HAZARD RANKING SYSTEM (HRS) PACKAGE
THE BATTERY RECYCLING COMPANY
BO. CAMBALACHE, ARECIBO, PR

EPA ID No.: PRR000004655

EPA Contract No. EP-S13-08-01
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Prepared for:

U.S. ENVIRONMENTAL PROTECTION AGENCY

Prepared by:

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HRS DOCUMENTATION RECORD--REVIEW COVER SHEET

Name of Site: The Battery Recycling Company

Date Prepared: September 2016

Contact Persons

Site Investigation: Region 2 Site Assessment Team
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Pathways, Components, or Threats Not Scored

The ground water migration pathway, surface water migration pathway–drinking water threat and human food chain threat, and soil exposure pathway were not scored because the listing decision is not affected significantly by those pathways. The site score is sufficient to list the site on the surface water migration pathway–environmental threat and air migration pathway scores.

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HRS DOCUMENTATION RECORD

Name of Site:	The Battery Recycling Company	Date Prepared: September 2016
Aliases:	Arecibo Battery; Puerto Rico Battery Recycling	
EPA ID No.:	PRR000004655	
EPA Region:	2	
Street Address of Site*:	Road 2 Km 72.2 Bo. Cambalache, Arecibo, PR 00612	
County and State:	Arecibo, Puerto Rico	
General Location in the State:	north coast area, about 50 miles west of San Juan	
Topographic Map:	Arecibo, PR	
Latitude*:	18° 27′ 12.97” North (18.453603°)	
Longitude*:	66° 41′ 38.75″ West (-66.694097°)	
Site Reference Point:	EPA site coordinates (main process building)	

[**Figures 1 and 2**; Refs. 3, pp. 1–2; 4, p. 1; 5, pp. 1, 10, 31, 39, 42, 44; 6, p. 1]

* The street address, coordinates, and contaminant locations presented in this Hazard Ranking System (HRS) documentation record identify the general area where the site is located. They represent one or more locations EPA considers to be part of the site based on the screening information EPA used to evaluate the site for NPL listing. EPA lists national priorities among the known "releases or threatened releases" of hazardous substances; thus, the focus is on the release, not precisely delineated boundaries. A site is defined as where a hazardous substance has been "deposited, stored, placed, or otherwise come to be located." Generally, HRS scoring and the subsequent listing of a release merely represent the initial determination that a certain area may need to be addressed under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Accordingly, EPA contemplates that the preliminary description of facility boundaries at the time of scoring will be refined as more information is developed as to where the contamination has come to be located.

Scores

Ground Water Pathway	Not Scored
Surface Water Pathway	53.33
Soil Exposure Pathway	Not Scored
Air Pathway	100.00
HRS SITE SCORE	56.66

WORKSHEET FOR COMPUTING HRS SITE SCORE
THE BATTERY RECYCLING COMPANY

		S	S^2
1.	Ground Water Migration Pathway Score (S_{gw}) (from Table 3-1, line 13)	Not Scored	
2a.	Surface Water Overland/Flood Migration Component (from Table 4-1, line 30)	53.33	2,844.08
2b.	Ground Water to Surface Water Migration Component (from Table 4-25, line 28)	Not Scored	
2c.	Surface Water Migration Pathway Score (S_{sw}) Enter the larger of lines 2a and 2b as the pathway score.	53.33	2,844.08
3.	Soil Exposure Pathway Score (S_s) (from Table 5-1, line 22)	Not Scored	
4.	Air Migration Pathway Score (S_a) (from Table 6-1, line 12)	100.00	10,000.00
5.	Total of $S_{gw}^2 + S_{sw}^2 + S_s^2 + S_a^2$	12,844.08	
6.	**HRS Site Score** Divide the value on line 5 by 4 and take the square root	56.66	

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET
THE BATTERY RECYCLING COMPANY

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT Factor Categories & Factors DRINKING WATER THREAT	MAXIMUM VALUE	VALUE ASSIGNED
Likelihood of Release		
1. Observed Release	550	550
2. Potential to Release by Overland Flow		
2a. Containment	10	not scored
2b. Runoff	25	not scored
2c. Distance to Surface Water	25	not scored
2d. Potential to Release by Overland Flow (lines 2a [2b + 2c])	500	not scored
3. Potential to Release by Flood		
3a. Containment (Flood)	10	not scored
3b. Flood Frequency	50	not scored
3c. Potential to Release by Flood (lines 3a x 3b)	500	not scored
4. Potential to Release (lines 2d + 3c)	500	not scored
5. Likelihood of Release (higher of lines 1 and 4)	550	550
Waste Characteristics		
6. Toxicity/Persistence	*	not scored
7. Hazardous Waste Quantity	*	not scored
8. Waste Characteristics	100	not scored
Targets		
9. Nearest Intake	50	not scored
10. Population		
10a. Level I Concentrations	**	not scored
10b. Level II Concentrations	**	not scored
10c. Potential Contamination	**	not scored
10d. Population (lines 10a + 10b + 10c)	**	not scored
11. Resources	5	not scored
12. Targets (lines 9 + 10d + 11)	**	not scored
13. DRINKING WATER THREAT SCORE ([lines 5 x 8 x 12]/82,500)	100	not scored

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET
THE BATTERY RECYCLING COMPANY

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT Factor Categories & Factors HUMAN FOOD CHAIN THREAT	MAXIMUM VALUE	VALUE ASSIGNED
Likelihood of Release		
14. Likelihood of Release (same as line 5)	550	550
Waste Characteristics		
15. Toxicity/Persistence/Bioaccumulation	*	not scored
16. Hazardous Waste Quantity	*	not scored
17. Waste Characteristics	1,000	not scored
Targets		
18. Food Chain Individual	50	not scored
19. Population		
19a. Level I Concentrations	**	not scored
19b. Level II Concentrations	**	not scored
19c. Potential Human Food Chain Contamination	**	not scored
19d. Population (lines 19a + 19b + 19c)	**	not scored
20. Targets (lines 18 + 19d)	**	not scored
21. HUMAN FOOD CHAIN THREAT SCORE ([lines 14 x 17 x 20]/82,500)	100	not scored

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET
THE BATTERY RECYCLING COMPANY

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT Factor Categories & Factors ENVIRONMENTAL THREAT	MAXIMUM VALUE	VALUE ASSIGNED
Likelihood of Release		
22. Likelihood of Release (same as line 5)	550	550
Waste Characteristics		
23. Ecosystem Toxicity/Persistence/Bioaccumulation	*	5.00E+08
24. Hazardous Waste Quantity	*	100
25. Waste Characteristics	1,000	320
Targets		
26. Sensitive Environments		
26a. Level I Concentrations	**	0
26b. Level II Concentrations	**	25
26c. Potential Contamination	**	NS
26d. Sensitive Environments (lines 26a + 26b + 26c)	**	25
27. Targets (line 26d)	**	25
28. ENVIRONMENTAL THREAT SCORE ([lines 22 x 25 x 27]/82,500)	60	53.33
29. WATERSHED SCORE (lines 13 + 21 + 28)	100	53.33
30. SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORE (S_{of})	100	53.33
SURFACE WATER MIGRATION PATHWAY SCORE (S_{sw})	100	53.33

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

AIR MIGRATION PATHWAY SCORESHEET
THE BATTERY RECYCLING COMPANY

AIR MIGRATION PATHWAY Factor Categories & Factors	MAXIMUM VALUE	VALUE ASSIGNED
Likelihood of Release		
1. Observed Release	550	550
2. Potential to Release:		
2a. Gas Potential to Release	500	not scored
2b. Particulate Potential to Release	500	not scored
2c. Potential to Release (higher of lines 2a and 2b)	500	not scored
3. Likelihood of Release	550	550
Waste Characteristics		
4. Toxicity/Mobility	*	200
5. Hazardous Waste Quantity	*	100
6. Waste Characteristics	100	10
Targets		
7. Nearest Individual	50	50
8. Population		
8a. Level I Concentrations	**	1,470
8b. Level II Concentrations	**	0
8c. Potential Contamination	**	not scored
8d. Population (lines 8a+8b+8c)	**	1,470
9. Resources	5	not scored
10. Sensitive Environments:	**	not scored
10a. Actual Contamination		not scored
10b. Potential Contamination		not scored
10c. Sensitive Environments (lines 10a + 10b)		not scored
11. Targets (lines 7+8d+9+10c)		1,520
12. AIR PATHWAY SCORE (lines 3 x 6 x 11)/82,500	100	100.00

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

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SITE DESCRIPTION

The Battery Recycling Company site (a.k.a. Arecibo Battery; a.k.a. Puerto Rico Battery Recycling) is the location of a secondary lead smelting and processing facility and associated releases of hazardous substances [Refs. 3, pp. 1–2; 4, p. 4; 5, pp. 1–3, 38–40, 45–47]. The lead smelting facility is located at State Road 2 Km 72.2, Barrio Cambalache, Arecibo, Puerto Rico, a rural area southeast of the Arecibo town center [Refs. 4, p. 1; 5, pp. 1–3; 6, p. 1; 10, pp. 2–3]. The Battery Recycling Company, Inc. (TBRCI) owns and operates the facility, which occupies a property of approximately 16 acres; it is bounded on three sides (north, east, and south) by agricultural or undeveloped land, and on the west side by State Road 2 [Refs. 4, p. 4; 10, pp. 2–3]. There are cattle fields and a small residential neighborhood north of the subject property, as well as a hardware store and concrete block business on the opposite side of State Road 2 to the west [Ref. 11, pp. 3–4, 42].

For the Battery Recycling Company site, EPA is evaluating the environmental threat of the surface water migration pathway overland/flood migration component, as well as the air migration pathway. The sources that are being evaluated, fugitive and stack air emissions (Sources 1A and 1B, respectively), waste piles (Source 2), and contaminated soil (Source 3), contain significant levels of lead and other hazardous substances. The general location of the site is shown in **Figure 1**, and the location of the sources are shown in **Figure 2**. Observed releases and actual contamination of targets are documented in the surface water and air migration pathways, which are depicted in **Figure 3** and **Figure 4**, respectively.

