDGED OR FILL MATERIAL; PROCEDURES, 404 PROGRAM DEFINITIONS; 404 STATE PROGRAM REGULATIONS	PERTAINS DISPOSAL SITES FOR DREDGED FOR FILL MATERIAL AND REQUIRES COMPLIANCE WITH CLEAN WATER ACT			X	x*	X	x*			X	X			* these alts will avoid wetlands.

CATEGORY	USC/CFR	ORC	OAC	PARAGRAPH	CAPTION	TEXT	APPLICATION	S-1	S-2	S-3, S-5, S-11	S-4, S-6	S-7, S-9	S-8, S-10	SED-1	SED-2	SED-3, SED-4, SED-5	SED-6, SED-7, SED-8	G-1	G-2	NOTES
								No act	LUCs	Exc; WL	Exc	Cov; WL	Cov	No act	LUCs	Exc; WL	Cov; WL	No act	LUCs	
DSW		6111.021, 6111.022, 6111.023, 6111.024, AND 6111.028			ISOLATED WETLAND REQUIREMENTS	WATER POLLUTION CONTROL DEFINITIONS, ISOLATED WETLAND PERMITS, LEVEL OF REVIEW, DISCHARGE OF DREDGED MATERIAL INTO ISOLATED WETLANDS	PERTAINS TO ANY SITE WHERE ISOLATED WETLANDS ARE PROPOSED TO BE FILLED, LISTS ALL COMPLIANCE REQUIREMENTS			X	x*	X	x*			X	X			* these alts will avoid wetlands.
DSW			3745-1-51	A-C	WETLAND NARRATIVE CRITERIA	LISTS CRITERIA TO BE PROTECTED IN WETLAND ENVIRONMENTS	CONSIDER FOR SITES THAT HAVE IMPACTED WETLANDS OR WHERE REMEDIAL ACTIVITIES WOULD IMPACT WETLANDS.			X	x*	X	x*			X	X			* these alts will avoid wetlands.
DSW			3745-1-54	A-D	WETLAND ANTIDEGRADATION	REQUIRES THAT ALL WETLANDS BE ASSIGNED A CATEGORY CLASSIFICATION AND GIVES CRITERIA FOR CLASSIFICATION. DISCUSSES REQUIREMENTS FOR AVOIDANCE AND MINIMIZATION OF WETLANDS DAMAGE AS WELL AS COMPENSATORY MITIGATION.	CONSIDER FOR SITES THAT HAVE IMPACTED WETLANDS OR WHERE REMEDIAL ACTIVITIES WOULD IMPACT WETLANDS.			X	x*	X	x*			X	X			* these alts will avoid wetlands.
APC			3745-17-08	A1,A2,B,D	EMISSION RESTRICTIONS FOR FUGITIVE DUST	ALL EMISSIONS OF FUGITIVE DUST SHALL BE CONTROLLED.	PERTAINS TO SITES WHICH MAY HAVE FUGITIVE EMISSIONS (NON-STACK) OF DUST. CONSIDER FOR SITES THAT WILL UNDERGO GRADING, LOADING OPERATIONS, DEMOLITION, CLEARING AND GRUBBING AND CONSTRUCTION UTILIZE INCINERATION OR FUEL RECOVERY (WASTE FUEL RECOVERY)			X	X	X	X			X	X			
APC			3745-19-03	A,B,C,D	OPEN BURNING STANDARDS IN RESTRICTED AREAS	OPEN BURNING WITHOUT PRIOR AUTHORIZATION FROM OHIO EPA IS PROHIBITED.	PERTAINS TO SITES WITHIN A RESTRICTED AREA (WITHIN THE BOUNDARY OF A MUNICIPALITY AND A ZONE EXTENDING BEYOND SUCH MUNICIPALITY).													No open burning proposed.
APC			3745-19-04	A,B,C,D	OPEN BURNING STANDARDS IN UNRESTRICTED AREAS	OPEN BURNING WITHOUT PRIOR AUTHORIZATION FROM OHIO EPA IS PROHIBITED	PERTAINS TO SITES WITHIN AN UNRESTRICTED AREA (OUTSIDE THE BOUNDARY OF A MUNICIPALITY AND A ZONE EXTENDING BEYOND SUCH MUNICIPALITY).													No open burning proposed.
APC			3745-20-05	A-D	STANDARD FOR ASBESTOS WASTE HANDLING	SPECIFIES PROCEDURES FOR HANDLING ASBESTOS WASTE GENERATED AT A DEMOLITION SITE. SITES THAT WILL UNDERGO WATER TREATMENT.	CONSIDER FOR SITES AT WHICH ASBESTOS CONTAINING WASTES ARE PRESENT OR MAY BE GENERATED.			X	X	X	X			X	X			
APC			3745-20-06	A,B	STANDARD FOR AACTIVE ASBESTOS WASTE DISPOSAL SITES	ESTABLISHES OPERATING STANDARDS FOR AN ACTIVE ASBESTOS WASTE DISPOSAL SITES.	PERTAINS TO SITES WHERE ASBESTOS HAS COME TO BE LOCATED AND MUST BE CONSOLIDATED ON-SITE. CONSIDER FOR LANDFILLS WHERE WASTES WILL BE EXCAVATED AND RE-DEPOSITED ON-SITE.													Not an active asbestos site.
APC			3745-20-07	A,B,C	STANDARD FOR INACTIVE ASBESTOS WASTE DISPOSAL SITES	ESTABLISHES EMISSIONS AND MAINTENANCE STANDARDS FOR INACTIVE ASBESTOS WASTE DISPOSAL SITES.	PERTAINS TO SITES WHERE ASBESTOS HAS COME TO BE LOCATED. CONSIDER FOR LANDFILLS WITH INADEQUATE COVER OR WHERE WASTES WILL BE CONSOLIDATED.	X	X	X	X	X	X	X	X	X	X			
FEDERAL	40 CFR 122.26				STORM WATER DISCHARGES	APPLICABLE TO STATE NPDES PROGRAMS	SPECIFIES WHEN STORM WATER DISCHARGE PERMITS ARE REQUIRED			X	X	X	X			X	X			
DSW			3745-32-01, 3745-32-02, 3745-32-03, 3745-32-04, 3745-32-05, 3745-32-06, 3745-32-07		SECTION 401 WATER QUALITY CERTIFICATION RULES	APPLICABLE TO ALL FEDERAL LICENSES OR PERMITS WHICH MAY RESULT IN A DISCHARGE OF POLLUTANTS TO WATERS OF THE US.	SPECIFIES WHEN 401 IS REQUIRED, OR EXEMPT AND APPLICABLE CRITERIA FOR DECISION, REVOCATION AND ADMINISTRATIIVE PROCESSES.			X	X	X	X			X	X			
DSW			3745-39		PHASE II STORM WATER RULES	SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4S)	REQUIRED FOR SITES WHERE STORM WATER RUN OFF MAY AFFECT THE MS4			X	X	X	X			X	X			
HW			3745-270-03	A-D	DILUTION PROHIBITED AS A SUBSTITUTE FOR TREATMENT.	FORBIDS DILUTION AS A MEANS OF ACHIEVING LAND DISPOSAL RESTRICTION LEVELS	CONSIDER FOR REMEDIAL OPTIONS INCLUDING LAND DISPOSAL OR LEAVING WASTES IN-PLACE													No dilution proposed.

