



UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION III

STATEMENT OF BASIS

Exide Technologies
3000 Montrose Avenue
Reading, PA 19605

EPA ID NO. PAD990753089

Prepared by
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Land, Chemicals, and Redevelopment Division
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List of Acronyms

AOC	Administrative Order on Consent
AR	Administrative Record
BGS	Below Ground Surface
CAP	Corrective Action and Waste Minimization Permit
CMI	Corrective Measures Implementation
COC	Constituents of Concern
EI	Environmental Indicator
EPA	Environmental Protection Agency
FDRTC	Final Decision and Response to Comments
GPRA	Government Performance and Results Act
HSWA	Hazardous and Solid Waste Amendments
HWMU	Hazardous Waste Management Unit
IC	Institutional Control
MCL	Maximum Contaminant Level
MSC	Medium-Specific Concentration
PADEP	Pennsylvania Department of Environmental Protection
PRB	Permit-by-Rule
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SB	Statement of Basis
SHS	PADEP Statewide Health Standard
SPLP	Synthetic Precipitation Leaching Procedure
SWMU	Solid Waste Management Unit
UECA	Pennsylvania Uniform Environmental Covenants Act

Section 1: Introduction

The United States Environmental Protection Agency (EPA) has prepared this Statement of Basis (SB) to solicit public comment on its proposed remedy for the Exide Technologies (Exide) facility located at 3000 Montrose Avenue, Reading, Pennsylvania (Facility or Site). The SB highlights key information relied upon by EPA proposing, as the final remedy for the Facility, a combination of soil excavation and capping for onsite lead-contaminated areas, soil remediation of elevated exposure risk areas at the Gethsemane Cemetery adjacent to the Facility, sediment remediation, ongoing groundwater monitoring, and implementation of land and groundwater use restrictions.

The Facility is subject to the Corrective Action Program under the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act (RCRA) of 1976, and the Hazardous and Solid Waste Amendments (HSWA) of 1984, 42 U.S.C. Sections 6901 to 6992k. The Corrective Action Program requires that owners and/or operators of facilities subject to certain provisions of RCRA investigate and address releases of hazardous waste and hazardous constituents, usually in the form of soil or groundwater contamination, that have occurred at or from their property. The Commonwealth of Pennsylvania (the Commonwealth) is not authorized for the Corrective Action Program under Section 3006 of RCRA. Therefore, EPA retains primary authority in the Commonwealth for the Corrective Action Program.

Under RCRA and its applicable regulations, EPA and its authorized states, have the authority to regulate the permitting of hazardous waste treatment, storage, and disposal facilities. These regulations include rules governing the closure of hazardous waste management units (HWMUs), which require owners and operators of land disposal units to obtain a post-closure permit if they are leaving waste in place. In addition to implementing the Corrective Action Program pursuant to EPA's 1988 Corrective Action and Waste Minimization Permit (CAP), the Facility operates under the oversight of the Pennsylvania Department of Environmental Protection (PADEP) pursuant to Hazardous Waste Permit #PAD990753089 (Hazardous Waste Permit). The Hazardous Waste Permit expires on September 29, 2020. Exide is currently implementing closure for several permitted HWMU areas pursuant to the Hazardous Waste Permit. Any remaining closure and post-closure activities required by the Hazardous Waste Permit that are not completed prior to its expiration will be required by the final remedy selected under EPA's Corrective Action Program and will be enforced in a permit, order, or covenant. *See* 40 CFR 270.1(c)(7).

EPA is providing a forty-five (45)-day public comment period on this SB. EPA may modify its proposed remedy based on comments received during this period. EPA will announce its selection of a final remedy for the Facility in a Final Decision and Response to Comments (FDRTC) after the public comment period has ended.

EPA will make a decision after considering all comments received during the comment period, consistent with applicable RCRA requirements and regulations. If the decision is substantially unchanged from the one proposed, EPA will issue a final decision and inform all persons who submitted written comments or requested notice of EPA's final determination. If

the final decision is significantly different from the one proposed, EPA will issue a public notice explaining the new decision and will reopen the comment period. In the Response to Comments section attached to the FDRTC, EPA will respond in writing to each comment received.

The Administrative Record (AR) for the Facility contains all documents, including data and quality assurance information, on which EPA's proposed remedy is based. See Section 8, Public Participation, for information on how you can participate in the proposed remedy selection process and/or review the AR. EPA's proposed remedy in this SB may change based on new information or public comments received during the public participation process. Information on the Corrective Action Program as well as a fact sheet for the Facility can be found by navigating through the EPA website at:

<https://www.epa.gov/hwcorrectiveactionsites>

Section 2: Facility Background

The Facility is located partially in Muhlenberg Township and the Borough of Laureldale, about 0.75 mile north of the City of Reading, Berks County, Pennsylvania. The Site is approximately 40 acres in size. A layout of the Facility is presented in Figure 1.

The Facility began operating as a battery manufacturing plant in the mid-1930s under the ownership of the Bowers Battery Company. General Battery Corporation purchased the Facility in 1958, which was later acquired by Exide in 1987. For many years Exide operated a lead smelter and recycled lead batteries at the Facility. Spent lead-acid batteries were sent to a battery breaker unit where lead, plastic and acid are separated. The recycled lead was smelted and cast into lead-alloy bars to produce new battery plates. Exide discontinued the battery manufacturing operations in 2010. In 2013, Exide ceased all lead recycling operations and removed hazardous waste materials. In 2016, Exide began the formal closure of HWMUs pursuant to Exide's Hazardous Waste Permit and PADEP's oversight. Currently, Exide utilizes the Facility for the recycling of non-hazardous plastic materials.

Section 3: Summary of Environmental Investigations

3.1 Offsite Investigation and Remediation

Prior to the Clean Air Act (1970), Exide operated the lead smelter and recycled lead batteries without air pollution control systems, which are currently available and required. As a result, Exide's lead emissions impacted the soils in the surrounding community and the Site.

In August 2000, EPA and Exide entered into an Administrative Order on Consent (AOC) requiring Exide to investigate the extent of lead contamination in soil near the Facility and to clean up properties that were adversely impacted by the lead emissions. Exide sampled potentially impacted properties in Laureldale Borough and Muhlenberg Township to evaluate the soil lead concentration for each property. The total area sampled is sometimes referred to as "The Exide Study Area." Upon completion of the soil lead investigation, Exide conducted a

human health risk assessment using site-specific data to determine a cleanup level that is protective for the regional Exide Study Area.