TBRCI was founded and began operations at the Arecibo location in 1994 for the collection and recycling of lead-acid batteries [Refs. 4, p. 4; 10, p. 3]. Until 2004, TBRCI performed small-scale battery breaking and lead smelting [Ref. 10, p. 4]. Between 2004 and 2005, the facility increased operations and became a large-scale secondary smelter [Refs. 4, p. 4; 10, p. 4]. Operations at the facility included breaking and sorting lead-acid batteries and refining the lead to be resold [Refs. 10, p. 3; 11, p. 4]. TBRCI reports recycling about 55,000 metric tons of used batteries and producing an average of 27,500 metric tons of secondary lead annually [Refs. 4, p. 4; 12, p. 6]. EPA determined that TBRCI processed more than 47 million pounds of lead and 605,000 pounds of antimony from 2006 to 2008 [Refs. 14, pp. 7–10; 15, p. 14; 16, pp. 2–3, 7, 9]. Through EPA's Toxics Release Inventory (TRI) system, TBRCI has reported air emissions releases of more than 4,800 pounds of CERCLA hazardous substances (i.e., antimony, lead, lead compounds, and sulfuric acid) from the facility [Refs. 1, Section 1.1; 5, pp. 45–47, 61–166; 17, pp. 84–85; 18, pp. 6, 11–12, 21–23]. The locations of the air emissions (Sources 1A and 1B) are shown in **Figure 2**. The operations at TBRCI have generated large quantities of battery acid and lead-contaminated waste; improper handling of the hazardous materials and hazardous wastes by the company has led to high levels of lead contamination at and near the facility [Refs. 10, pp. 28–38; 11, p. 4; 12, pp. 6–12].

Historically, the subject property was used by Puerto Rico Chemical Co. (PRCC) for the manufacture of organic chemicals from the mid-1960s until October 1979, when an explosion led to plant closure [Refs. 7, pp. 2, 5; 9, p. 58; 10, p. 4; 34, pp. 5–6]. In the years that followed the 1979 explosion and plant shutdown, several activities occurred at the former chemical plant, including partial dismantling, waste removal activities, backfilling of low-lying areas of the property with crushed limestone, inspections, investigations, and regulatory actions [Ref. 7, pp. 5–7]. After TBRCI began operating at the former PRCC facility, Puerto Rico Environmental Quality Board (PREQB) completed a Preliminary Assessment in January 1996 and EPA conducted a sampling investigation in January 1999 to evaluate the former PRCC facility [Refs. 7, pp. 31–34; 9, pp. 53–73]. Summary results for the 1999 investigation indicated that arsenic and lead were detected at maximum concentrations of 10.6 and an estimated 117 milligrams per kilogram (mg/kg) in soil and sediment samples collected from the property [Ref. 7, pp. 31–34]. In 2001, EPA provided file information to TBRCI and indicated that the Superfund program would not take further action at the location unless prompted by additional information at a later time [Ref. 8, p. 1].

From 1996 until 2004, PREQB found TBRCI to be out of compliance with state and federal regulations, including: operating without the required permits; improper storage of hazardous substances; irregularities in waste management; spills; and violations of air emissions regulations. During the same timeframe, PREQB also received complaints of accumulations of batteries and solid wastes, discharges of battery acid to the soil and water, bad odors, acid-like smells, and illegal dumping [Ref. 9, pp. 5–10, 139–305].

In April 2008, EPA collected surficial soil samples along the fence line between the TBRCI facility and the cattle pasture to the north; the sample analytical results indicated lead up to 57,500 mg/kg in the southern portion of the cattle pasture, which contained an east-west ditch along a former rail line, parallel to the fence line between the pasture and the TBRCI facility [Ref. 11, p. 4]. EPA conducted a second sampling event in July 2010, collecting soil

samples to depths of 2 feet in 6-inch intervals from the cattle pasture; analytical results showed lead levels up to 4,700 mg/kg with an average lead concentration of 843 mg/kg [Ref. 11, p. 4].

EPA conducted Resource Conservation and Recovery Act (RCRA) compliance evaluation inspections of the facility in February and July 2010, at which time TBRCI was operating 24/7/365 and employing approximately 100 full-time employees in three shifts [Ref. 10, p. 1–2, 4]. The RCRA inspector observed improper storage of hazardous materials and hazardous waste, significant spillage of particulate matter in several areas, and overflow of the stormwater/wastewater collection system into an onsite drainage ditch on the east side of the property and to other areas [Ref. 10, pp. 28–38]. The inspections showed that TBRCI was in violation of RCRA on several counts, including: Failure to make hazardous waste determinations on its solid waste; Illegal disposal of hazardous waste; Never applied for an ID [as a large quantity generator and hazardous waste storage facility]; and Failure to minimize risks (releases) [Ref. 10, p. 38].

In November 2010, April 2011, and May 2011, Centers for Disease Control and Prevention (CDC) tested some family members of TBRCI employees for blood lead levels [Ref. 11, p. 5]. From each clinic that performed testing, 20–40% of samples from the susceptible population (children below 7 years of age, pregnant and lactating women) were found to have lead levels above 10 micrograms per deciliter (µg/dL) [Ref. 11, p. 5]. The testing of one infant indicated a blood lead level greater than 65 µg/dL and a confirmatory testing level of 32.9 µg/dL [Ref. 11, p. 5]. Sampling of cars and homes of TBRCI employees indicated lead levels above 40 micrograms per square foot (µg/ft^2), with 27 employee vehicles measuring above 100,000 µg/ft^2 [Ref. 11, p. 5]. The pathway of contamination is believed to be the transfer of lead-contaminated dust in the employee boots and uniforms from the facility to the employees' cars and homes [Refs. 5, p. 19; 11, p. 5].

In 2011 and 2012, EPA conducted removal assessments of residential properties and vehicles belonging to current and former TBRCI employees throughout Puerto Rico, to determine if any of the properties had been impacted by lead dust being transported from the TBRCI facility [Ref. 21, p. 41]. The first phase of the removal assessments was initiated in June 2011 and included contacting current and former employees, conducting assessments of 202 residential properties and 282 vehicles, and overseeing removal actions at 129 residential properties and 140 vehicles that contained lead contamination [Ref. 21, p. 41]. The second phase was initiated in March 2012 and included the reassessment of 61 properties and 45 vehicles that had previously been assessed and remediated, and removal actions at 20 residential properties and 5 vehicles with elevated lead levels [Ref. 21, p. 41].

From August through October 2011, PREQB collected soil, sediment, and aqueous samples from the TBRCI property and other properties within a 1-mile radius [Ref. 23, pp. 12–17, 28–29]. Elevated lead levels above the soil screening level of 400 mg/kg were detected in several areas at the facility and on surrounding properties [Ref. 23, p. 32]. An aqueous runoff sample, collected from the drainage ditch at the eastern edge of the property, contained lead at 4,000 micrograms per liter (µg/L) [Ref. 23, pp. 31, 41].

In July 2015, EPA began another investigation of the cattle field adjacent to the northern edge of the TBRCI facility [Ref. 21, p. 41]. During this period, EPA conducted surface soil screening activities for lead with a portable x-ray fluorescence (XRF) elemental analyzer to delineate the areas of contamination in the cattle field [Ref. 21, p. 41]. The delineated area was excavated, and post-excavation sampling reportedly confirmed that all lead contamination had been removed from the excavated area [Ref. 21, p. 41]. In September 2015, EPA conducted additional XRF screening of samples collected from the northeastern corner of the property and from the east lot drainage ditch, and the screening results indicated the presence of lead throughout both areas [Ref. 19, pp. 1–9, 16].

In November 2015, aqueous samples collected from runoff flowing through the onsite drainage ditch and off the property showed the presence of lead at levels as high as 1.9 milligrams per liter (mg/L) [Refs. 19, pp. 14, 16; 21, p. 46]. In addition, EPA collected solid waste samples from two slag storage areas at the facility, where piles of furnace slag and other solid waste from site operations are kept in open-air buildings [Refs. 10, pp. 22, 29, 37; 19, pp. 10–12, 16; 20, p. 3; 21, p. 46]. The analytical results showed that both waste piles contain elevated levels of arsenic, cadmium, and lead [Refs. 19, pp. 10–12; 21, pp. 36–37, 46]. The waste storage piles, which are not covered or bermed, are subject to erosion by wind and water; waste material has spilled out onto the open ground, and staining is visible throughout the ground surface near both piles [Refs. 10, pp. 22, 29, 37; 19, p. 16; 20, p. 3; 21, p. 46; 27, p. 4]. In November 2015, EPA observed an air release of particulate matter from the western waste storage pile [Ref. 29, pp. 1–4]. The locations of the waste storage piles (Source 2) are shown in **Figure 2**.