CATEGORY	USC/CFR	ORC	OAC	PARAGRAPH	CAPTION	TEXT	APPLICATION	S-1	S-2	S-3, S-5, S-11	S-4, S-6	S-7, S-9	S-8, S-10	SED-1	SED-2	SED-3, SED-4, SED-5	SED-6, SED-7, SED-8	G-1	G-2	NOTES
								No act	LUCs	Exc; WL	Exc	Cov; WL	Cov	No act	LUCs	Exc; WL	Cov; WL	No act	LUCs	
HW			3745-270-07	A-E	TESTING, TRACKING, AND RECORDKEEPING REQUIREMENTS	TESTING, TRACKING, AND RECORDKEEPING REQUIREMENTS FOR GENERATORS, TREATERS, AND DISPOSAL FACILITIES.	CONSIDER FOR SITES AT WHICH WASTES ARE GENERATED, STORED, DISPOSED, OR TREATED			X**	X**					X**				**Only if HW is generated
HW			3745-270-09	A-D	SPECIAL RULES REGARDING CHARACTERISTIC WASTES	RULES APPLICABLE TO LAN D DISPOSAL OF CHARACTERISTIC WASTES	CONSIDER FOR SITES THAT GENERATE CHARACTERISTIC WASTES			X**	X**					X**				**Only if HW is generated
HW			3745-270-34	A-F	WASTE SPECIFIC PROHIBITIONS-TOXIC METALS	RESTRICTIONS ON LAND DISPOSAL OF WASTE THAT ARE TOXIC CHARACTERISTIC FOR SPECIFIED METALS	CONSIDER FOR SITES WITH METALLIC CONTAMINATION IN WASTES			X**	X**					X**				**Only if HW is generated
HW			3745-270-42	A-D	TREATMENT STANDARDS EXPRESSED AS SPECIFIED TECHNOLOGIES	LISTS SPECIFIC TREATMENT TECHNOLOGIES REQUIRED FOR SPECIFIC WASTES	CONSIDER AT ALL SITES GENERATING WASTES OR WITH ON-SITE DISPOSAL			X**	X**					X**				**Only if HW is generated
HW			3745-270-45	A-D	TREATMENT STANDARDS FOR HAZARDOUS DEBRIS	SPECIFIES TREATMENT TECHNOLOGIES AND PERFORMANCE STANDARDS FOR VARIOUS DEBRIS.	CONSIDER FOR SITES WITH CONTAMINATION BY DEBRIS.													No hazardous debris.
HW			3745-270-48	A	UNIVERSAL TREATMENT STANDARDS	GIVES CONTAMINANT CHEMICAL SPECIFIC STANDARDS FOR LAND DISPOSAL	CONSIDER FOR SITES WITH WASTE GENERATION OR ON-SITE DISPOSAL													No universal waste.
HW			3745-270-49	A-E	LAND DISPOSAL RESTRICTION FOR CONTAMINATED SOILS	SPECIFIES STANDARDS FOR SOIL TREATMENT	CONSIDER AT SITES WHERE CONTAMINATED SOILS ARE GENERATED			X**	X**					X**				**Only if HW is generated
HW			3745-270-50	A-F	PROHIBITIONS ON STORAGE OF RESTRICTED WASTES	RULES FOR STORAGE OF WASTES THAT VIOLATE LDR'S	CONSIDER AT SITES WHERE REMEDIATION INCLUDES STORAGE OF WASTES.			X**	X**					X**				**Only if HW is generated
HW			3745-52-11	A-D	EVALUATION OF WASTES	ANY PERSON GENERATING A WASTE MUST DETERMINE IF THAT WASTE IS A HAZARDOUS WASTE (EITHER THROUGH LISTING OR BY CHARACTERISTIC).	PERTAINS TO SITES AT WHICH WASTES OF ANY TYPE (BOTH SOLID AND HAZARDOUS) ARE LOCATED.			X	X					X				
HW			3745-52-12	A-C	GENERATOR IDENTIFICATION NUMBER	A GENERATOR MUST NOT STORE, TREAT DISPOSE OR TRANSPORT HAZARDOUS WASTES WITHOUT A GENERATOR NUMBER	PERTAINS TO SITES WHERE HAZARDOUS WASTE WILL BE TRANSPORTED OFF-SITE FOR TREATMENT, STORAGE OR DISPOSAL			X**	X**					X**				**Only if HW is generated
HW			3745-52-20		HAZARDOUS WASTE MANIFEST - GENERAL REQUIREMENTS	REQUIRES A GENERATOR WHO TRANSPORTS OR OFFERS FOR TRANSPORTATION HAZARDOUS WASTE FOR OFF-SITE TREATMENT, STORAGE OR DISPOSAL TO PREPARE A UNIFORM HAZARDOUS WASTE MANIFEST	PERTAINS TO SITES WHERE HAZARDOUS WASTE WILL BE TRANSPORTED OFF-SITE FOR TREATMENT, STORAGE OR DISPOSAL			X**	X**					X**				**Only if HW is generated
HW			3745-52-22		HAZARDOUS WASTE MANIFEST - NUMBER OF COPIES	SPECIFIES THE NUMBER OF MANIFEST COPIES TO BE PREPARED	PERTAINS TO SITES WHERE HAZARDOUS WASTE WILL BE TRANSPORTED OFF-SITE FOR TREATMENT, STORAGE OR DISPOSAL			X**	X**					X**				**Only if HW is generated
HW			3745-52-23		HAZARDOUS WASTE MANIFEST - USE	SPECIFIES PROCEDURES FOR THE USE OF HAZARDOUS WASTE MANIFESTS INCLUDING A REQUIREMENT THAT THEY BE HAND SIGNED BY THE GENERATOR	PERTAINS TO SITES WHERE HAZARDOUS WASTE WILL BE TRANSPORTED OFF-SITE FOR TREATMENT, STORAGE OR DISPOSAL			X**	X**					X**				**Only if HW is generated
HW			3745-52-30		HAZARDOUS WASTE PACKAGING	REQUIRES A GENERATOR TO PACKAGE HAZARDOUS WASTE IN ACCORDANCE WITH U.S. DOT REGULATIONS FOR TRANSPORTATION OFF-SITE.	PERTAINS TO ANY SITE WHERE HAZARDOUS WASTE WILL BE GENERATED BY ON-SITE ACTIVITIES AND SHIPPED OFF-SITE FOR TREATMENT AND/OR DISPOSAL.			X**	X**					X**				**Only if HW is generated
HW			3745-52-31		HAZARDOUS WASTE LABELING	REQUIRES PACKAGES OF HAZARDOUS WASTE TO BE LABELED IN ACCORDANCE WITH U.S.DOT REGULATIONS FOR OFF-SITE TRANSPORTATION.	PERTAINS TO ANY SITE WHERE HAZARDOUS WASTE WILL BE GENERATED BY ON-SITE ACTIVITIES AND SHIPPED OFF-SITE FOR TREATMENT AND/OR DISPOSAL.			X**	X**					X**				**Only if HW is generated
HW			3745-52-32		HAZARDOUS WASTE MARKING	SPECIFIES LANGUAGE FOR MARKING PACKAGES OF HAZARDOUS WASTE PRIOR TO OFF-SITE TRANSPORTATION	PERTAINS TO ANY SITE WHERE HAZARDOUS WASTE WILL BE GENERATED BY ON-SITE ACTIVITIES AND SHIPPED OFF-SITE FOR TREATMENT AND/OR DISPOSAL.			X**	X**					X**				**Only if HW is generated
HW			3745-52-33		HAZARDOUS WASTE PLACARDING	GENERATOR SHALL PLACARD HAZARDOUS WASTE PRIOR TO OFF-SITE TRANSPORTATION.	PERTAINS TO ANY SITE WHERE HAZARDOUS WASTE WILL BE GENERATED BY ON-SITE ACTIVITIES AND SHIPPED OFF-SITE FOR TREATMENT AND/OR DISPOSAL.			X**	X**					X**				**Only if HW is generated