In 2007, EPA approved a cleanup level and required that Exide remediate all residential properties with average soil lead levels above 650 mg/kg. Residential properties with lead in soil at average levels equal to or less than 650 mg/kg did not require soil remediation.

Soil remediation consisted of soil excavation, backfill with clean soil, and restoration of the residential properties. Exide completed the residential property soil remediation in 2009. In 2010, Exide investigated and completed the cleanup and restoration of Bernhart Park, a recreational area and reservoir adjacent to the Facility.

Pursuant to the AOC, Gethsemane Cemetery (Gethsemane) requires additional evaluation based on the proposed use or change in use of the property. Under the AOC, Exide will address this property during Corrective Measures Implementation as detailed below.

3.1.1 Gethsemane Cemetery

The Gethsemane Cemetery (Gethsemane) is approximately 60 acres and is located west/northwest of the Facility. Twenty-two of the sixty acres were recently acquired from the Missionary Sisters of the Most Sacred Heart of Jesus. The acquired land is undeveloped and is adjacent to and west of the Facility. Gethsemane plans to redevelop the land into additional burial areas. The soil lead concentrations detected on the newly acquired land ranged from 500 mg/kg to 27,000 mg/kg. The highest soil lead levels were detected along the sloped areas adjacent to the Facility. The soil lead concentrations in this area are between 3,500 to 27,000 mg/kg.

Exide will conduct a human health risk assessment for the entire property that includes the additional twenty-two acres to evaluate employees and visitors' exposures at the Gethsemane Cemetery and determine the areas that require soil remediation. Exide will then implement soil remediation at those areas as indicated in the risk assessment. These areas will be incorporated into the Corrective Measures Implementation (CMI) Design Report.

3.2 Onsite Investigation

Under the CAP, Exide conducted a RCRA Facility Investigation (RFI) to determine the nature and extent of all releases of hazardous wastes or hazardous constituents from regulated units, solid waste management units (SWMUs), and other source areas at the Site. Constituents of Concern (COCs) are antimony (Sb), arsenic (As), cadmium (Cd), mercury (Hg), and lead (Pb). Lead is the predominant COC evaluated in all impacted media. The investigation consists of evaluating the impact of potential releases to groundwater, sediment and surface and subsurface soils at the Site from specific SWMUs. These SWMUs are illustrated in Figure 1 and are described below:

Convent Landfill

The Convent Landfill is located on the northwest corner of the Facility. The SWMU is approximately 220 feet long by 75 feet wide by 5 feet deep. This SWMU received a PADEP permit in 1977 and accepted wastes until September 1979. It was constructed with an 18-inch stabilized liner of dewatered sludge, fly ash, and lime. Wastes in this landfill included wastewater treatment sludge, emission control sludge, broken battery casings, and blast furnace slag. Leachate from the Convent Landfill is collected and treated at the onsite wastewater treatment plant. The Convent Landfill is capped with a two-foot clay and soil cover and vegetation.

Reading Landfill

This SWMU is located east and southeast of the Convent Landfill. It operated from the late 1930's or early 1940's. The Reading Landfill is unlined. Leachate from this landfill is collected and treated at the onsite wastewater treatment plant. Like the Convent Landfill, wastes in the Reading Landfill included wastewater treatment sludge, emissions control sludge, broken battery casings and blast furnace slag. The Reading Landfill was closed in 1980. It is capped with asphalt on the top and a vegetated clay/soil cover on the sides. Portions of the plastics recycling building were constructed over the Reading Landfill.

Battery Case Disposal Area

This SWMU covers an area of approximately 15,000 square feet. It is located in the southwestern section of the Facility between Nolan Street and the Facility entrance. Broken battery casings were reportedly placed in the Battery Case Disposal Area, a low-lying area within the 100-year floodplain of Bernhart Creek, in the 1950s. Battery casings were encountered and remediated during the construction of the storm water system (circa late-1990s) and storm water tank #3 (circa 2013). A driveway and an asphalt parking lot were constructed over the Battery Case Disposal Area.

Lead Oxide Surface Impoundment #1

This SWMU is located south of the smelter building and was reportedly constructed with a concrete liner and earthen sidewalls. The Lead Oxide Surface Impoundment #1 collected emission control sludge from the blast furnace/smeltering operations. The sludge was neutralized with sodium hydroxide. The period of operation is not known. The SWMU was reportedly closed during the 1960s or early 1970s. Closure consisted of sludge removal, collection of leachate and backfilling the SWMU with soil. The sludge was recycled through the smelter furnaces and the leachate was transported and treated at the onsite wastewater treatment plant.

Lead Oxide Surface Impoundment #2

This SWMU is in the southwestern section of the Facility within the footprint of the onsite wastewater treatment plant. It covers approximately 2,500 square feet and contained neutralized wastewater treatment sludge. The SWMU was reportedly closed in the late 1960s or early 1970s. Closure consisted of sludge removal, collection of leachate and backfilling the SWMU with soil. The sludge was recycled through the smelter furnaces, and the leachate was transported and treated at the onsite wastewater treatment plant.

Groundwater Recovery Trench

This SWMU is located at the southern end of the Facility and is approximately 125 feet in length. It collects low pH shallow groundwater impacted by the former acid storage tank area and transports the collected groundwater to the onsite wastewater treatment plant for treatment. Since the installation of the Groundwater Recovery Trench, the pH levels in the shallow groundwater in this area of the Facility have steadily approach neutral levels. Exide will continue to maintain and operate the Groundwater Recovery Trench.

3.2.1 Groundwater Investigation

Exide conducted a hydrogeologic investigation and implemented a groundwater monitoring program to evaluate potential releases from the aforementioned SWMUs and to determine the extent of groundwater contamination. COCs are antimony, arsenic, cadmium, lead, and mercury. Both total and dissolved concentrations of the COCs were analyzed to evaluate suspended and dissolved metals in groundwater. The groundwater monitoring program consists of 40 wells located spatially (i.e., upgradient, downgradient) throughout the Site and vertically within three aquifer zones.