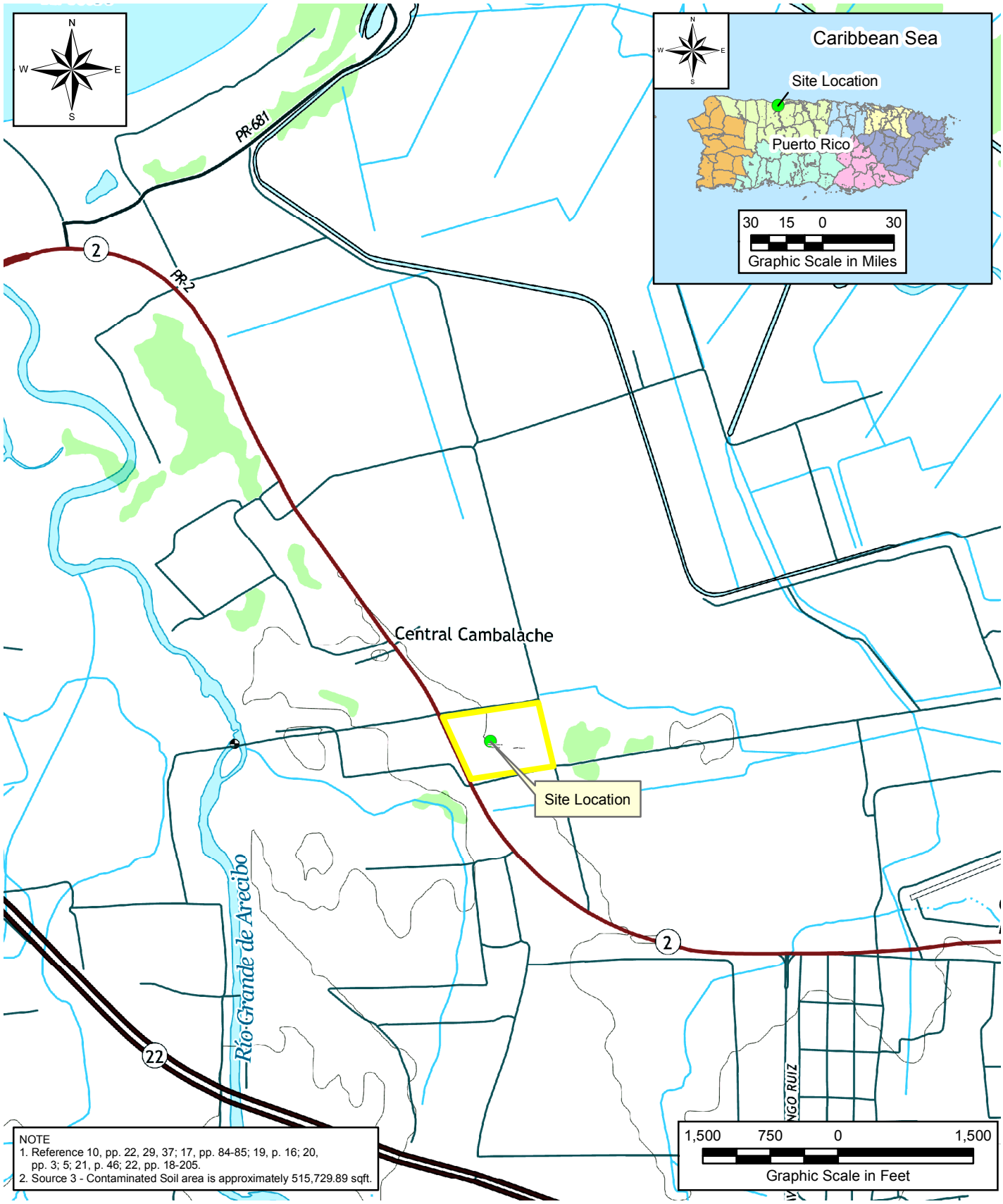
In January 2016, EPA advanced soil borings and collected soil samples for lead screening throughout the property [Refs. 21, pp. 1–31, 39–46; 22, pp. 3–10]. XRF screening, as well as off-site laboratory confirmation for about 20% of samples, showed that lead is present above the Removal Management Level (RML) of 800 mg/kg throughout the property [Refs. 21, pp. 2–31, 46; 22, pp. 22–111, 118–205]. All areas of the property are affected, including bare soil areas, vegetated areas, asphalt- and gravel-covered areas, and the onsite drainage ditch; in some areas, contamination was shown to extend to depths of 3 feet or more below ground surface [Ref. 21, pp. 2–31, 46, 98]. The location of the contaminated soil (Source 3) is shown in **Figure 2**.

Storm water runoff primarily flows in an easterly direction across the TBRCI facility to the onsite drainage ditch, which discharges to the east lot ditch on the adjacent property [Refs. 21, p. 46; 27, pp. 3–4, 9–10]. In May 2016, EPA delineated an isolated wetland in the onsite and east lot drainage ditches, and collected sediment samples from those and other nearby drainage ditches [Refs. 27, pp. 6–28; 30, pp. 3–4, 12; 35, pp. 3–6, 13]. The onsite drainage ditch is the western spur of the isolated wetland, which also extends throughout a significant portion of the east lot ditch [Refs. 27, p. 9; 35, pp. 3–6, 13]. Analytical results for the May 2016 sampling event show the presence of lead and other site-related contaminants in sediment samples throughout the isolated wetland and in the east lot ditch beyond the wetland [**Figure 3**; Refs. 30, p. 12; 31, pp. 7–28; 35, p. 13]

The site sources are located in a 100-year floodplain; when the area floods, there can be sheet flow in an easterly direction across the entire area [Refs. 27, pp. 4, 8–9; 32, p. 12]. The nearest perennial surface water beyond the isolated wetland is the irrigation channel along the southeastern edge of Caño Tiburones Natural Reserve (i.e., "the south channel"), located approximately 0.5 mile east of site sources [Ref. 27, pp. 4, 9]. Caño Tiburones Natural Reserve is Puerto Rico's largest wetland estuary; it is a State-designated natural area that contains HRS-eligible wetlands and habitat for endangered and threatened species [Refs. 36, pp. 1–4; 37, p. 1; 38, pp. 11–12, 29]. The south channel is a fishery (blue mud crabs and other species) and it is mapped as critical wildlife habitat [Refs. 27, pp. 7–8; 36, p. 3]. The south channel flows north and merges with the Caño Tiburones Natural Reserve main channel before it flows to the Atlantic Ocean [Ref. 36, pp. 3–4]. The fishery and sensitive environments associated with Caño Tiburones are potentially affected by the surface water releases from the site. However, due to the presence of upland areas between the isolated wetland and the south channel, and the discontinuous nature of the flow path, the isolated wetland and Caño Tiburones are considered to be separate watersheds.

PREQB manages the collection and analysis of lead samples at two air monitoring stations within ¼ mile of the TBRCI facility; both stations are located in predominant downwind directions from the TBRCI facility [**Figure 4**; Refs. 17, pp. 15–16, 86; 25, pp. 7–9; 26, pp. 8–11]. The lead samplers are operated on a year-round basis and the measurements are sent quarterly to the EPA's Air Quality System (AQS) [Refs. 17, p. 15; 44, p. 8]. From 2011 to 2015, the stations downwind of the TBRCI facility repeatedly showed lead concentrations that exceed the National Ambient Air Quality Standard (NAAQS) of 0.15 micrograms per cubic meter ($\mu g/m^3$), including the highest lead reading in the entire AQS database for calendar year 2013 (8.216 $\mu g/m^3$) [Refs. 17, pp. 4, 22; 26, pp. 14–45]. Air quality modeling by PREQB shows that the TBRCI facility is the primary source causing the high lead concentrations at the downwind monitoring stations, and that the contribution of other lead emission sources in the area is insignificant [Ref. 17, p. 22].

Based on the above considerations, 147 residents and workers within ¼ mile of site sources are considered as subject to Level I concentration air releases (see **Section 6.3.2.2**). There are more than 50,000 residents; commercial agricultural enterprises, including a cattle ranch to the north and a palm tree farm and garden center to the south; 2,900 acres of wetlands; and several other sensitive environments within 4 miles of the TBRCI facility and associated site sources [Refs. 10, pp. 2–3; 27, p. 10; 36, pp. 1–4; 37, p. 1; 38, pp. 11–12, 29]; these targets are potentially affected by air releases from the site.



NOTE
1. Reference 10, pp. 22, 29, 37; 17, pp. 84-85; 19, p. 16; 20, pp. 3; 5; 21, p. 46; 22, pp. 18-205.
2. Source 3 - Contaminated Soil area is approximately 515,729.89 sqft.

LEGEND:
- Site Location
- Facility Boundary

TITLE:
Site Location Map
The Battery Recycling Company
Arecibo, PR

PROJECT: The Battery Recycling Company

CLIENT NAME: EPA

WESTON SOLUTIONS

DATE: August 2016

FIGURE #: 1

P:\SAT2\Battery Recycling Company (0322)\MXD\17923_Arecibo_Battery_Recycling_Site_Loc_Map_Topo.mxd

NOTE
1. Reference 10, pp. 22, 29, 37; 17, pp. 84-85; 19, p. 16; 20, pp. 3, 5; 21, p. 46; 22, pp. 18-205.
2. Source 3 - Contaminated Soil area is approximately 515,729.89 sqft.

LEGEND:
- Source 1A - Fugitive Air Emissions
- Source 1B - Stack
- Source 2 - Waste Storage Piles
- Facility Boundary
- Source 3 - Contaminated Soil

TITLE:

Site and Source Map
The Battery Recycling Company
Arecibo, PR

PROJECT: The Battery Recycling Company

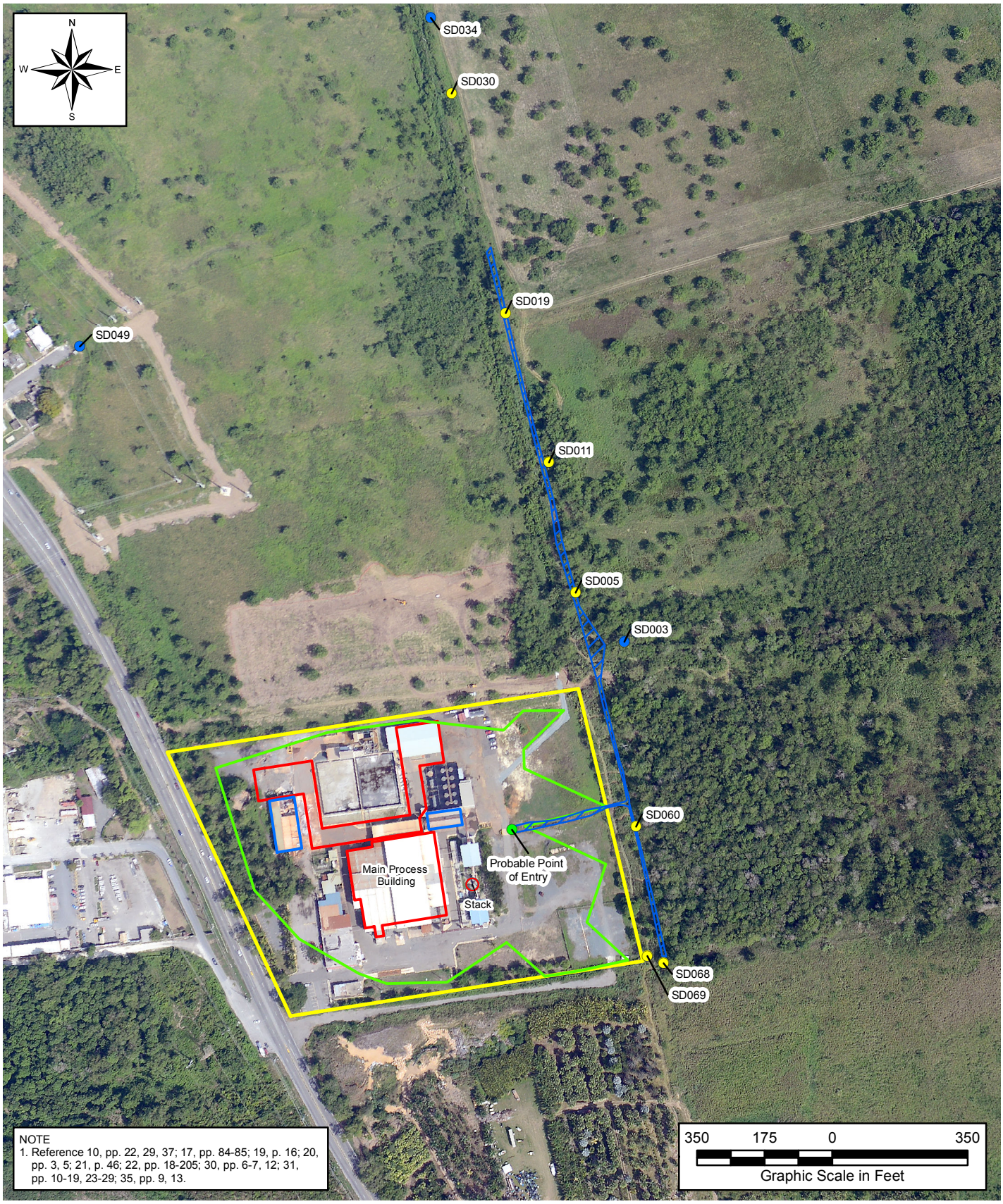
CLIENT NAME: EPA

WESTON SOLUTIONS

DATE: August 2016

FIGURE #: 2

P:\SAT2\Battery Recycling Company (0322)\MXD\18313_Arecibo_BRC_Site_Source.mxd



LEGEND:

- Source 1A - Fugitive Air Emissions
- Source 1B - Stack
- Source 2 - Waste Storage Piles
- Probable Point Of Entry
- Source 3 - Contaminated Soil
- **Sample Type**
- Facility Boundary
- Background Sample
- Isolated Wetland
- Release Sample

TITLE:

Surface Water Pathway Map
The Battery Recycling Company
Arecibo, PR

PROJECT: The Battery Recycling Company

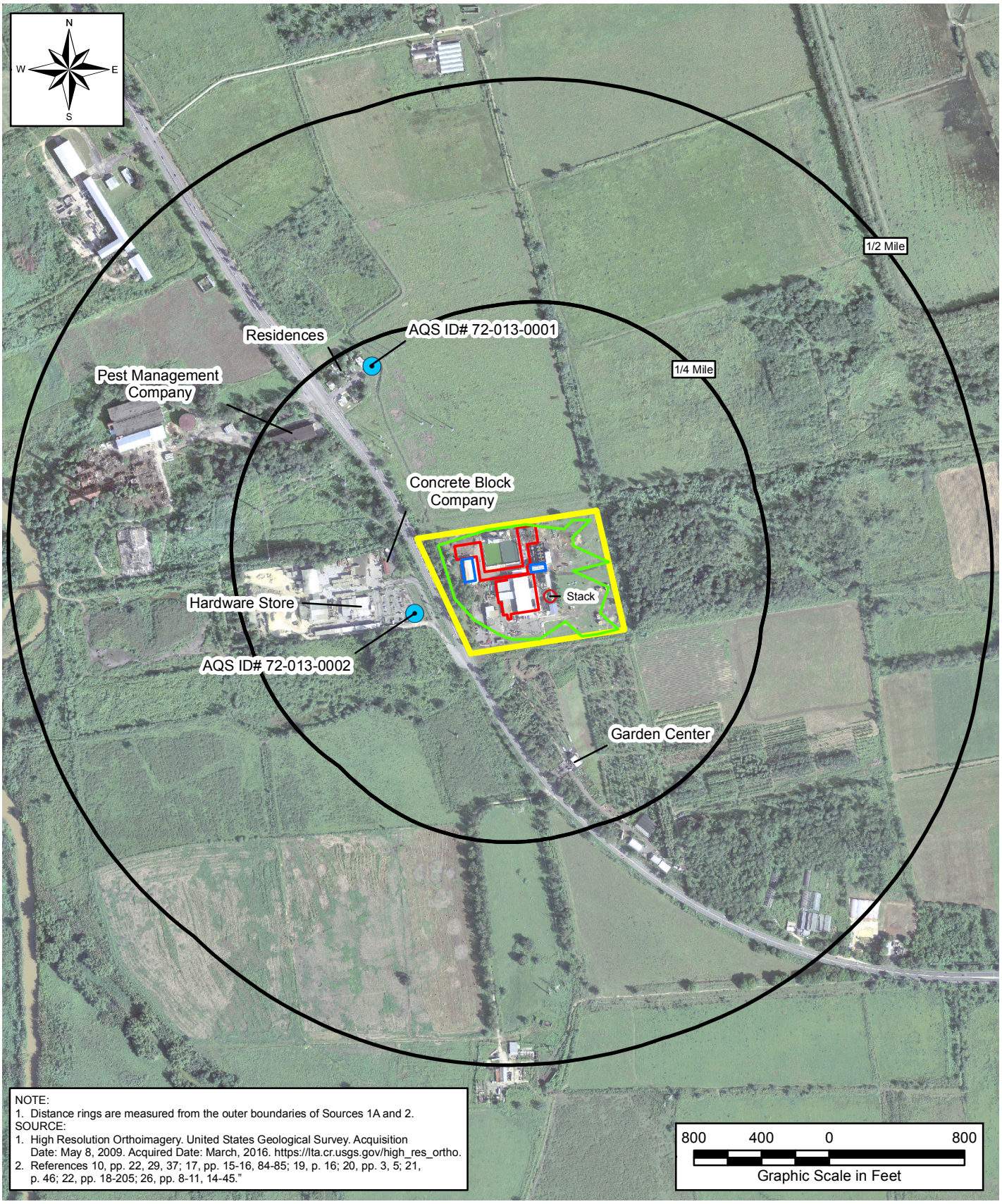
CLIENT NAME: EPA

WESTON SOLUTIONS

DATE: August 2016

FIGURE #: 3

P:\SAT2\Battery Recycling Company (0322)\MXD\18322_Arecibo_BRC_Surface_Water_Pathway_Map.mxd



NOTE:
1. Distance rings are measured from the outer boundaries of Sources 1A and 2.

SOURCE:
1. High Resolution Orthoimagery. United States Geological Survey. Acquisition Date: May 8, 2009. Acquired Date: March, 2016. https://lta.cr.usgs.gov/high_res_ortho.
2. References 10, pp. 22, 29, 37; 17, pp. 15-16, 84-85; 19, p. 16; 20, pp. 3, 5; 21, p. 46; 22, pp. 18-205; 26, pp. 8-11, 14-45."

LEGEND:
- Source 1A - Fugitive Air Emissions
- Source 2 - Waste Storage Piles
- Source 3 - Contaminated Soil
- Facility Boundary
- Source 1B - Stack
- Air Monitoring Stations

TITLE:

Air Pathway Map
The Battery Recycling Company
Arecibo, PR

PROJECT: The Battery Recycling Company

CLIENT NAME: EPA

WESTON SOLUTIONS

DATE: August 2016

FIGURE #: 4

P:\SAT2\Battery Recycling Company (0322)\MXD\18323_Arecibo_BRC_Air_Pathway_Map.mxd

SOURCE DESCRIPTION

2.2 SOURCE CHARACTERIZATION

2.2.1 Source Identification

Number of the source: Source No. 1A

Name and description of the source: Fugitive Air Emissions

Source Type: Other

Source 1A consists of fugitive air emissions of hazardous substances from the facility, reported by TBRCI through EPA's Toxics Release Inventory (TRI) system under the category "Fugitive or Non-Point Air Emissions" [Ref. 5, pp. 47, 61–166]. Fugitive emissions were from the main process building and from material handling and transport across the facility property [Ref. 17, pp. 84–85]. TBRCI reported fugitive air emissions of lead from 2004 to 2010, lead compounds from 2011 to 2013, antimony from 2005 to 2013, and sulfuric acid from 2009 to 2010 [Ref. 5, pp. 45–47]. All four substances are CERCLA hazardous substances [Refs. 1, Section 1.1; 18, pp. 6, 11–12, 21–23].

Location of the source, with reference to a map of the site:

The location of Source 1A is shown in **Figure 2**. The location is based on those areas where fugitive emissions occurred, specifically the main process building and vehicle movement between waste storage areas [Ref. 17, p. 85].

Containment

Release to surface water via overland migration and/or flood:

Neither of the following features are associated with the fugitive air emissions: (1) maintained engineered cover, or (2) functioning and maintained run-on control system and runoff management system [Refs. 1, Table 4-2; 9, pp. 7–9, 18–21, 299–300, 303; 10, pp. 13–14, 24–27, 31–32, 35–37; 12, pp. 8–11]. Based on the lack of containment features preventing migration of the contamination, a surface water migration pathway containment factor value of 10 is assigned for Source 1A [Ref. 1, Table 4-2].

Release to air:

The HRS defines gaseous hazardous substances as having vapor pressure greater than or equal to 10^{-9} torr [Ref. 1, Section 6.1.2.1]. The vapor pressure of sulfuric acid (98%) is 0.002 millimeters of mercury (mmHg; equivalent to torr); therefore, sulfuric acid is a gaseous hazardous substance [Refs. 1, Section 6.1.2.1; 42, p. 5]. Lead and antimony are particulate hazardous substances [Ref. 2, pp. 2, 7]. Based on these considerations, Source 1A is evaluated for both the gas and particulate containment factors in the air migration pathway [Ref. 1, Sections 6.1.2.1 and 6.1.2.2].