CATEGORY	USC/CFR	ORC	OAC	PARAGRAPH	CAPTION	TEXT	APPLICATION	S-1	S-2	S-3, S-5, S-11	S-4, S-6	S-7, S-9	S-8, S-10	SED-1	SED-2	SED-3, SED-4, SED-5	SED-6, SED-7, SED-8	G-1	G-2	NOTES
								No act	LUCs	Exc; WL	Exc	Cov; WL	Cov	No act	LUCs	Exc; WL	Cov; WL	No act	LUCs	
HW			3745-52-34		ACCUMULATION TIME OF HAZARDOUS WASTE	IDENTIFIES MAXIMUM TIME PERIODS THAT A GENERATOR MAY ACCUMULATE A HAZARDOUS WASTE WITHOUT BEING CONSIDERED AN OPERATOR OF A STORAGE FACILITY. ALSO ESTABLISHES STANDARDS FOR MANAGEMENT OF HAZARDOUS WASTES BY GENERATORS.	PERTAINS TO A SITE WHERE HAZARDOUS WASTE WILL BE GENERATED AS A RESULT OF THE REMEDIAL ACTIVITIES.			X**	X**					X**				**Only if HW is generated
HW			3745-52-40	A-D	RECORDKEEPING REQUIREMENTS, THREE YEAR RETENTION	SPECIFIES RECORDS THAT SHALL BE KEPT FOR THREE YEARS	CONSIDER FOR SITES AT WHICH HAZARDOUS WASTES ARE GENERATED			X**	X**					X**				**Only if HW is generated
HW			3745-52-41	A,B	ANNUAL REPORT	REQUIRES GENERATORS TO PREPARE ANNUAL REPORT TO OEPA	APPLICABLE AT SITES GENERATING WASTES FOR OFF--SITE SHIPMENT			X**	X**					X**				**Only if HW is generated
HW			3745-54-13	A	GENERAL ANALYSIS OF HAZARDOUS WASTE	PRIOR TO ANY TREATMENT, STORAGE OR DISPOSAL OF HAZARDOUS WASTES, A REPRESENTATIVE SAMPLE OF THE WASTE MUST BE CHEMICALLY AND PHYSICALLY ANALYZED.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS IS TO BE TREATED, STORED OR DISPOSED OF (OR HAS BEEN DISPOSED OF).			X**	X**					X**				**Only if HW is generated
HW			3745-54-14	A,B,C	SECURITY FOR HAZARDOUS WASTE FACILITIES	HAZARDOUS WASTE FACILITIES MUST BE SECURED SO THAT UNAUTHORIZED AND UNKNOWING ENTRY ARE MINIMIZED OR PROHIBITED.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS IS TO BE TREATED, STORED OR DISPOSED OF (OR HAS BEEN DISPOSED OF).													No on-site treatment is proposed.
HW			3745-54-15	A,C	INSPECTION REQUIREMENTS FOR HAZARDOUS WASTE FACILITIES	HAZARDOUS WASTE FACILITIES MUST BE INSPECTED REGULARLY TO DETECT MALFUNCTIONS, DETERIORATIONS, OPERATIONAL ERRORS AND DISCHARGES. ANY MALFUNCTIONS OR DETERIORATIONS DETECTED SHALL BE REMEDIED EXPEDITIOUSLY.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS IS TO BE TREATED, STORED OR DISPOSED OF (OR HAS BEEN DISPOSED OF).													No on-site treatment is proposed.
HW			3745-54-16		PERSONNEL TRAINING	ESTABLISHES REQUIREMENTS FOR TRAINING OF PERSONNEL AT HAZARDOUS WASTE FACILITIES	PERTAINS TO ANY SITE AT WHICH HAZARDOUS IS TO BE TREATED, STORED OR DISPOSED OF (OR HAS BEEN DISPOSED OF).													No on-site treatment is proposed.
HW			3745-54-31		DESIGN & OPERATION OF HAZARDOUS WASTE FACILITIES	HAZARDOUS WASTE FACILITIES MUST BE DESIGNED, CONSTRUCTED, MAINTAINED AND OPERATED TO MINIMIZE THE POSSIBILITY OF FIRE, EXPLOSION OR UNPLANNED RELEASE OF HAZARDOUS WASTE OR HAZARDOUS CONSTITUENTS TO THE AIR, SOIL OR SURFACE WATER WHICH COULD THREATEN HUMAN HEALTH OR THE ENVIRONMENT.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS IS TO BE TREATED, STORED OR DISPOSED OF (OR HAS BEEN DISPOSED OF).													No on-site TSD is proposed.
HW			3745-54-32	A,B,C,D	REQUIRED EQUIPMENT FOR HAZARDOUS WASTE FACILITIES	ALL HAZARDOUS WASTE FACILITIES MUST BE EQUIPPED WITH EMERGENCY EQUIPMENT, SUCH AS AN ALARM SYSTEM, FIRE CONTROL EQUIPMENT AND A TELEPHONE OR RADIO.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS IS TO BE TREATED, STORED OR DISPOSED OF (OR HAS BEEN DISPOSED OF). SPECIFICATIONS													No on-site TSD is proposed.
HW			3745-54-33		TESTING & MAINTENANCE OF EQUIPMENT; HAZ WASTE FACILITIES	ALL HAZARDOUS WASTE FACILITIES MUST TEST AND MAINTAIN EMERGENCY EQUIPMENT TO ASSURE PROPER OPERATION.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE IS TO BE TREATED, STORED OR DISPOSED OF (OR HAS BEEN DISPOSED OF).													No on-site TSD is proposed.
HW			3745-54-34		ACCESS TO COMMUNICATIONS OR ALARM SYSTEM; HAZ WASTE FAC	WHENEVER HAZARDOUS WASTE IS BEING HANDLED, ALL PERSONNEL INVOLVED SHALL HAVE IMMEDIATE ACCESS TO AN INTERNAL ALARM OR EMERGENCY COMMUNICATION DEVICE.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE IS TO BE TREATED, STORED OR DISPOSED OF (OR HAS BEEN DISPOSED OF).													No on-site TSD is proposed.
HW			3745-54-37	A,B	ARRANGEMENTS/ AGREEMENTS WITH LOCAL AUTHORITIES	ARRANGEMENTS OR AGREEMENTS WITH LOCAL AUTHORITIES, SUCH AS POLICE, FIRE DEPARTMENT AND EMERGENCY RESPONSE TEAMS MUST BE MADE. IF LOCAL AUTHORITIES WILL NOT COOPERATE, DOCUMENTATION OF THAT NON-COOPERATION SHOULD BE PROVIDED.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE IS TO BE TREATED, STORED OR DISPOSED OF (OR HAS BEEN DISPOSED OF).													No on-site TSD is proposed.