The groundwater aquifer consists of the shallow (15-75'), intermediate (55-95') and deep (95-155') zones. Because of the unique hydrogeology, groundwater flow slightly varies in the different aquifer zones at the Site. Shallow groundwater flows towards the southeast and then towards the south-southwest direction. Shallow groundwater flow in the north end of the Site has a strong downward gradient, has a horizontal gradient in the center of the Site, and has a slight upward gradient at the south end of the Site. The shallow zone and intermediate zone groundwater vertical flow gradients recharge the deeper regional aquifer in the northern end of the Site. Groundwater in the deep aquifer flows into the Site from the east and then flows towards the northwest at the northern end of the Site and to the southwest at the southern end. In summary, groundwater throughout most of the northern and central portions of the Site flows downward into the regional groundwater system. Along the southern portion of the Site, flow direction is more horizontal to the southwest with some groundwater flowing vertically and discharging into Bernhart Creek.

After a temporary suspension of the groundwater monitoring program to concentrate on the immediate offsite soil investigation and remediation, Exide resumed the monitoring program and re-evaluated the groundwater investigation in 2013. As part of the re-evaluation, Exide changed from volume sampling method to low flow sampling techniques that collect samples that are more representative of the heavy metal concentrations in groundwater. The groundwater samples were analyzed for total and dissolved metals for the COCs as well as sulfate, which is a Secondary Maximum Contaminant Level constituent that is not considered to present a risk to human health but rather used to evaluate aesthetic considerations (i.e., taste, color, and odor). The total and dissolved metal concentrations detected in groundwater are compared to the EPA Maximum Contaminant Levels (MCLs), standards set by EPA that are protective limits for contaminants in drinking water and promulgated pursuant to Section 42 U.S.C. Section 300f et seq. of the Safe Drinking Water Act and codified at 40 CFR Part 141, except for lead which does not have an MCL. Concentrations of lead were compared to the PADEP Statewide Health

Standard (SHS) of 5 µg/L in a Used Aquifer with Total Dissolved Solid Lead ($\leq 2,500$). The results collected from the low flow sampling techniques were exclusively used to assess the groundwater conditions at the Site.

Out of the seventeen designated shallow zone monitoring wells, five wells have consistently detected elevated total lead concentrations in the shallow aquifer. These wells are located near several contaminant source areas that include the Reading Landfill, the Battery Case Disposal Area, and buried solid waste backfilled areas. The range of total lead concentrations detected in these wells is between 8 -18 µg/L. Elevated levels of total antimony, cadmium, and arsenic concentrations were detected in one well during one sampling event. The elevated levels in that well have since decreased to levels below MCLs in subsequent sampling events. Total antimony, arsenic, cadmium, and mercury concentrations and all dissolved COCs in the shallow aquifer have been consistently below MCLs.

Out of the thirteen designated intermediate zone monitoring wells, five wells have consistently detected elevated total lead concentrations. These wells are located near several contaminant source areas that include the Battery Case Disposal Area and the buried solid waste backfilled areas. The range of total lead concentrations detected in these wells is between 12 -31 µg/L. Elevated antimony, arsenic, and cadmium concentrations were detected once in one well. These levels have since decreased to levels below the MCLs in subsequent sampling events. Total antimony, arsenic, cadmium, and mercury concentrations and all dissolved COCs in the intermediate aquifer have been consistently below MCLs.

Out of the ten designated deep zone monitoring wells, four wells have consistently detected elevated total lead concentrations. These wells are located near the Battery Case Disposal Area. The range of total lead concentrations detected in these wells is between 10-33 µg/L. Elevated antimony, arsenic, and cadmium concentrations were detected once in one well. These levels have since decreased to levels below the MCLs in subsequent sampling events. Total antimony, arsenic, cadmium, and mercury concentrations and all dissolved COCs in the deep aquifer have been consistently below MCLs.

Below is a list of COCs, the range of total heavy metal concentrations detected in the three groundwater aquifers, and the applicable MCLs or PADEP SHS:

Heavy Metals	Range of Detected Concs. (µg/L)	MCLs/ PADEP SHS for lead (µg/L)
Antimony	ND - 70	6
Arsenic	ND - 49	10
Cadmium	ND - 22	5
Lead	ND - 33	5
Mercury	ND - 2	2

Note: ND represents non-detect.

Lead is the primary contaminant in groundwater. The Facility contains several areas where lead-containing sludges and battery casings were disposed. In some cases, buildings were

constructed on top of these areas. These areas act as the lead source for the low-level (8 -33 µg/L) plume found beneath the surface. While total lead concentrations exceed the PADEP SHS for lead in a few interior wells, concentrations of antimony, arsenic, cadmium and mercury in Site groundwater are below their respective MCLs.

Groundwater monitoring data collected over the past seven years indicate that the lead levels are slowly decreasing, and the size of the contaminant plume is slowly shrinking. EPA attributes this reduction to natural attenuation (declining source of soluble lead in the landfills, soil adsorption) and the impact of the Groundwater Recovery Trench to collect and treat low pH shallow groundwater near source areas along the southern area of the Facility.

Overall, the groundwater contaminant plume has remained within the Facility property boundaries. Perimeter monitoring wells have consistently shown heavy metal concentrations below applicable MCLs and the PADEP SHS for lead, as applicable. The groundwater plume is primarily static and has not migrated much beyond its current location. There are no onsite drinking or process water supply wells at the Facility property. The Facility is connected to public water for potable use. Most of the properties within a mile radius of the Site are connected to public water. There are a handful of residential wells located uphill from the Site that have not been impacted by the groundwater contamination at the Site. Heavy metals levels in the residential wells are below applicable MCLs and the PADEP SHS for lead. Exide will continue to conduct annual groundwater monitoring to confirm that the onsite groundwater plume remains static and does not migrate beyond the Facility property boundaries.

3.2.2 Onsite Subsurface Soil Investigation

Presently, most of the areas at the Facility are covered with manufacturing buildings, warehouses, offices or paved over. However, this was not always the case. Over the years as the Facility expanded its operations or closed specific processes, some of the solid wastes generated at the Facility were disposed at the Site in regulated and non-regulated areas such as the landfills, the Battery Casing Disposal Area or used as fill materials for the construction of new buildings. Solid wastes included blast furnace slag, cinders, construction debris, dewatered sludge and crushed battery casings.