The release of hazardous substances in fugitive air emissions represents an observed release by direct observation [Ref. 1, Section 6.1.1]. On a regular basis, the facility has generated large quantities of dust containing lead through waste and product management operations conducted almost exclusively in structures that are not fully enclosed [Refs. 10, p. 24; 12, p. 9]. In addition, emissions from TBRCI are considered to be the primary source of high lead concentrations measured at nearby air monitoring stations [Ref. 17, pp. 4–5]. Based on this evidence of migration of hazardous substances from the source, gas and particulate containment factor values of 10 are assigned for Source 1A [Ref. 1, Tables 6-3 and 6-9].

2.2.2 Hazardous Substances

TBRCI reported air emissions releases of antimony, lead, lead compounds, and sulfuric acid [Ref. 5, pp. 45–47]. All four substances are CERCLA hazardous substances [Refs. 1, Section 1.1; 18, pp. 6, 11–12, 21–23].

2.4.2 Hazardous Waste Quantity

2.4.2.1.1 Tier A – Hazardous Constituent Quantity

TBRCI has reported the following quantities of hazardous substances released in fugitive emissions from the facility:

TABLE 1. HAZARDOUS CONSTITUENT QUANTITY, SOURCE 1A

Year	Chemical	CAS#	Fugitive or Non-Point Air Emissions (lb.)	References
2004	Lead	7439-92-1	2.14	Ref. 5, pp. 164-166
2005	Antimony	7440-36-0	2.62	Ref. 5, pp. 154-156
2005	Lead	7439-92-1	2.63	Ref. 5, pp. 159-161
2006	Antimony	7440-36-0	3.17	Ref. 5, pp. 149-151
2006	Lead	7439-92-1	3.07	Ref. 5, pp. 144-146
2007	Antimony	7440-36-0	4.06	Ref. 5, pp. 134-136
2007	Lead	7439-92-1	3.93	Ref. 5, pp. 139-141
2008	Antimony	7440-36-0	0.95	Ref. 5, pp. 123-125
2008	Lead	7439-92-1	4.59	Ref. 5, pp. 128-130
2009	Antimony	7440-36-0	0.95	Ref. 5, pp. 118-120
2009	Lead	7439-92-1	4.59	Ref. 5, pp. 113-115
2009	Sulfuric Acid	7664-93-9	588.00	Ref. 5, pp. 108-110
2010	Antimony	7440-36-0	1.54	Ref. 5, pp. 103-105
2010	Lead	7439-92-1	7.44	Ref. 5, pp. 93-95
2010	Sulfuric Acid	7664-93-9	588.00	Ref. 5, pp. 98-100
2011	Antimony	7440-36-0	15.88	Ref. 5, pp. 83-85
2011	Lead Compounds	N420	123.86	Ref. 5, pp. 88-90
2012	Antimony	7440-36-0	5.94	Ref. 5, pp. 72-74
2012	Lead Compounds	N420	71.07	Ref. 5, pp. 77-79
2013	Antimony	7440-36-0	4.77	Ref. 5, pp. 67-69
2013	Lead Compounds	N420	45.95	Ref. 5, pp. 61-63
		Subtotal	**1,485.15**	

Based on these reported release data, the mass (C) of CERCLA hazardous substances allocated to Source 1A is 1,485.15 pounds, and the source is assigned a hazardous constituent quantity value of 1,485.15 [Ref. 1, Section 2.4.2.1.1, Table 2.5]. The facility remained operational beyond 2013, and there is evidence of additional releases from the source in 2014 and 2015 that were not reported to TRI (see **Section 6.1.1**); therefore, the hazardous constituent quantity is not adequately determined according to the HRS requirements [Ref. 1, Section 2.4.2.1.1]. As a result, the evaluation of hazardous waste quantity for Source 1A proceeds to *Tier B* – Hazardous Wastestream Quantity [Ref 1, Section 2.4.2.1.1].

Hazardous Constituent Quantity (C) Value: 1,485.15

2.4.2.1.2 Tier B – Hazardous Wastestream Quantity

The mass of all known hazardous wastestreams allocated to Source 1A is equal to the mass of CERCLA hazardous substances, or 1,485.15 pounds (see **Section 2.4.2.1.1** above). The mass is divided by 5,000 to determine the hazardous wastestream quantity (W); based on this calculation, *Tier B* – Hazardous Wastestream Quantity is assigned a value of 0.29703 for Source 1A.

Hazardous Wastestream Quantity (W) Value = 1,485.15/5,000 = 0.29703

2.4.2.1.3 Tier C – Volume

There is insufficient information to determine the volume of Source 1A; therefore, *Tier C* – Volume is assigned a value of 0 for the source.

Volume (V) Assigned Value: 0

2.4.2.1.4 Tier D – Area

There is insufficient information to determine the area of Source 1A; therefore, *Tier D* – Area is assigned a value of 0 for the source.

Area (A) Assigned Value: 0

2.4.2.1.5 Source Hazardous Waste Quantity Value

The source hazardous waste quantity value for Source 1A is 1,485.15 for *Tier A* – Hazardous Constituent Quantity [Ref. 1, Section 2.4.2.1].

Source Hazardous Waste Quantity Value: 1,485.15

SOURCE DESCRIPTION

2.2 SOURCE CHARACTERIZATION

2.2.1 Source Identification

Number of the source: Source No. 1B

Name and description of the source: Stack Air Emissions

Source Type: Other

Source 1B consists of the air emissions of hazardous substances from the stack at the facility, which were reported by TBRCI through EPA's TRI system under the category "Stack or Point Air Emissions" [Ref. 5, pp. 47, 61–166]. The air emissions stack is located east of the main process building [Ref. 17, pp. 84–85]. TBRCI reported stack air emissions of lead from 2004 to 2010, lead compounds from 2011 to 2013, and antimony from 2005 to 2013 [Ref. 5, pp. 45–47]. All three substances are CERCLA hazardous substances [Refs. 1, Section 1.1; 18, pp. 6, 11–12, 21–23].

Location of the source, with reference to a map of the site:

The location of Source 1B (i.e., the stack) is shown in **Figure 2** [Ref. 17, p. 85].

Containment

Release to surface water via overland migration and/or flood:

Neither of the following features are associated with the air emissions stack: (1) maintained engineered cover, or (2) functioning and maintained run-on control system and runoff management system [Refs. 1, Table 4-2; 9, pp. 7–9, 18–21, 299–300, 303; 10, pp. 13–14, 24–27, 31–32, 35–37; 12, pp. 8–11]. Based on the lack of containment features preventing migration of the contamination, a surface water migration pathway containment factor value of 10 is assigned for Source 1B [Ref. 1, Table 4-2].

Release to air:

The release of hazardous substances in the stack air emissions represents an observed release by direct observation [Ref. 1, Section 6.1.1]. In addition, emissions from TBRCI are considered to be the primary source of high lead concentrations measured at nearby air monitoring stations [Ref. 17, pp. 4–5]. Based on this evidence of migration of particulate hazardous substances from the source, a particulate containment factor value of 10 is assigned for Source 1B [Refs. 1, Tables 6-3 and 6-9; 2, p. 7].

2.2.2 Hazardous Substances

TBRCI reported stack or point air emissions releases of antimony, lead, and lead compounds [Ref. 5, pp. 45–47]. All three substances are CERCLA hazardous substances [Refs. 1, Section 1.1; 18, pp. 6, 11–12, 21–23].

2.4.2 Hazardous Waste Quantity

2.4.2.1.1 Tier A – Hazardous Constituent Quantity

TBRCI has reported the following quantities of hazardous substances released from the facility:

TABLE 1. HAZARDOUS CONSTITUENT QUANTITY, SOURCE 1				
Year	**Chemical**	**CAS#**	**Stack or Point Air Emissions (lb.)**	**References**
2004	Lead	7439-92-1	608.15	Ref. 5, pp. 164-166
2005	Antimony	7440-36-0	66.79	Ref. 5, pp. 154-156
2005	Lead	7439-92-1	746.49	Ref. 5, pp. 159-161
2006	Antimony	7440-36-0	66.79	Ref. 5, pp. 149-151
2006	Lead	7439-92-1	872.36	Ref. 5, pp. 144-146
2007	Antimony	7440-36-0	66.79	Ref. 5, pp. 134-136
2007	Lead	7439-92-1	160.80	Ref. 5, pp. 139-141
2008	Antimony	7440-36-0	36.90	Ref. 5, pp. 123-125
2008	Lead	7439-92-1	88.84	Ref. 5, pp. 128-130
2009	Antimony	7440-36-0	31.37	Ref. 5, pp. 118-120
2009	Lead	7439-92-1	61.20	Ref. 5, pp. 113-115
2010	Antimony	7440-36-0	47.94	Ref. 5, pp. 103-105
2010	Lead	7439-92-1	98.61	Ref. 5, pp. 93-95
2011	Antimony	7440-36-0	59.24	Ref. 5, pp. 83-85
2011	Lead Compounds	N420	131.60	Ref. 5, pp. 88-90
2012	Antimony	7440-36-0	64.56	Ref. 5, pp. 72-74
2012	Lead Compounds	N420	45.91	Ref. 5, pp. 77-79
2013	Antimony	7440-36-0	42.68	Ref. 5, pp. 67-69
2013	Lead Compounds	N420	32.58	Ref. 5, pp. 61-63
		Subtotal	**3,329.60**	

Based on these reported release data, the mass (C) of CERCLA hazardous substances allocated to Source 1B is 3,329.60 pounds, and the source is assigned a hazardous constituent quantity value of 3,329.60 [Ref. 1, Section 2.4.2.1.1, Table 2.5]. The facility remained operational beyond 2013, and there is evidence of additional releases from the source in 2014 and 2015 that were not reported to TRI (see **Section 6.1.1**); therefore, the hazardous constituent quantity is not adequately determined according to the HRS requirements [Ref. 1, Section 2.4.2.1.1]. As a result, the evaluation of hazardous waste quantity for Source 1B proceeds to *Tier B* – Hazardous Wastestream Quantity [Ref 1, Section 2.4.2.1.1].