CATEGORY	USC/CFR	ORC	OAC	PARAGRAPH	CAPTION	TEXT	APPLICATION	S-1	S-2	S-3, S-5, S-11	S-4, S-6	S-7, S-9	S-8, S-10	SED-1	SED-2	SED-3, SED-4, SED-5	SED-6, SED-7, SED-8	G-1	G-2	NOTES
								No act	LUCs	Exc; WL	Exc	Cov; WL	Cov	No act	LUCs	Exc; WL	Cov; WL	No act	LUCs	
HW			3745-54-52	A-F	CONTENT OF CONTINGENCY PLAN; HAZ WASTE FACILITIES	HAZARDOUS WASTE FACILITIES MUST HAVE A CONTINGENCY PLAN THAT ADDRESSES ANY UNPLANNED RELEASE OF HAZARDOUS WASTES OR HAZARDOUS CONSTITUENTS INTO THE AIR, SOIL OR SURFACE WATER. THIS RULE ESTABLISHES THE MINIMUM REQUIRED INFORMATION OF SUCH A PLAN.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE IS TO BE TREATED, STORED OR DISPOSED OF (OR HAS BEEN DISPOSED OF).														No on-site TSD is proposed.
HW			3745-54-53	A,B	COPIES OF CONTINGENCY PLAN; HAZARDOUS WASTE FACILITIES	COPIES OF THE CONTINGENCY PLAN REQUIRED BY 3745-54-50 MUST BE MAINTAINED AT THE FACILITY AND SUBMITTED TO ALL LOCAL POLICE DEPARTMENTS, FIRE DEPARTMENTS, HOSPITALS LOCAL EMERGENCY RESPONSE TEAMS AND THE OHIO EPA.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE IS TO BE TREATED, STORED OR DISPOSED OF (OR HAS BEEN DISPOSED OF)														No on-site TSD is proposed.
HW			3745-54-54	A	AMENDMENT OF CONTINGENCY PLAN; HAZ WASTE FACILITIES	THE CONTINGENCY PLAN MUST BE AMENDED IF IT FAILS IN AN EMERGENCY, THE FACILITY CHANGES (IN ITS DESIGN, CONSTRUCTION, MAINTENANCE OR OPERATION), THE LIST OF EMERGENCY COORDINATORS CHANGE OR THE LIST OF EMERGENCY EQUIPMENT.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE IS TO BE TREATED, STORED OR DISPOSED OF (OR HAS BEEN DISPOSED OF).														No on-site TSD is proposed.
HW			3745-54-55		EMERGENCY COORDINATOR; HAZARDOUS WASTE FACILITIES	AT ALL TIMES THERE SHOULD BE AT LEAST ONE EMPLOYEE EITHER ON THE PREMISES OR ON CALL TO COORDINATE ALL EMERGENCY RESPONSE MEASURES.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE IS TO BE TREATED, STORED OR DISPOSED OF (OR HAS BEEN DISPOSED OF).														No on-site TSD is proposed.
HW			3745-54-56	A-I	EMERGENCY PROCEDURES; HAZARDOUS WASTE FACILITIES	SPECIFIES THE PROCEDURES TO BE FOLLOWED IN THE EVENT OF AN EMERGENCY.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE IS TO BE TREATED, STORED OR DISPOSED OF (OR HAS BEEN DISPOSED OF).														No on-site TSD is proposed.
HW			3745-54-73	A,B	OPERATING RECORD	SPECIFIES RECORDS TO BE KEPT AT TSD FACILITIES	CONSIDER FOR SITES WITH ON-SITE TREATMENT, STORAGE OR DISPOSAL													No on-site TSD is proposed.
HW			3745-54-77	A	ADDITIONAL REPORTS	REQUIRES FACILITIES TO REPORT FIRES, EXPLOSIONS OR OTHER MISHAPS	CONSIDER AT SITES WITH TREATMENT, STORAGE OR DISPOSAL ON-SITE													No on-site TSD is proposed.
HW			3745-55-11	A,B,C	GENERAL CLOSURE PERFORMANCE STANDARD; HAZ WASTE FACIL	REQUIRES THAT ALL HAZARDOUS WASTE FACILITIES BE CLOSED IN A MANNER THAT MINIMIZES THE NEED FOR FURTHER MAINTENANCE, CONTROLS, MINIMIZES, ELIMINATES OR PREVENTS POST-CLOSURE ESCAPE OF HAZARDOUS WASTE, HAZARDOUS CONSTITUENTS, LEACHATE, CONTAMINATED RUN-OFF OR HAZARDOUS WASTE DECOMPOSITION PRODUCTS TO THE GROUND OR SURFACE WATER OR THE ATMOSPHERE.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE IS TO BE TREATED, STORED OR DISPOSED OF (OR HAS BEEN TREATED, STORED OR DISPOSED OF).														No on-site TSD is proposed.
HW			3745-55-12	B	CONTENT OF CLOSURE PLAN; HAZ WASTE FACILITIES	SPECIFIES THE MINIMUM INFORMATION REQUIRED IN A CLOSURE PLAN FOR OHIO EPA TO DETERMINE THE ADEQUACY OF THE PLAN.	SUBSTANTIVE REQUIREMENTS PERTAIN TO ANY SITE AT WHICH HAZARDOUS WASTE IS TO BE TREATED, STORED OR DISPOSED OF (OR HAS BEEN TREATED, STORED OR DISPOSED OF).														No on-site TSD is proposed.
HW			3745-55-14		DISPOSAL/ DECON OF EQUIPMENT, STRUCTURES & SOILS	REQUIRES THAT ALL CONTAMINATED EQUIPMENT, STRUCTURES AND SOILS BE PROPERLY DISPOSED OF OR DECONTAMINATED. REMOVAL OF HAZARDOUS WASTES OR CONSTITUENTS FROM A UNIT MAY CONSTITUTE GENERATION OF HAZARDOUS WASTES.	PERTAINS TO ANY SITE AT WHICH HAZARDOUS WASTE IS TO BE TREATED, STORED OR DISPOSED OF (OR HAS BEEN TREATED, STORED OR DISPOSED OF).														No on-site TSD is proposed.
HW			3745-55-17	B	POST-CLOSURE CARE AND USE OF PROPERTY	SPECIFIES THE POST-CLOSURE CARE REQUIREMENTS, INCLUDING MAINTENANCE, MONITORING AND POST-CLOSURE USE OF PROPERTY.	PERTAINS TO ALL SITES WITH LAND-BASED HAZARDOUS WASTE UNITS (LANDFILLS AND SURFACE IMPOUNDMENTS, WASTE PILES, LAND TREATMENT UNITS AND TANKS THAT MEET REQUIREMENTS OF LANDFILLS AFTER CLOSURE). THIS INCLUDES EXISTING LAND-BASED AREAS OF CONTAMINATION.														No on-site TSD is proposed.