Exide conducted a subsurface soil investigation to evaluate the subsurface soils and fill materials present at the Site. Exide drilled approximately 62 soil borings and excavated a test pit to assess subsurface soils and fill materials at targeted locations that included suspected areas of contamination and former SWMUs and HWMUs. The purpose of the soil borings was to characterize and determine the lateral and vertical extent of the contaminated subsurface soils and fill materials and their potential impact to groundwater. In addition, Exide conducted composite subsurface soil sampling beneath open paved areas such as parking lots and interior roads to evaluate the degree of soil lead contamination from fugitive smelter emissions prior to the installation of the asphalt pavement.

Subsurface Soil Investigation Beneath Structures

The soil borings were completed to refusal (i.e., inability to dig deeper) using a hollow-stem auger or to refusal using a hand auger. In most cases, split spoon samples were collected from each boring every 2.5 feet. Once the borings had advanced through the fill material and encountered native soils, split spoon samples were collected every 10 feet. The physical characteristics of the split spoon samples were logged for each boring. A sample of the fill materials and a subsurface soil sample collected approximately one foot below the bottom of the fill layer were collected and analyzed.

Overburden soils and fill materials overlying the bedrock varies at depths ranging from 3 to 90 feet below ground surface (bgs). Subsurface soils consist of gravel, loose sands, and dense silty sand/gravel clays. Fill was encountered at various depths and comprised of different materials. The thickness of the fill materials varies between 1.5 to 26.5 feet. Depending on the location, fill materials consisted of dense sand, granular, silt, and clay materials, a mixture of slag, cinders, brick fragments, and in some cases crushed battery casings.

The subsurface soils and fill materials were analyzed for total antimony, arsenic, cadmium, lead, pH, and sulfate. In addition, Synthetic Precipitation Leaching Procedure (SPLP) was conducted to evaluate the mobility of the heavy metals in the fill materials and subsurface soils. Elevated levels of heavy metals were detected in the fill and soil samples. Lead is the predominant contaminant and is detected in all the soil boring samples. The fill materials contain significantly higher levels of heavy metals than the soil beneath the fill. The SPLP tests for the fill materials resulted in elevated lead levels ranging from 109 to 1260 µg/L, which indicate that elevated lead concentrations in the fill materials are relatively mobile, and lead leaches from the materials under acidic conditions. Conversely, the associated SPLP lead results for subsurface soils were mostly below the detection limit of 5 µg/L, which indicate that lower lead concentrations in subsurface soils are generally immobile. Overall, subsurface soils beneath the fill do not show significant levels of impact except for isolated locations where large volumes of buried crushed battery casings were identified. Most of the fill materials contained elevated heavy metal concentrations above the PADEP Medium Specific Concentrations (MSCs) for soil to groundwater in a used aquifer, which are concentrations established by PADEP for soils that may potentially impact groundwater. However, heavy metal concentrations in the fill materials and in subsurface soils are below the PADEP Subsurface Soil (2-15 feet) Direct Contact Nonresidential MSCs of 190,000 mg/kg. The range of concentrations for the respective heavy metals detected in the fill materials, subsurface soils, and the PADEP MSC standards for soil to groundwater are provided below:

	Fill (mg/kg)	Subsurface Soils (mg/kg)	PADEP MSC Soil to GW (mg/kg)
Antimony	ND - 6,930	ND - 23	27
Arsenic	ND - 2,800	3-18	29
Cadmium	ND - 629	ND	38
Lead	60 -163,000	33 - 1,130	450

Note: ND denotes non-detect. GW denotes groundwater

Sulfate concentrations ranged from 550 mg/kg to 1,500 mg/kg in the fill materials and subsurface soils. The pH levels for most of the boring samples were relatively neutral and ranged from 6.36 to 7.25. In some areas, pH levels were slightly acidic, in the range of 5-5.91.

The soil boring results show that elevated lead concentrations in subsurface soil and fill materials are associated with the battery manufacturing and recycling operations. Fill materials were identified beneath the overburden or paved asphalt/concrete cover for most of the soil boring locations. The thickness of the fill material varied between 1.5 to 26.5 feet. The fill consisted of varying dense sand, granular, silt and clay materials a mixture of slag, cinders, brick fragments and in some cases crushed battery casings. Elevated heavy metals were detected in the fill materials. Lead is the predominant contaminant with the highest concentrations detected in all the soil boring samples. Despite the elevated metal concentrations and noticeable SPLP results in the fill materials, subsurface soil beneath the fill do not show significant levels of impact due to the relatively neutral pH levels that limit the mobilization of metals.

Presently, the contaminated subsurface soils and fill materials are covered by the existing structures (e.g., concrete building slabs and asphalt pavement). There are currently no direct exposures to these contaminated areas. Elevated metal concentrations in the fill materials have minimal impacts to subsurface soils and groundwater except for locations that contained large volumes of buried crushed battery casings. Institutional Controls (ICs) will be implemented at the identified areas of contamination. Exide will inspect and maintain the integrity of the existing structures that function as a cap to prevent direct exposures to contaminated subsurface soils and fill materials and to prevent water infiltration and minimize potential leaching of the COCs into groundwater.

Subsurface Soil Beneath Open Paved Areas

In general, open paved areas consist of parking areas and interior roads. The paved surface is generally asphalt that is six to nine inches thick. Each distinct parking area and interior road was delineated and sampled separately. Composite subsurface soil samples were collected beneath the asphalt and analyzed to evaluate the subsurface soil lead concentrations. Depending on the size of the area, five to ten discrete soil samples were composited to determine the average soil lead concentration for the specified area. Most of the subsurface soil concentrations beneath the paved areas that were sampled are below the PADEP Surface Soil Direct Contact Nonresidential MSCs of 1,000 mg/kg. Therefore, these areas will not require periodic maintenance of the asphalt cap to ensure the integrity of the cap to prevent direct exposures for nonresidential use. Only one paved area identified as a parking lot behind the SLI Plant 2 and located across from the former smelter was found to have elevated soil lead concentrations above 1,000 mg/kg. Although this area is capped and there are currently no direct exposures to subsurface soils, this area will require periodic maintenance of the asphalt cap to ensure the integrity of the cap to prevent direct exposures for nonresidential use.