Hazardous Constituent Quantity (C) Value: 3,329.60

2.4.2.1.2 Tier B – Hazardous Wastestream Quantity

The mass of all known hazardous wastestreams allocated to Source 1A is equal to the mass of CERCLA hazardous substances, or 3,329.60 pounds (see **Section 2.4.2.1.1** above). The mass is divided by 5,000 to determine the hazardous wastestream quantity (W); based on this calculation, *Tier B* – Hazardous Wastestream Quantity is assigned a value of 0.66592 for Source 1B.

Hazardous Wastestream Quantity (W) Value = 3,329.60/5,000 = 0.66592

2.4.2.1.3 Tier C – Volume

There is insufficient information to determine the volume of Source 1B; therefore, *Tier C* – Volume is assigned a value of 0 for the source.

Volume (V) Assigned Value: 0

2.4.2.1.4 Tier D – Area

There is insufficient information to determine the area of Source 1B; therefore, *Tier D* – Area is assigned a value of 0 for the source.

Area (A) Assigned Value: 0

2.4.2.1.5 Source Hazardous Waste Quantity Value

The source hazardous waste quantity value for Source 1B is 3,329.60 for *Tier A* – Hazardous Constituent Quantity [Ref. 1, Section 2.4.2.1].

Source Hazardous Waste Quantity Value: 3,329.60

SOURCE DESCRIPTION

2.2 SOURCE CHARACTERIZATION

2.2.1 Source Identification

Number of the source: Source No. 2

Name and description of the source: Waste Storage Piles

Source Type: Pile

Source 2 consists of two waste storage piles located in the northern portion of the TBRCI facility (see **Figure 2**). The piles, which consist of solid waste (including furnace slag) stored in open-air buildings on a long-term basis, are not covered or bermed [Refs. 10, pp. 22, 29, 37; 20, pp. 3, 5; 21, p. 46]. The piles/buildings are hereinafter referred to individually as "western" and "eastern" for clarity. The waste piles are subject to erosion by water and wind due to their positioning within the large, open storage buildings—waste material has spilled out onto the open ground, staining is visible throughout the ground surface near both storage buildings, and EPA has observed a dust plume blowing from the western pile during waste handling operations [Refs. 10, pp. 22, 29, 37; 19, pp. 10–12, 16; 20, pp. 3, 5; 21, pp. 36–37, 46; 29, pp. 1–4]. During a July 2010 inspection, EPA observed that the storage piles of gray and black material were sitting in ponded water and draining across the open lot [Ref. 10, p. 37].

As determined by TBRCI, material handling operations outside the main process building, such as that which occurred at the waste storage piles, resulted in the resuspension of loose dust containing lead and other heavy metals [Refs. 10, p. 24; 12, pp. 9–10; 17, pp. 82–83]. Based on multiple compliance inspections, EPA found that the facility's open-air storage and handling of wastes were regular, large-scale contributors to the generation of dust containing lead and other heavy metals [Refs. 10, p. 24; 12, pp. 7–9]. The roof of the western storage building has become badly damaged, exacerbating the releases of contaminated material via runoff and airborne dust [Refs. 20, p. 3; 21, p. 46; 29, p. 2]. In November 2015, EPA collected solid waste samples from the waste storage piles [Refs. 19, pp. 10–12, 16; 20, pp. 3, 5; 21, pp. 36–37]. The analytical results showed that the waste piles in both storage buildings contain elevated levels of arsenic, cadmium, and lead (see **Section 2.2.2**, below).

The waste piles are addressed as one combined source for HRS scoring purposes based on sharing similar characteristics, including: same source type (i.e., pile); same hazardous substances, leading to similar waste characteristics factor value; same lack of containment (i.e., not covered or bermed); and impact on the same targets within the same watershed, floodplain, and air migration distance rings.

Location of the source, with reference to a map of the site:

Source 2 is located in the northern portion of the subject property, as shown on **Figure 2**.

Containment

Release to surface water via overland migration and/or flood:

The piles are stored in open-air buildings and are not covered or bermed [Refs. 10, pp. 22, 29, 37; 20, pp. 3, 5; 21, p. 46]. During a July 2010 inspection, EPA observed that the storage piles were sitting in ponded water and draining across the open lot [Ref. 10, p. 37]. Staining is visible throughout the ground surface in front of the piles, and between the piles and the drainage ditch on the eastern portion of the property. These observations indicate that neither of the following are present: (1) maintained engineered cover, or (2) functioning and maintained run-on control system and runoff management system [Ref. 1, Table 4-2]. Based on the lack of containment features preventing migration of the contamination, a surface water containment factor value for overland migration of 10 is assigned for Source 2 [Ref.1, Table 4-2].

Release to air:

Samples collected from the piles in November 2015 showed the presence of particulate hazardous substances (see **Section 2.2.2** below). The waste piles are not covered with any uncontaminated soil and they are not vegetated [Ref. 20, p. 3]. The open-air storage and handling of wastes are large-scale contributors to the generation of dust containing lead and other heavy metals at the TBRCI facility [Refs. 10, p. 24; 12, pp. 7–9; 17, pp. 82–83]. EPA has observed and videotaped the release of particulate matter from the western pile to the air and off the source [Refs. 27, p. 3; 29, pp. 1–4]. Based on the lack of containment features preventing migration of the hazardous substances, a particulate containment factor value of 10 is assigned for Source 2 [Ref.1, Table 6-9].

2.2.2 Hazardous Substances

In November 2015, EPA collected solid waste samples PRBR-005SW-001 and PRBR-005SW-002 from the western waste storage pile, and solid waste sample PRBR-006SW-001 from the eastern waste storage pile. Analytical results show the presence of lead at percent levels and elevated levels of arsenic and cadmium (all results are above the minimum detection limits [MDL], which are based on matrix and dilution for each sample) [Refs. 19, pp. 10, 16; 20, pp. 3, 5, 6, 9, 11, 14, 17]:

TABLE 2. HAZARDOUS SUBSTANCES, SOURCE 2

Sample #	**PRBR-005SW-001**		**PRBR-005SW-002**		**PRBR-006SW-001**	
Sample Date	11/20/15		11/20/15		11/20/15	
Sample Time	1030		1035		1050	
Matrix	Solid Waste		Solid Waste		Solid Waste	
Sample Type	Field Sample		Field Duplicate		Field Sample	
Analyte	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**
Arsenic (mg/kg)	434	50	431	50	150	50
Cadmium (mg/kg)	77.3	10	109	10	55.5	10
Lead (mg/kg)	34,241	25	35,411	25	44,975	25
Reference	Ref. 20, p. 11		Ref. 20, p. 14		Ref. 20, p. 17	

Subsequent analysis with an XRF elemental analyzer confirmed the presence of lead at percent levels in the waste storage piles [Refs. 19, p. 16; 21, pp. 36–37, 46].

2.4.2 Hazardous Waste Quantity

2.4.2.1.1 Tier A – Hazardous Constituent Quantity

The hazardous constituent quantity for Source 2 could not be adequately determined according to the HRS requirements; that is, the total mass of all CERCLA hazardous substances in the source and releases from the source is not known and cannot be estimated with reasonable confidence [Ref. 1, Section 2.4.2.1.1]. There are insufficient historical and current data (manifests, potentially responsible party [PRP] records, State records, permits, waste concentration data, etc.) available to adequately calculate the total or partial mass of all CERCLA hazardous substances in the source and the associated releases from the source. Therefore, there is insufficient information to evaluate the associated releases from the source to calculate the hazardous constituent quantity for Source 1 with reasonable confidence. As a result, the evaluation of hazardous waste quantity proceeds to the evaluation of *Tier B*, Hazardous Wastestream Quantity [Ref 1, Section 2.4.2.1.1].

Hazardous Constituent Quantity (C) Value: NS

2.4.2.1.2 Tier B – Hazardous Wastestream Quantity

The hazardous wastestream quantity for Source 2 could not be adequately determined according to the HRS requirements; that is, the total mass of all hazardous wastestreams plus the mass of any additional CERCLA pollutants and contaminants in the source and releases from the source is not known and cannot be estimated with reasonable confidence [Ref. 1, Section 2.4.2.1.2]. There are insufficient historical and current data (manifests, PRP records, State records, permits, waste concentration data, etc.) available to adequately calculate the total mass or partial mass of the hazardous wastestreams plus the mass of all CERCLA pollutants and contaminants in the source and the associated releases from the source. Therefore, there is insufficient information to evaluate the associated releases from the source to calculate the hazardous wastestream quantity for Source 1 with reasonable confidence. Scoring proceeds to the evaluation of *Tier C*, Volume [Ref. 1, Section 2.4.2.1.2].

Hazardous Wastestream Quantity (W) Value: NS

2.4.2.1.3 Tier C – Volume

There is insufficient information to determine the volume of Source 2; therefore, *Tier C* – Volume is assigned a value of 0 for the source.

Volume (V) Assigned Value: 0

2.4.2.1.4 Tier D – Area

The total area of the waste piles, as measured by the land surface area under the piles (i.e., the floor space of the open-air storage buildings), is approximately: (135 ft x 70 ft) + (100 ft x 35 ft) = 9,450 ft^2 + 3,500 ft^2 = 12,950 ft^2 [**Figure 2**]. The source type is "Pile," so the area value is divided by 13 to obtain the assigned value shown below [Ref. 1, Section 2.4.2.1.4].

Dimensions of source = (135 ft x 70 ft) + (100 ft x 35 ft) = 12,950 ft^2
Area (A) Assigned Value: 12,950/13 = 996.15

2.4.2.1.5 Source Hazardous Waste Quantity Value

The source hazardous waste quantity value for Source 2 is 996.15 for Tier D – Area [Ref. 1, Section 2.4.2.1].