CATEGORY	USC/CFR	ORC	OAC	PARAGRAPH	CAPTION	TEXT	APPLICATION	S-1	S-2	S-3, S-5, S-11	S-4, S-6	S-7, S-9	S-8, S-10	SED-1	SED-2	SED-3, SED-4, SED-5	SED-6, SED-7, SED-8	G-1	G-2	NOTES
								No act	LUCs	Exc; WL	Exc	Cov; WL	Cov	No act	LUCs	Exc; WL	Cov; WL	No act	LUCs	
HW			3745-55-18	B	POST-CLOSURE PLAN	PRESENTS THE INFORMATION NECESSARY FOR OHIO EPA TO DETERMINE THE ADEQUACY OF A POST-CLOSURE PLAN.	PERTAINS TO ALL SITES WITH LAND-BASED HAZARDOUS WASTE UNITS (LANDFILLS AND SURFACE IMPOUNDMENTS, WASTE PILES, LAND TREATMENT UNITS AND TANKS THAT MEET REQUIREMENTS OF LANDFILLS AFTER CLOSURE). THIS INCLUDES EXISTING LAND-BASED AREAS OF CONTAMINATION.														No on-site TSD is proposed.
HW			3745-55-19	B	NOTICE TO LOCAL LAND AUTHORITY	REQUIRES THAT A RECORD OF THE TYPE, LOCATION AND QUANTITY OF HAZARDOUS WASTES DISPOSED OF IN EACH UNIT BE SUBMITTED TO THE LOCAL LAND AUTHORITY AND THE DIRECTOR OF THE OHIO EPA. ALSO REQUIRES THAT A NOTATION TO THE DEED TO THE FACILITY PROPERTY BE MADE INDICATING THAT THE LAND WAS USED TO MANAGE HAZARDOUS WASTES AND THAT CERTAIN USE RESTRICTIONS MAY APPLY TO THE PROPERTY.	PERTAINS TO ALL SITES WITH LAND-BASED HAZARDOUS WASTE UNITS (LANDFILLS AND SURFACE IMPOUNDMENTS, WASTE PILES, LAND TREATMENT UNITS AND TANKS THAT MEET REQUIREMENTS OF LANDFILLS AFTER CLOSURE). THIS INCLUDES EXISTING LAND-BASED AREAS OF CONTAMINATION.														No on-site TSD is proposed.
HW			3745-57-74	A-K	STAGING PILES	DESIGN REQUIREMENTS FOR TEMPORARY WASTE STAGING PILES	PERTAINS TO REMEDIAL SITE WHERE WASTE WILL BE TEMPORARILY STORED IN PILES			X**	X**					X**				**Only if HW is generated
DW			3745-81-11	A,B,C	MAXIMUM CONTAMINANT LEVELS FOR INORGANIC CHEMICALS	PRESENTS MAXIMUM CONTAMINANT LEVELS FOR INORGANICS.	PERTAINS TO ANY SITE WHICH HAS CONTAMINATED GROUND OR SURFACE WATER THAT IS EITHER BEING USED, OR HAS THE POTENTIAL FOR USE, AS A DRINKING WATER SOURCE.												X	
DW			3745-81-12	A,B,C	MAXIMUM CONTAMINANT LEVELS FOR ORGANIC CHEMICALS	PRESENTS MCLS FOR ORGANICS.	PERTAINS TO ANY SITE WHICH HAS CONTAMINATED GROUND OR SURFACE WATER THAT IS EITHER BEING USED, OR HAS THE POTENTIAL FOR USE, AS A DRINKING WATER SOURCE.												X	