3.2.3 Onsite Surface Soil Investigation

Given the Site history, onsite surface soils have been impacted by fugitive dust from air emissions associated with the secondary lead smelter and battery recycling operations. Onsite open surface soil areas are present in the Former Railroad Right-of-Way and Drainage Ditches, the Convent Landfill, the eastern and northern slopes of the Reading Landfill, steep slopes along the western edge of the Site, and a few distinct lawn and landscaped areas. Because each area is distinctively different in topography, area size, and mechanism of contamination (e.g., fugitive emission, runoffs), the sampling procedures for each area were modified to procure representative samples.

Former Railroad Right-of-Way

The Former Railroad Right-of-Way runs approximately north-south through the center of the Facility and is 50 to 60 feet wide. The former railroad bed has a nominal width of 24 feet. The onsite drainage ditches consist of two individual ditches that each run along either side of the railroad bed. Neither ditch runs the entire length of the railroad bed. A drainage ditch is present along one side or the other of the railroad bed except for a 400-foot section, where both ditches are present on either side. The drainage ditches are typically dry throughout the year. However, after stormwater events, the drainage ditches may flow for several days and drain the stormwater south to Bernhart Creek or to a culvert that discharges to the unnamed tributary.

Initially, the drainage ditches were sampled every 200 linear feet at 17 sample locations. Each location was sampled at three different depth intervals (0 to 6-inches, 6 to 12-inches, and 12 to 18-inches) using a decontaminated stainless-steel hand auger. It was later determined that additional sampling was required to further characterize the lateral and vertical limits of the lead concentrations within the Former Railroad Right-of-Way. Twenty-one additional soil borings were performed on the railroad bed, and twelve additional soil borings were performed in the drainage ditches. For the railroad bed, the soil borings were advanced to a total depth of 4 feet bgs. In the drainage ditches, the soil borings were advanced to target depths from 4 to 6 feet bgs, depending on the location. In both the rail bed and the drainage ditches, soil grab samples were collected at one-foot intervals and analyzed for total lead. The materials encountered in the soil boring samples were a mixture of railroad ballast and cinders.

The sample results were compared to PADEP Direct Contact Nonresidential MSCs for lead in Surface (1,000 mg/kg, 0-2 feet) and Subsurface (190,000 mg/kg, 2-15 feet) Soils and the site-specific residential soil standard of 650 mg/kg. The range of lead concentrations detected for each sample event at the respective depth is provided below:

Drainage Ditches

Sampling Depth Intervals (in.)	Range of Pb Concs. (mg/kg)
0-6"	62 - 10,100
6-12"	59 - 9,610
12-18"	73 - 6,490

12"	242 - 35,600
24"	202 - 7,000
36"	32 - 16,900
48"	10 - 574
60"	53 - 4,570
72"	15 - 123

Railroad Bed

Sampling Depth Intervals (in.)	Range of Pb Concs. (mg/kg)
12"	276 -14,900
24"	45 - 8,370
36"	9 - 8,930
48"	6 - 9,240

In general, higher lead concentrations were detected on the surface (0-24") than in the subsurface (> 24"). The highest concentrations were generally detected in the top 0-6 inches and at locations closer to the smelter. In isolated areas, subsurface soil concentrations were greater than the surface soil. Higher concentrations of lead were observed in the vicinity of the smelter with the vertical extent of concentrations exceeding 1,000 mg/kg up to 4 feet deep. Lead concentrations in the southern portion of the former railroad bed and drainage ditch generally exceeded 1,000 mg/kg at 2 feet bgs. The lowest lead concentrations are located upstream of the smelter where surface soil lead levels are below 1,000 mg/kg. However, soil lead concentrations for most of the sampled locations exceeded the PADEP Direct Contact Nonresidential MSCs. Identified areas in the railroad bed with soil lead levels above 1,000 mg/kg will require soil remediation.

Although the drainage ditches are typically dry throughout the year, they collect stormwater and transport sediment during periods of precipitation. For this reason, the site-specific residential soil standard (650 mg/kg) is applied to the drainage ditches to ensure that any potential sediment runoff will continue to be protective for human health. Areas in the drainage ditches with lead concentration greater than 650 mg/kg will require remediation.

Onsite Open Surface Soil Areas

Open surface soil areas are areas throughout the Site that are accessible to exposed surface soil. These areas include the vegetative cover on the Convent Landfill, the Reading Landfill side slopes and isolated lawn/landscape areas. Inaccessible areas such as the western steep slopes areas, rock outcrops, and fenced electrical substations, which pose minimal surface soil exposures were not sampled.

Exide conducted composite surface soil sampling for each defined open surface soil area throughout the Site to determine the average soil lead level. Most of the sampled areas contain soil lead levels above 1,000 mg/kg. Sampled areas that are located outside the facility fence line and are accessible by the public will be remediated to the site-specific residential soil standard of 650 mg/kg. All other sampled areas within the facility fence line will be remediated to the

PADEP Direct Contact Nonresidential MSCs of 1,000 mg/kg. Depending on the characteristics and size of the area, Exide will either excavate the contaminated soil and restore the area or cap the area.

3.2.4 Sediment

Prior to the installation of the onsite stormwater management system, surface water runoffs that contained particulate contaminants flowed into Bernhart Creek and the unnamed tributary. The unnamed tributary is an intermittent stream that only flows during periods of precipitation and when there is an emergency discharge/bypass from the dedicated stormwater treatment plant. It runs along a portion of the western side of the Facility and connects downstream to Bernhart Creek.

Exide conducted a sediment investigation to determine the impact of the stormwater runoffs and fugitive emissions to Bernhart Creek and the unnamed tributary. The initial investigation was conducted from 1994-1996 under the oversight of PADEP. As a result of the investigation, Exide implemented interim remedial measures to remediate high risk areas with sediment lead concentrations greater than 10,000 mg/kg. Approximately 180 linear feet of sediment in the unnamed tributary were remediated in 1996. Remediation consisted of mostly excavation and restoration except for a small section of the unnamed tributary that required capping.