Source Hazardous Waste Quantity Value: 996.15

SOURCE DESCRIPTION

2.2 SOURCE CHARACTERIZATION

2.2.1 Source Identification

Number of the source: Source No. 3

Name and description of the source: Contaminated Soil

Source Type: Contaminated Soil

Source 3 consists of the contaminated soil found throughout the property, as documented by EPA's removal assessment including XRF screening and confirmatory laboratory sampling in January 2016. EPA collected soil samples from soil borings throughout the property; soil samples were collected beneath a variety of ground surfaces, including bare soil, grass, gravel, and asphalt [Ref. 21, pp. 1–31, 41, 46, 98]. Soil samples from the borings were screened for lead with an XRF, and about 20% of samples were analyzed at an off-site laboratory for TAL metals [Refs. 21, pp. 1–31, 39–46; 22, pp. 3–10]. The XRF and laboratory analytical results show the presence of lead in many areas of the site, at concentrations that in a few instances approach or exceed 10% [Refs. 21, pp. 2–31, 46; 22, pp. 22–111, 118–205]. Samples from soil borings along the southern edge of the property show lower concentrations than other samples, and are therefore considered to represent background conditions for the sake of comparison (see **Section 2.2.2**, below).

Location of the source, with reference to a map of the site:

Source 3 is located throughout the property, as shown on **Figure 2**.

Containment

Release to surface water via overland migration and/or flood:

Bare contaminated soil is present at the ground surface in the eastern portion of the property; soil samples collected in January 2016 show the presence of particulate hazardous substances (see **Section 2.2.2** below). Neither of the following are present: (1) maintained engineered cover, or (2) functioning and maintained run-on control system and runoff management system [Refs. 1, Table 4-2; 21, pp. 2–31, 46]. Based on the lack of containment features preventing migration of hazardous substances, a surface water containment factor value for overland migration of 10 is assigned for this source [Ref. 1, Table 4-2].

Release to air:

Bare contaminated soil is present at the ground surface in the eastern portion of the property; soil samples collected in January 2016 show the presence of particulate hazardous substances (see **Section 2.2.2** below). The contaminated soil is not covered by any uncontaminated soil and it is not heavily vegetated [Ref. 21, pp. 2–31, 46]. Based on the lack of containment features preventing migration of the hazardous substances, a particulate containment factor value of 10 is assigned for this source [Ref.1, Table 6-9].

2.2.2 Hazardous Substances

Laboratory analytical results for the soil samples collected by EPA in January 2016 show the presence of antimony, arsenic, cadmium, and lead at concentrations significantly above background in many areas of the site. The soil in all areas of the property is affected, including bare soil areas, vegetated areas, asphalt- and gravel-covered areas, and the onsite drainage ditch. In some areas, contamination was shown to extend to depths of 3 feet or more below ground surface. Samples from soil borings along the southern edge of the property and in the southeastern corner of the property show lower impact and are therefore considered to represent background conditions for the sake of comparison. Sample similarity among background and contaminated samples includes: same timeframe (January 11–21, 2016), same location types (direct-push soil borings), same sampling team and collection procedures, similar depth intervals*, and same laboratory and analyses [Refs. 21, pp. 1–31, 39–46, 98; 22, pp. 3–10, 22–111, 118–205]. While background samples indicate elevated levels of antimony, arsenic, cadmium, and lead, all contaminated source samples meet HRS criteria for an observed release by chemical analysis and exhibit concentrations of these metals that are three times greater than the associated background level [Ref. 1, Section 2.3].

*Note: The samples used to show background levels and source concentrations all were collected within 2 feet of the ground surface samples; additional results indicate that soil contamination extends to greater depths in some areas.

Background Samples

TABLE 3. BACKGROUND SAMPLES, SOURCE 3

Hazardous Substance	Sample ID	Depth (in.)	Sample Date	Conc. (mg/kg)	RL (mg/kg)	References
Antimony	BRC001-GB034-0106-01	1–6	1/16/16	13	1.6	21, pp. 1, 15, 46, 98; 22, pp. 4, 59
	BRC001-GB034-0612-01	6–12	1/16/16	5.3	1.7	21, pp. 1, 15, 46, 98; 22, pp. 4, 60
	BRC001-GB040-0001-01	0–1	1/18/16	U	1.7	21, pp. 1, 16, 46, 98; 22, pp. 4, 163
	BRC001-SB046-0001-01	0–1	1/19/16	9.6	1.8	21, pp. 1, 19, 46, 98; 22, pp. 4, 187
	BRC001-SB048-0001-01	*0–1*	*1/19/16*	*14*	*1.9*	*21, pp. 1, 19, 46, 98; 22, pp. 4, 188*
	BRC001-SB048-1824-01	18–24	1/19/16	1.9	1.9	21, pp. 1, 19, 46, 98; 22, pp. 4, 189
	BRC001-SB054-0001-01	0–1	1/20/16	5.8	1.9	21, pp. 1, 19, 46, 98; 22, pp. 4, 197
	BRC001-SB055-0612-01	6–12	1/20/16	U	1.8	21, pp. 1, 19, 46, 98; 22, pp. 4, 198
	BRC001-SB058-0001-01	0–1	1/20/16	7.7	1.9	21, pp. 1, 19, 46, 98; 22, pp. 4, 201
Arsenic	BRC001-GB034-0106-01	1–6	1/16/16	8.2	0.64	21, pp. 1, 15, 46, 98; 22, pp. 4, 59
	BRC001-GB034-0612-01	6–12	1/16/16	13	0.68	21, pp. 1, 15, 46, 98; 22, pp. 4, 60
	BRC001-GB040-0001-01	0–1	1/18/16	4.0	0.70	21, pp. 1, 16, 46, 98; 22, pp. 4, 163
	BRC001-SB046-0001-01	*0–1*	*1/19/16*	*22*	*0.73*	*21, pp. 1, 19, 46, 98; 22, pp. 4, 188*
	BRC001-SB048-0001-01	0–1	1/19/16	11	0.75	21, pp. 1, 19, 46, 98; 22, pp. 4, 188

TABLE 3. BACKGROUND SAMPLES, SOURCE 3						
Hazardous Substance	**Sample ID**	**Depth (in.)**	**Sample Date**	**Conc. (mg/kg)**	**RL (mg/kg)**	**References**
	BRC001-SB048-1824-01	18–24	1/19/16	3.2	0.75	21, pp. 1, 19, 46, 98; 22, pp. 4, 189
	BRC001-SB054-0001-01	0–1	1/20/16	7.1	0.75	21, pp. 1, 19, 46, 98; 22, pp. 4, 197
	BRC001-SB055-0612-01	6–12	1/20/16	2.5	0.72	21, pp. 1, 19, 46, 98; 22, pp. 4, 198
	BRC001-SB058-0001-01	0–1	1/20/16	12	0.74	21, pp. 1, 19, 46, 98; 22, pp. 4, 201
Cadmium	BRC001-GB034-0106-01	1–6	1/16/16	0.77	0.24	21, pp. 1, 15, 46, 98; 22, pp. 4, 59
	BRC001-GB034-0612-01	6–12	1/16/16	0.38	0.25	21, pp. 1, 15, 46, 98; 22, pp. 4, 60
	BRC001-GB040-0001-01	0–1	1/18/16	0.82	0.26	21, pp. 1, 16, 46, 98; 22, pp. 4, 163
	BRC001-SB046-0001-01	0–1	1/19/16	2.7	0.27	21, pp. 1, 19, 46, 98; 22, pp. 4, 188
	BRC001-SB048-0001-01	*0–1*	*1/19/16*	*2.9*	*0.28*	*21, pp. 1, 19, 46, 98; 22, pp. 4, 189*
	BRC001-SB048-1824-01	18–24	1/19/16	0.85	0.28	21, pp. 1, 19, 46, 98; 22, pp. 4, 190
	BRC001-SB054-0001-01	0–1	1/20/16	1.2	0.28	21, pp. 1, 19, 46, 98; 22, pp. 4, 197
	BRC001-SB055-0612-01	6–12	1/20/16	0.84	0.27	21, pp. 1, 19, 46, 98; 22, pp. 4, 198
	BRC001-SB058-0001-01	0–1	1/20/16	0.75	0.28	21, pp. 1, 19, 46, 98; 22, pp. 4, 201
Lead	BRC001-GB034-0106-01	1–6	1/16/16	1,000	0.64	21, pp. 1, 15, 46, 98; 22, pp. 4, 59
	BRC001-GB034-0612-01	6–12	1/16/16	710	0.68	21, pp. 1, 15, 46, 98; 22, pp. 4, 60
	BRC001-GB040-0001-01	0–1	1/18/16	43	0.70	21, pp. 1, 16, 46, 98; 22, pp. 4, 163
	BRC001-SB046-0001-01	0–1	1/19/16	790	1.5	21, pp. 1, 19, 46, 98; 22, pp. 4, 188
	BRC001-SB048-0001-01	*0–1*	*1/19/16*	*1,200*	*1.5*	*21, pp. 1, 19, 46, 98; 22, pp. 4, 189*
	BRC001-SB048-1824-01	18–24	1/19/16	400	1.5	21, pp. 1, 19, 46, 98; 22, pp. 4, 190
	BRC001-SB054-0001-01	0–1	1/20/16	560	1.5	21, pp. 1, 19, 46, 98; 22, pp. 4, 197
	BRC001-SB055-0612-01	6–12	1/20/16	98	1.4	21, pp. 1, 19, 46, 98; 22, pp. 4, 198
	BRC001-SB058-0001-01	0–1	1/20/16	860	1.5	21, pp. 1, 19, 46, 98; 22, pp. 4, 201

RL = Reporting limit based on method detection limits (MDL), contract-required quantitation limits (CRQL), and sample characteristics including matrix and dilution; meets HRS definition of sample quantitation limit [Refs. 1, Sections 1.1 and 2.3; 22, p. 11; 43, pp. 29, 36].

Note: Samples TBRCI-SB046-0001-01 (arsenic) and TBRCI-SB048-0001-01 (antimony, cadmium, and lead) represent the maximum background concentrations in this comparison, as denoted by *italics* in the table above.