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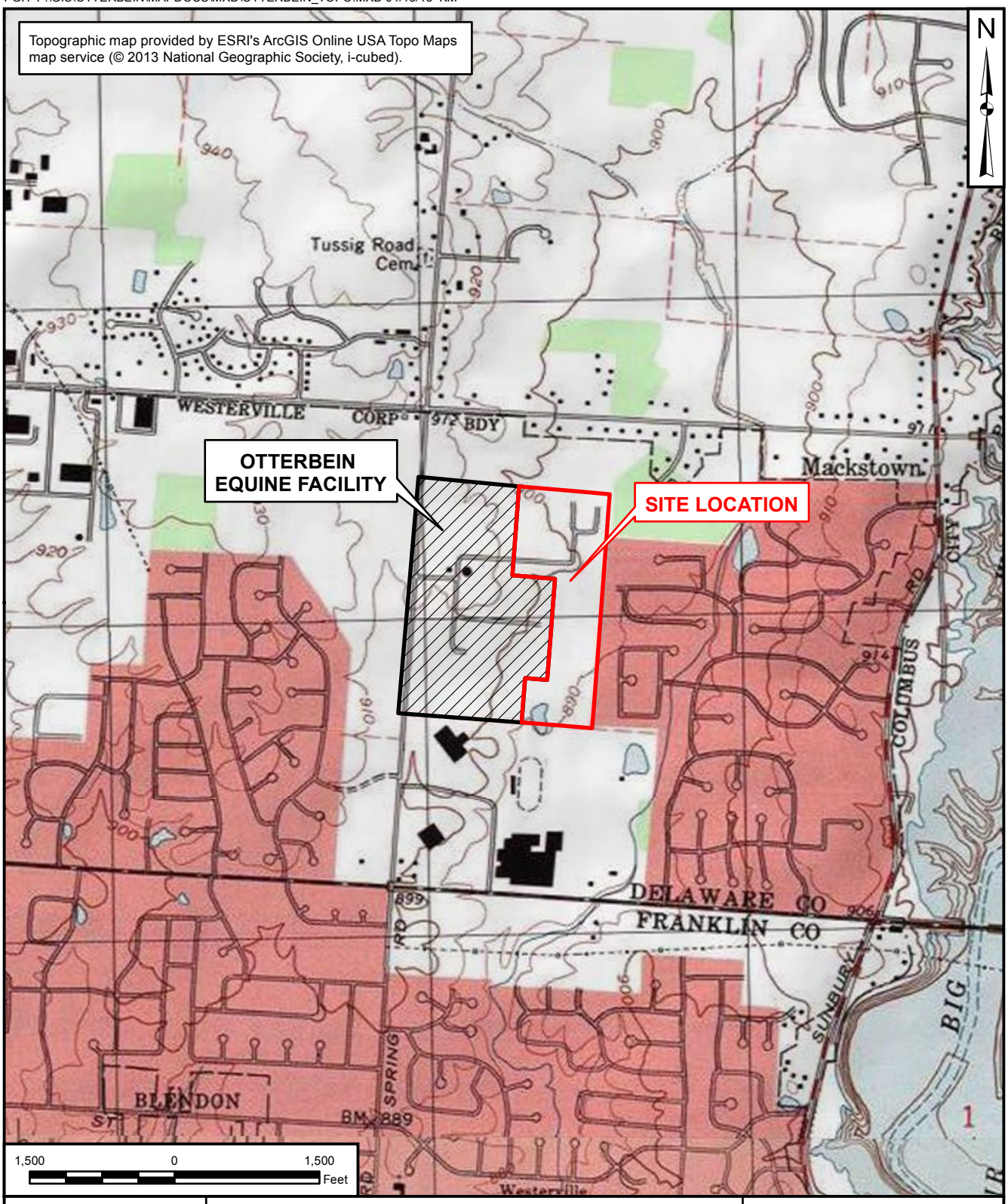