As part of the EPA RFI, Exide resampled the two areas in 2014 and 2018 to confirm the lead levels in the sediment and to further delineate areas that exceeded the site-specific residential soil standard (650 mg/kg), a cleanup standard that is applied to sediments to ensure that any potential sediment runoff will continue to be protective of human health. Samples in the unnamed tributary and the Bernhart Creek consisted of composite sampling at each location at a depth of 0-3 inches. Twenty sediments samples were collected throughout the unnamed tributary and 26 sample locations were systematically collected along Bernhart Creek to the confluence of the unnamed tributary.

Lead concentrations in the unnamed tributary ranged from 1,070 mg/kg to 11,300 mg/kg, which exceed the site-specific residential soil standard (650 mg/kg). Therefore, the sediment in the unnamed tributary will require remediation.

The sediment lead concentrations in Bernhart Creek ranged from 30 mg/kg to 2,400 mg/kg. Elevated levels were primarily observed in the vicinity of the confluence of the Creek and the Drainage Ditches and further downstream near the confluence of the Creek and the unnamed tributary. It is suspected that lead contaminants in the stormwater runoff discharged into the Drainage Ditches and the unnamed tributary and were transported and deposited at the confluence points of Bernhart Creek. The lead sediment levels in the vicinity of the two confluences were greater than 650 mg/kg. The highest lead levels were detected at the confluence of the Creek and the Drainage Ditches. Outside of these two areas, the lead levels in sediment were below 650 mg/kg. Areas along Bernhart Creek with sediment lead concentrations greater than 650 mg/kg will require remediation.

3.2.5 Hazardous Waste Permit Closures

The Facility operates under the Hazardous Waste Permit (#PAD990753089) issued by PADEP to manage, store, and treat hazardous wastes. The HWMUs authorized under the Hazardous Waste Permit are the Smelter Feed Containment Building and Container Storage Areas 1 and 2 and four permit-by-rule (PRB) processes at the following HWMUs: Wastewater Treatment Plant, Emissions Control Sludge (ECS) Building, Slag Crusher Building, and Slag Storage Building. The Hazardous Waste Permit was renewed on September 30, 2010 and expires on September 29, 2020.

When the recycling operations were inactive in 2013, Exide removed all hazardous waste materials in process and waiting to be processed. In October 2016, Exide permanently ended all lead recycling operations at the Site and proceeded to close out several regulated units. PADEP approved the RCRA Closure plan for the regulated units and directed Exide to implement its provisions. Exide proceeded with additional cleaning pursuant to the PADEP-approved Closure Plan which consisted of vacuum cleaning and pressure washing to remove residual materials remaining in the permitted and PBR HWMUs. Soil sampling was performed beneath the floors of all the HWMUs. Results of the soil sampling identified fill materials with concentrations of lead and other metals exceeding the Pennsylvania Nonresidential Statewide Health Standard in every location within the Slag Storage Area, Slag Crushing Area, Container Storage Area, and in some locations within the Containment Building. The Containment Building and Container Storage Area are within the estimated limits of the Reading Landfill, and the elevated lead (and related metals) concentrations are a result of waste fill materials that underlie the buildings.

Exide proposes to use the former Containment Building and Container Storage Area for the storage of plastic battery case material received from off-site. To facilitate reuse, the structures containing the Containment Building and Container Storage Area will remain in place. The concrete floors in these structures act as a cover that ultimately protect the area from precipitation and prevent infiltration through the ground surface and into the underlying impacted material. To satisfy PADEP closure requirements and reduce worker exposure, the existing floor surfaces will be upgraded with a surficial concrete layer.

Exide expects to complete most of the required closure activities prior to the expiration of the Hazardous Waste Permit on September 29, 2020. However, closure activities may not be completed, and post-closure care may not be implemented before the Hazardous Waste Permit expires. Therefore, EPA and PADEP have agreed to include the remaining RCRA closure and post-closure work required as part of the final remedy.

3.3 Environmental Indicators

Under the Government Performance and Results Act (GPRA), EPA has set national goals to address RCRA Corrective Action facilities. Under the GPRA, EPA evaluates two key environmental cleanup indicators for each facility: (1) Current Human Exposures Under Control and (2) Migration of Contaminated Groundwater Under Control. On September 20, 2019, EPA determined that the environmental indicator for groundwater had been met. However, to meet

the environmental indicator for human exposures, surface soil and sediment will require remediation as proposed in this SB. After EPA selects the final remedy for the Facility and remediation is complete, EPA will evaluate the environmental indicator determination for human exposures.

The approved environmental indicator determination for groundwater is available at:

https://www.epa.gov/sites/production/files/2020-03/documents/gw_pad990753089.pdf

Section 4: Corrective Action Objectives

EPA's Corrective Action Objectives for the specific environmental media at the Facility are the following:

A. Subsurface Soils

EPA's corrective action objective for subsurface soils is to prevent exposures to COCs that remain in the subsurface beneath existing structures and paved areas in concentrations above PADEP nonresidential MSCs.

B. Surface Soils

EPA's corrective action objective for surface soils is to prevent exposures to surface soils with lead in concentrations of greater than 650 mg/kg for areas located outside the facility fence line and 1,000 mg/kg for areas located within the facility fence line.

C. Sediment

EPA's corrective action objective for sediment in Bernhart Creek, the unnamed tributary and the onsite Drainage Ditches is to prevent exposures to sediments with lead concentrations of greater than 650 mg/kg.

D. Groundwater

EPA expects final remedies to return usable groundwater to its maximum beneficial use within a timeframe that is reasonable given the site-specific conditions. For facilities associated with aquifers that are either currently used for water supply or have the potential to be used for water supply, EPA will require the groundwater be remediated to MCLs.

EPA's Corrective Action Objectives for groundwater at the Facility are: (1) to obtain applicable MCLs and the PADEP SHS for lead and (2) to prevent exposure to groundwater COCs by requiring compliance with and maintenance of groundwater use restrictions until applicable MCLs and the PADEP SHS for lead have been achieved.

Section 5: Proposed Remedy

Under this proposed remedy, sediment and surface soils that contain elevated lead concentrations above appropriate protective levels at the Site will be remediated. Because some contaminants remain in the subsurface soils and groundwater at the Facility at levels that exceed nonresidential and residential use, respectively, EPA's proposed remedy requires compliance with and maintenance of land and groundwater use restrictions. EPA proposes to implement the land and groundwater restrictions necessary to prevent human exposure to contaminants at the Facility through enforceable ICs such as a permit, order or environmental covenant.