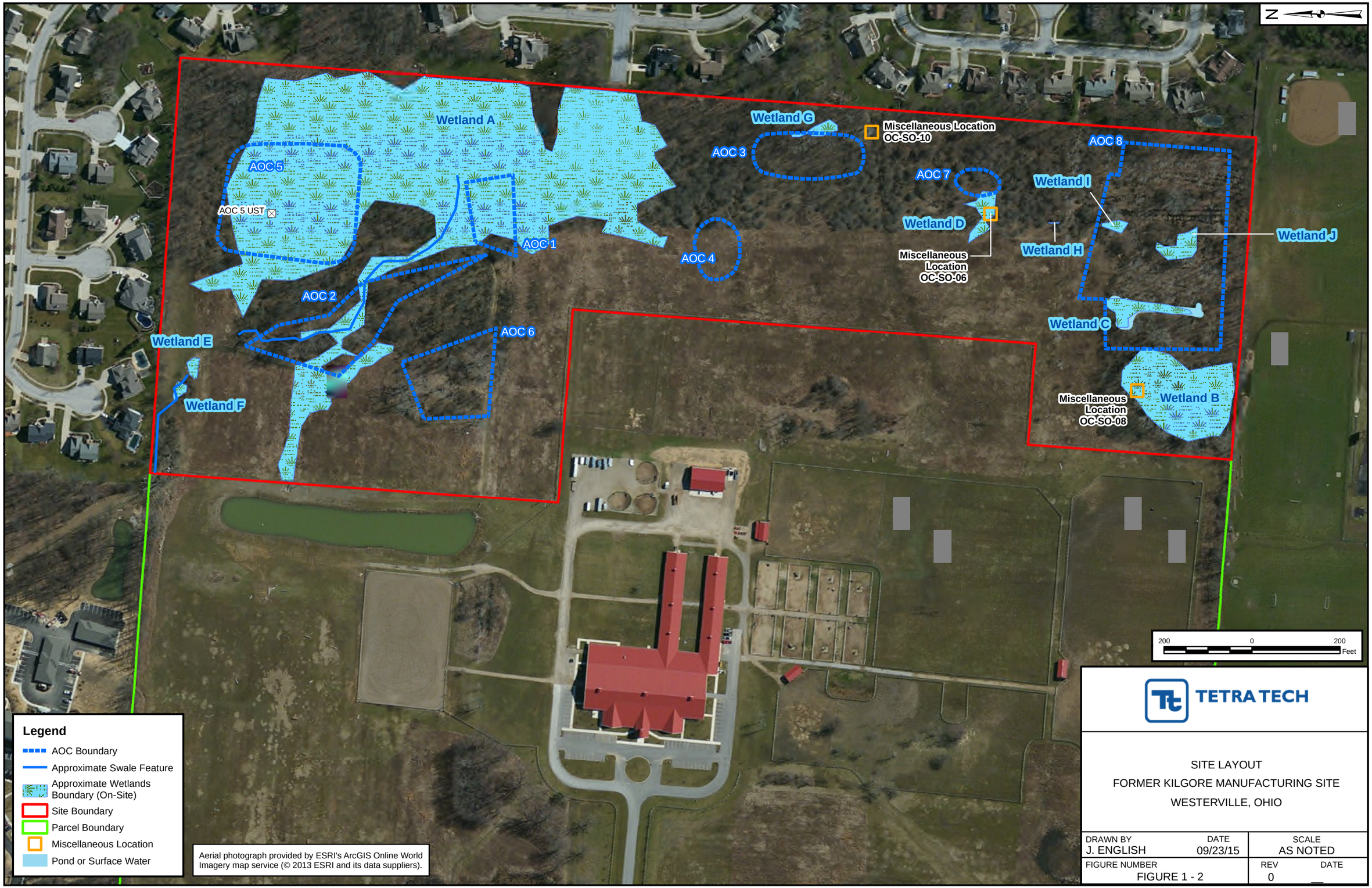
TETRA TECH

SITE LOCATION MAP

FORMER KILGORE MANUFACTURING SITE
WESTERVILLE, OHIO

DRAWN BY: D. COUCH 06/17/13

FIGURE NUMBER	REV
FIGURE 1 - 1	0



TETRA TECH

SITE LAYOUT
FORMER KILGORE MANUFACTURING SITE
WESTERVILLE, OHIO

DRAWN BY	DATE	SCALE
J. ENGLISH	09/23/15	AS NOTED
FIGURE NUMBER	REV	DATE
FIGURE 1 - 2	0	

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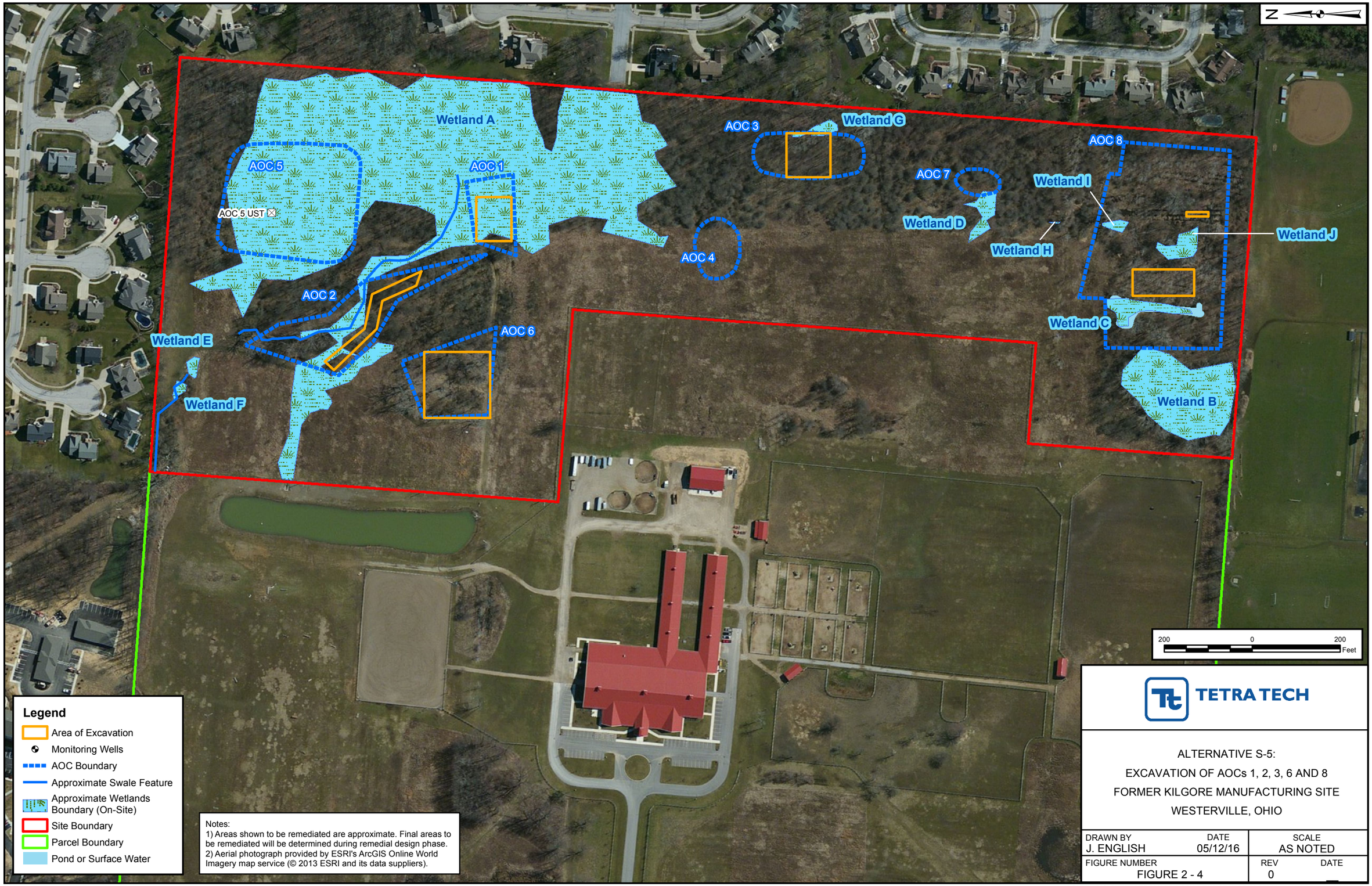

Notes:
1) Areas shown to be remediated are approximate. Final areas to be remediated will be determined during remedial design phase.
2) Aerial photograph provided by ESRI's ArcGIS Online World Imagery map service (© 2013 ESRI and its data suppliers).