A. Subsurface Soils

Currently, existing structures (e.g., building concrete slabs, asphalt pavement) at the Site function as a protective cap that prevent direct exposure to the contaminated subsurface soils beneath these areas. Because contaminant wastes will remain in the subsurface soils, ICs will restrict activities that can compromise the integrity of the existing asphalt paving and structures to allow them to continue functioning as a protective cap.

B. Surface Soils

Sampled areas that are located outside the facility fence line and are accessible by the public will be remediated to the site-specific residential soil standard of 650 mg/kg. All other sampled areas within the facility fence line will be remediated to the PADEP Direct Contact Nonresidential MSCs of 1,000 mg/kg for lead in soil. Remediation will consist of either capping the area to eliminate direct exposures to the contaminated surface soils or the contaminated soil will be excavated and disposed offsite. Depending on the characterization of the excavated soils (i.e., hazardous or nonhazardous), the soils may or may not require onsite treatment (stabilization) prior to offsite disposal. Land use restrictions will be implemented through ICs to restrict the Site use to non-residential uses only.

Exide will conduct a human health risk assessment at the Gethsemane Cemetery. Areas that pose a potentially unacceptable risk to the employees and visitors will require soil remediation. Remediation will consist of soil excavation, offsite disposal and restoration of the property.

C. Sediment

Areas along Bernhart Creek, the unnamed tributary and the Drainage Ditches where the sediment lead levels are greater than the residential site-specific soil lead standard of 650 mg/kg will be remediated. Remediation will consist of sediment excavation, offsite disposal and restoration. Depending on the characterization of the excavated sediment (i.e., hazardous or nonhazardous), the sediment may require onsite treatment (stabilization) prior to offsite disposal.

D. Groundwater

EPA's proposed remedy for groundwater consists of monitored natural attenuation until applicable MCLs and the PADEP SHS for lead are met and compliance with and maintenance of groundwater use restrictions to restrict onsite groundwater use to non-potable purposes only to prevent exposure to COCs until applicable MCLs and PADEP SHS for lead are achieved. Exide will continue to operate the groundwater recovery trench to collect and treat low pH shallow groundwater and to periodically verify that groundwater contamination does not migrate beyond the Facility boundaries.

E. Implementation

EPA proposes that remediation of surface soils and sediment, maintenance of existing structures to function as caps over contaminated subsurface soils, continued groundwater monitoring, and ground and land use restrictions for the Facility will be implemented through an enforceable document such as an order and/or an environmental covenant to be entered pursuant to the Pennsylvania Uniform Environmental Covenants Act, 27 Pa. C.S. Sections 6501-6517, (UECA) and recorded with the deed for the Facility property. Current owners and all subsequent owners will be required to comply with these requirements and restrictions.

Section 6: Evaluation of Proposed Remedy

This section provides a description of the criteria EPA used to evaluate the proposed remedy consistent with EPA guidance. The criteria are applied in two phases. In the first phase, EPA evaluates three remedy threshold criteria as general goals. In the second phase, for those remedies which meet the threshold criteria, EPA then evaluates seven balancing criteria.

Threshold Criteria	Evaluation
1. Protect human health and the environment	EPA's proposed remedy is protective of human health and the environment. The primary human health and environmental threat at the Site is the potential of direct human exposures to elevated heavy metal concentrations in groundwater, surface and subsurface soils and sediment. EPA's proposed remedy requires remediation of areas that contain elevated levels of lead concentrations in surface soils and sediment, maintenance of existing asphalt paving and structures at the Site to function as a cap to prevent direct human exposures to subsurface soils and fill materials, groundwater monitoring, and maintenance of land and groundwater use restrictions at the Facility.
2. Achieve media cleanup objectives	EPA's proposed remedy achieves media cleanup objectives. Areas of elevated lead concentrations in surface soils and sediments that exceed the site-specific 650 mg/kg standard will be remediated. Contaminated subsurface soils and fill materials will remain beneath existing structures; however, EPA's proposed remedy will

	<p>maintain the integrity of existing asphalt paving and structures to function as a cap to eliminate direct human exposures. Groundwater contamination is limited to the Facility property boundaries and has remained stationary. There are no current direct exposures to groundwater. Ongoing groundwater monitoring will continue to confirm the static state of the groundwater contamination and natural attenuation of COCs to achieve applicable MCLs and the PADEP SHS for lead. Groundwater use will be restricted to non-potable purposes and land use will be restricted to non-residential uses.</p>
3. Remediating the Source of Releases	<p>In all remedy decisions, EPA seeks to eliminate or reduce further releases of hazardous wastes or hazardous constituents that may pose a threat to human health and the environment. Areas of elevated lead concentrations in surface soils and sediment will be remediated. Existing asphalt paving and structures will function as a cap to prevent direct exposures to contaminated subsurface soils and fill materials and to prevent water infiltration and minimize potential leaching of the COCs into groundwater. Historic groundwater data confirm minimal impact to groundwater, groundwater COCs are below applicable MCLs except for a few interior wells that exceed the PADEP SHS for total lead, and groundwater contamination has remained stationary within the Facility property boundaries. Exide will continue to operate the groundwater recovery trench to treat low pH shallow groundwater and groundwater monitoring to confirm contaminated groundwater does not migrate outside the current Facility boundaries.</p>

Balancing Criteria	Evaluation
4. Long-term effectiveness	<p>The proposed remedy will maintain protection of human health and the environment over time by preventing exposure to the contamination remaining in the subsurface and in groundwater. EPA's proposed remedy requires continued groundwater monitoring, maintenance of the existing asphalt paving and structures to function as a cap, and compliance with land and groundwater use restrictions at the Facility. The groundwater and land use restrictions can be implemented through an environmental covenant to be recorded with the deed for the Facility property. The environmental covenant will run with the land, and as such, will notify future landowners of activity and use limitations on the Facility property.</p>
5. Reduction of toxicity, mobility, or	<p>The proposed remedy reduces the toxicity, mobility, or volume of contaminants remaining in the subsurface at the Facility. Areas of</p>

volume of the Hazardous Constituents	elevated lead concentrations in surface soils and sediment will be remediated. There are no direct human exposures to the subsurface soils and fill materials. Exide will maintain the integrity of the existing asphalt paving and structures to serve as a cap to prevent direct exposures to the contamination. Ongoing groundwater monitoring will continue to confirm the static state of the groundwater contamination and that it does not migrate outside the current Facility boundaries.
6. Short-term effectiveness	EPA's proposed remedy is effective in the short-term. Exide will continue to implement the current groundwater monitoring program and maintain the integrity of the existing asphalt paving and structures. Upon completion and approval of the CMI Design Plan. Exide will commence the remediation of surface soils and sediment.
7. Implementability	EPA's proposed remedy is readily implementable. Exide will continue to implement the current groundwater monitoring program and maintain the integrity of the existing structures to function as a cap. Surface soils and sediment remediation will commence upon completion and approval of the CMI Design Report. EPA anticipates that groundwater and land use restrictions will be fully implemented and enforced through an environmental covenant, permit, or order.
8. Cost	EPA's proposed remedy is cost effective. The costs associated with this proposed remedy and the continuation of groundwater monitoring and maintenance of the existing structures are estimated to be \$6,225,000.
9. Community Acceptance	EPA will evaluate community acceptance of the proposed remedy during the public comment period for this SB and will describe community acceptance in FDRTC.
10. State/Support Agency Acceptance	EPA will evaluate the Commonwealth's acceptance of the proposed remedy during the public comment period and will describe the Commonwealth's position in the FDRTC.

Overall, based on the evaluation criteria, EPA has determined the proposed remedy meets the threshold criteria and provides the best balance of tradeoffs with respect to the evaluation criteria.

Section 7: Financial Assurance

EPA determined that financial assurance is necessary to implement the proposed remedy at the Facility. The current estimated cost is approximately \$6,225,000; however, this estimate may be revised (during the Corrective Measures Design process) before posting of financial

assurance is required. EPA will require Exide to secure a surety bond to meet the financial obligation to implement the proposed remedy.

Section 8: Public Participation

Before EPA makes a final decision on the remedy for the Facility, the public may participate in the proposed remedy selection process by reviewing this SB and documents contained in the AR for the Facility. The AR contains all information considered by EPA in reaching this proposed remedy. It is available for public review during normal business hours at:

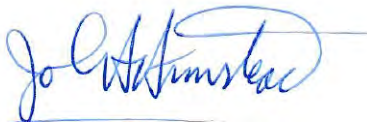
U.S. EPA Region III
1650 Arch Street
Mail code: 3LC20
Philadelphia, PA 19103
Contact: Mr. Khai Dao
Phone: (215) 814-5467
Fax: (215) 814-3113
Email: dao.khai@epa.gov

Interested parties are encouraged to review the AR and comment on EPA's proposed remedy. The public comment period will last forty-five (45) calendar days from the date that notice is published in a local newspaper. You may submit comments by mail, fax, or e-mail to Mr. Khai Dao. EPA will hold a public meeting to discuss this proposed remedy upon request. Requests for a public meeting should be made to Mr. Khai Dao.

EPA will respond to all relevant comments received during the comment period. If EPA determines that new information warrants a modification to the proposed remedy, EPA will modify the proposed remedy or select other alternatives based on such new information and/or public comments. EPA will announce its final remedy and explain the rationale for any changes in the FDRTC. All persons who comment on this proposed remedy will receive a copy of the FDRTC. Others may obtain a copy by contacting Mr. Khai Dao at the address listed above.

05/29/20

Date



John A. Armstead, Director
EPA Region III
Land, Chemicals and Redevelopment Division

Section 9: Index to Administrative Record

United States Environmental Protection Agency, Corrective Action and Waste Minimization Permit, November 7, 1988.

Exide Technologies, Phase III RCRA Facility Investigation (RFI) Current Conditions Report, prepared by Advanced GeoServices Corp., May 2013.

Exide Technologies, Phase III RFI Revised Report, prepared by Advanced GeoServices Corp., March 2015.

Exide Technologies, Groundwater Addendum Phase III RFI Report, prepared by Advanced GeoServices Corp., January 2017.

Exide Technologies, Corrective Measures Design Work Plan prepared by Advanced GeoServices Corp., April 2019.

Exide Technologies, 30% Corrective Measures Design Report, prepared by Advanced GeoServices Corp., April 2020.

Exide Technologies, Onsite Areas Soil Sampling Report Exide Recycling Facility, prepared by Advanced GeoServices Corp., April 2020.

Exide Technologies, 2015 Groundwater Monitoring Result Letter, prepared by Advanced GeoServices Corp., February 2016.

Exide Technologies, 2016 Annual Groundwater Monitoring Report, prepared by Advanced GeoServices Corp., February 2017.

Exide Technologies, 2017 Annual Groundwater Monitoring Report, prepared by Advanced GeoServices Corp., February 2018.

Exide Technologies, 2018 Annual Groundwater Monitoring Report, prepared by Advanced GeoServices Corp., December 2018.

Exide Technologies, 2019 Annual Groundwater Monitoring Report, prepared by Advanced GeoServices Corp., January 2020.

Attachment

- NOTES:
- 1) LOCATION OF FORMER LEAD OXIDE IMPOUNDMENT #1 (SWMU-4) BASED ON 1971 AERIAL PHOTOGRAPH.
 - 2) LOCATION OF FORMER LEAD OXIDE IMPOUNDMENT #2 (SWMU-5) BASED ON 1958 AERIAL PHOTOGRAPH.
 - 3) BATTERY CASE DISPOSAL AREA (SWMU-3) NOT VISIBLE IN HISTORIC AERIAL PHOTOGRAPHS, LIMITS SHOWN ARE ESTIMATED BASED ON SUB-SURFACE INFO OBTAINED DURING CONSTRUCTION OF TRUCK WASH AND STORMWATER TANK.
 - 4) LIMITS OF READING LANDFILL (SWMU-2) INTERPRETED FROM 1958 AND 1971 AERIAL PHOTOGRAPH, TOPOGRAPHIC RELIEF AND RESULTS OF SUBSURFACE SAMPLING.