TETRA TECH

ALTERNATIVE S-5:
EXCAVATION OF AOCs 1, 2, 3, 6 AND 8
FORMER KILGORE MANUFACTURING SITE
WESTERVILLE, OHIO

DRAWN BY	DATE	SCALE
J. ENGLISH	05/12/16	AS NOTED
FIGURE NUMBER	REV	DATE
FIGURE 2 - 4	0	

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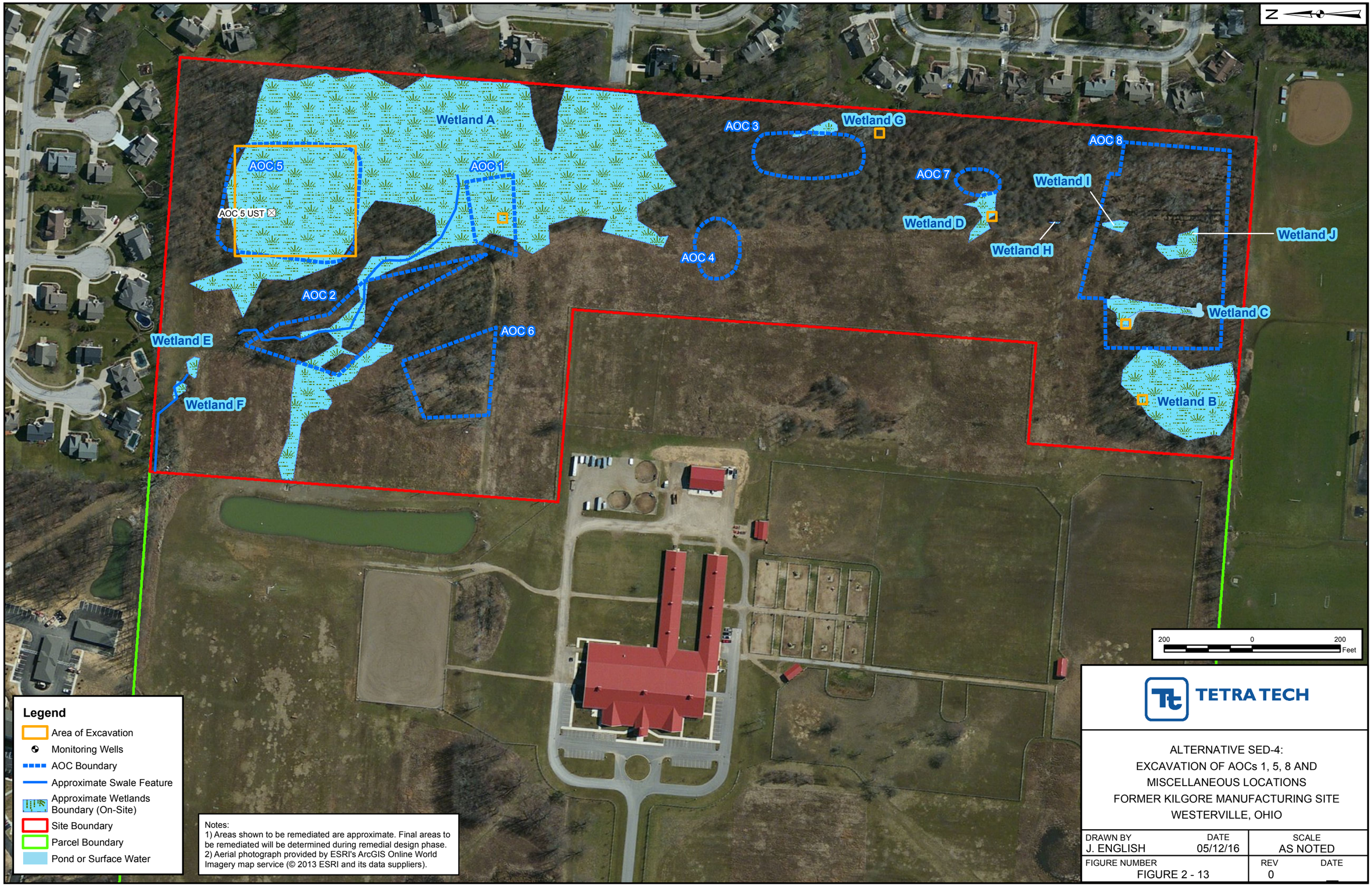

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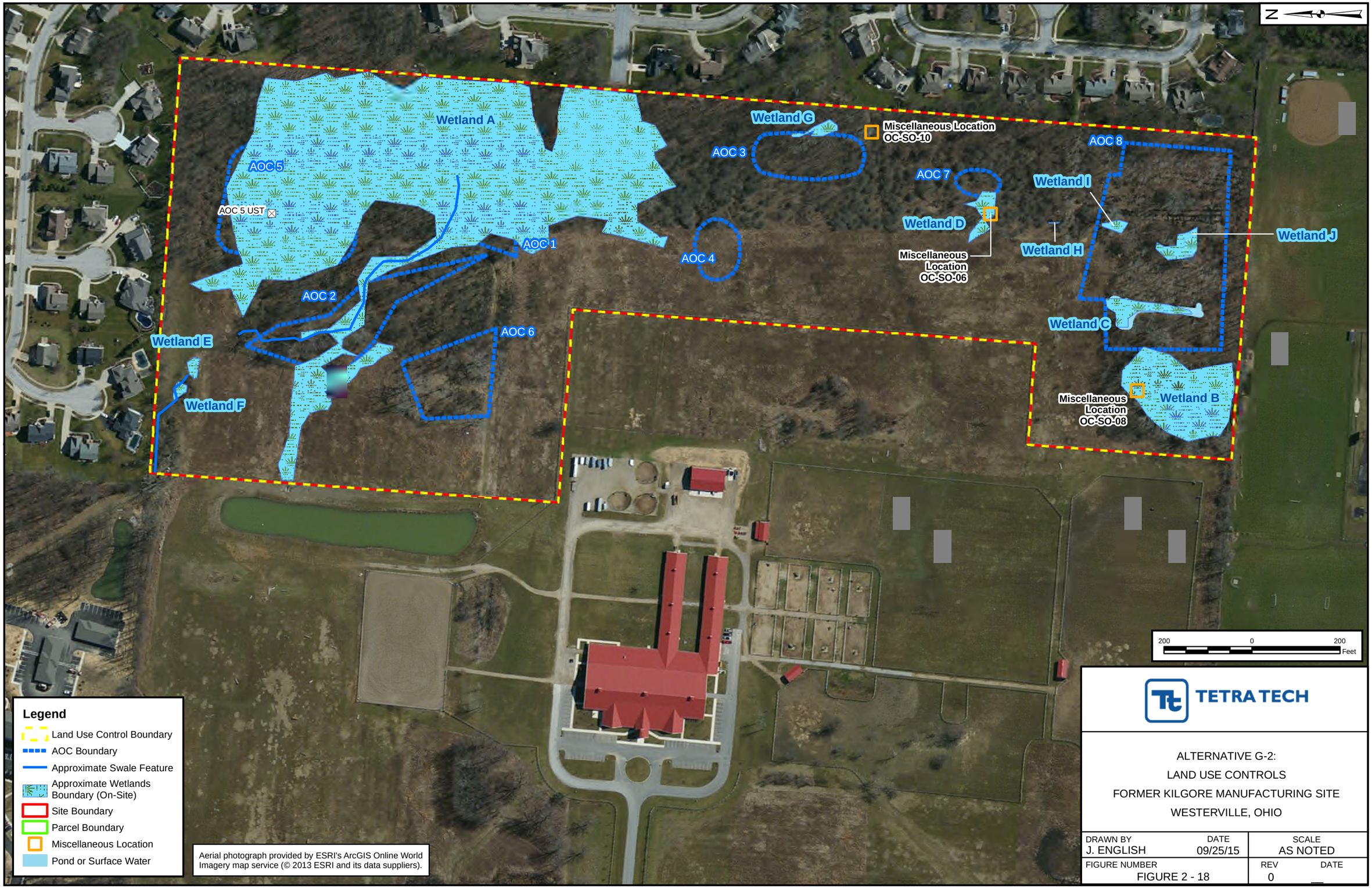

TETRA TECH

ALTERNATIVE G-2:
LAND USE CONTROLS
FORMER KILGORE MANUFACTURING SITE
WESTERVILLE, OHIO

DRAWN BY	DATE	SCALE
J. ENGLISH	09/25/15	AS NOTED
FIGURE NUMBER	REV	DATE
FIGURE 2 - 18	0	

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