Contaminated Samples

The results listed here are significantly above background concentrations (i.e., greater than three times the maximum background levels) and are considered to represent the minimum extent of contaminated soil at the site. Sample similarity among background and contaminated samples includes: same timeframe (January 11–21, 2016), same location types (direct-push soil borings), same sampling team and collection procedures, similar depth intervals (all within 2 feet of ground surface), and same laboratory and analyses [Refs. 21, pp. 1–31, 39–46, 98; 22, pp. 3–10, 22–111, 118–205]. While background samples indicate elevated levels of antimony, arsenic, cadmium, and lead, all contaminated source samples meet HRS criteria for an observed release by chemical analysis and exhibit concentrations of these metals that are three times greater than the associated background level [Ref. 1, Section 2.3].

TABLE 4. CONTAMINATED SAMPLES, SOURCE 3

Hazardous Substance	Sample ID	Depth (in.)	Sample Date	Result (mg/kg)	RL (mg/kg)	References
Antimony	BRC001-AB001-0001-01	0–1	1/20/16	1,600	2.0	21, pp. 1, 22, 46, 98; 22, pp. 6, 117
	BRC001-AB002-0001-01	0–1	1/20/16	1,500	1.9	21, pp. 1, 22, 46, 98; 22, pp. 7, 118
	BRC001-AB002-0001-02	0–1	1/20/16	1,400	1.8	21, pp. 1, 22, 27, 46, 98; 22, pp. 7, 119
	BRC001-AB004-0001-01	0–1	1/20/16	320	1.8	21, pp. 1, 22, 46, 98; 22, pp. 7, 121
	BRC001-AB004-0612-01	6–12	1/20/16	630	1.7	21, pp. 1, 22, 46, 98; 22, pp. 7, 122
	BRC001-AB005-0001-01	0–1	1/21/16	1,900	2.1	21, pp. 1, 22, 46, 98; 22, pp. 7, 124
	BRC001-AB008-0001-01	0–1	1/20/16	170	1.7	21, pp. 1, 23, 46, 98; 22, pp. 7, 128
	BRC001-AB009-0001-01	0–1	1/20/16	3,800	1.6	21, pp. 1, 23, 46, 98; 22, pp. 7, 129
	BRC001-AB010-0001-01	0–1	1/20/16	650	1.6	21, pp. 1, 23, 46, 98; 22, pp. 7, 130
	BRC001-AB011-0001-01	0–1	1/20/16	120	1.7	21, pp. 1, 23, 46, 98; 22, pp. 7, 131
	BRC001-AB011-0001-02	0–1	1/20/16	150	1.6	21, pp. 1, 23, 27, 46, 98; 22, pp. 7, 132
	BRC001-AB013-0001-01	0–1	1/20/16	240	1.7	21, pp. 1, 24, 46, 98; 22, pp. 7, 134
	BRC001-AB014-0001-01	0–1	1/20/16	430	1.7	21, pp. 1, 24, 46, 98; 22, pp. 7, 135
	BRC001-AB015-0106-01	1–6	1/21/16	980	1.8	21, pp. 1, 24, 46, 98; 22, pp. 7, 136
	BRC001-AB016-0001-01	0–1	1/21/16	4,300	1.7	21, pp. 1, 24, 46, 98; 22, pp. 7, 138
	BRC001-AB016-1824-01	18–24	1/21/16	140	1.9	21, pp. 1, 24, 46, 98; 22, pp. 7, 139
	BRC001-AB017-0001-01	0–1	1/21/16	4,100	1.7	21, pp. 1, 24, 46, 98; 22, pp. 7, 141
	BRC001-AB017-1218-01	12–18	1/21/16	100	1.8	21, pp. 1, 24, 46, 98; 22, pp. 7, 142
	BRC001-AB018-0001-01	0–1	1/21/16	4,100	1.7	21, pp. 1, 25, 46, 98; 22, pp. 7, 144

TABLE 4. CONTAMINATED SAMPLES, SOURCE 3						
Hazardous Substance	**Sample ID**	**Depth (in.)**	**Sample Date**	**Result (mg/kg)**	**RL (mg/kg)**	**References**
Antimony (continued)	BRC001-AB019-0001-01	0–1	1/21/16	530	1.6	21, pp. 1, 25, 46, 98; 22, pp. 8, 145
	BRC001-AB019-0001-02	0–1	1/21/16	410	1.6	21, pp. 1, 25, 27, 46, 98; 22, pp. 8, 146
	BRC001-AB020-0001-01	0–1	1/21/16	220	1.7	21, pp. 1, 25, 46, 98; 22, pp. 8, 148
	BRC001-AB024-0001-01	0–1	1/21/16	330	1.7	21, pp. 1, 25, 46, 98; 22, pp. 8, 152
	BRC001-AB026-0612-01	6–12	1/21/16	86	1.7	21, pp. 1, 26, 46, 98; 22, pp. 8, 155
	BRC001-GB005-0001-01	0–1	1/15/16	100	1.6	21, pp. 1, 10, 46, 98; 22, pp. 3, 24
	BRC001-GB011-0001-01	0–1	1/14/16	56	1.6	21, pp. 1, 11, 46, 98; 22, pp. 3, 30
	BRC001-GB020-0001-01	0–1	1/15/16	45	1.6	21, pp. 1, 13, 46, 98; 22, pp. 4, 39
	BRC001-GB030-0001-01	0–1	1/16/16	84	1.6	21, pp. 1, 14, 46, 98; 22, pp. 4, 49
	BRC001-GB041-0001-01	0–1	1/18/16	62	2.0	21, pp. 1, 16, 46, 98; 22, pp. 8, 164
	BRC001-GB042-0612-01	6–12	1/18/16	69	1.9	21, pp. 1, 16, 46, 98; 22, pp. 8, 165
	BRC001-GB043-0106-01	1–6	1/18/16	72	1.8	21, pp. 1, 16, 46, 98; 22, pp. 8, 166
	BRC001-GB044-0001-01	0–1	1/18/16	440	2.5	21, pp. 1, 16, 46, 98; 22, pp. 8, 167
	BRC001-GB045-0001-01	0–1	1/18/16	220	1.9	21, pp. 1, 16, 46, 98; 22, pp. 8, 168
	BRC001-GB046-0106-01	1–6	1/19/16	50	1.9	21, pp. 1, 17, 46, 98; 22, pp. 8, 169
	BRC001-SB005-1824-01	18–24	1/12/16	90	1.8	21, pp. 1, 2, 46, 98; 22, pp. 5, 65
	BRC001-SB010-0001-01	0–1	1/13/16	46	1.8	21, pp. 1, 3, 46, 98; 22, pp. 5, 73
	BRC001-SB011-0001-01	0–1	1/13/16	140	1.9	21, pp. 1, 4, 46, 98; 22, pp. 5, 75
	BRC001-SB015-1218-01	12–18	1/13/16	100	1.8	21, pp. 1, 4, 46, 98; 22, pp. 5, 82
	BRC001-SB015-1824-01	18–24	1/13/16	54	1.8	21, pp. 1, 4, 46, 98; 22, pp. 5, 83
	BRC001-SB016-0001-01	0–1	1/13/16	110	1.9	21, pp. 1, 5, 46, 98; 22, pp. 5, 84
	BRC001-SB020-1218-01	12–18	1/13/16	100	1.7	21, pp. 1, 5, 46, 98; 22, pp. 6, 92
	BRC001-SB021-0001-01	0–1	1/13/16	73	1.8	21, pp. 1, 6, 46, 98; 22, pp. 6, 93
	BRC001-SB026-0001-01	0–1	1/14/16	460	2.0	21, pp. 1, 7, 46, 98; 22, pp. 6, 101
	BRC001-SB027-0001-01	0–1	1/14/16	560	2.0	21, pp. 1, 7, 46, 98; 22, pp. 6, 102

TABLE 4. CONTAMINATED SAMPLES, SOURCE 3						
Hazardous Substance	**Sample ID**	**Depth (in.)**	**Sample Date**	**Result (mg/kg)**	**RL (mg/kg)**	**References**
Antimony (concluded)	BRC001-SB028-0001-01	0–1	1/14/16	56	2.0	21, pp. 1, 7, 30, 46, 98; 22, pp. 6, 103
		0–1	1/14/16	180	1.7	21, pp. 1, 7, 46, 98; 22, pp. 6, 104
	BRC001-SB029-0612-01	6–12	1/14/16	64	1.9	21, pp. 1, 7, 46, 98; 22, pp. 6, 107
	BRC001-SB031-0001-01	0–1	1/14/16	120	1.7	21, pp. 1, 8, 46, 98; 22, pp. 6, 110
	BRC001-SB032-0001-01	0–1	1/19/16	790	1.7	21, pp. 1, 17, 46, 98; 22, pp. 9, 174
	BRC001-SB036-0001-01	0–1	1/19/16	69	1.7	21, pp. 1, 17, 46, 98; 22, pp. 9, 178
	BRC001-SB038-0001-01	0–1	1/19/16	48	1.8	21, pp. 1, 18, 46, 98; 22, pp. 9, 180
	BRC001-SB051-0001-01	0–1	1/20/16	74	2.1	21, pp. 1, 20, 46, 98; 22, pp. 9, 192
	BRC001-SB052-0001-01	0–1	1/20/16	57	1.8	21, pp. 1, 20, 46, 98; 22, pp. 9, 194
	BRC001-SB052-0001-02	0–1	1/20/16	48	1.8	21, pp. 1, 20, 31, 46, 98; 22, pp. 9, 195
	BRC001-SB060-0001-01	0–1	1/20/16	3,200	1.9	21, pp. 1, 22, 46, 98; 22, pp. 10, 202
	BRC001-SB061-0001-01	0–1	1/20/16	2,900	1.8	21, pp. 1, 22, 46, 98; 22, pp. 10, 204
	BRC001-SB061-0612-01	6–12	1/20/16	480	1.8	21, pp. 1, 22, 46, 98; 22, pp. 10, 205
Arsenic	BRC001-AB001-0001-01	0–1	1/20/16	190	0.79	21, pp. 1, 22, 46, 98; 22, pp. 6, 117
	BRC001-AB002-0001-01	0–1	1/20/16	290	0.75	21, pp. 1, 22, 46, 98; 22, pp. 7, 118
	BRC001-AB002-0001-02	0–1	1/20/16	220	0.73	21, pp. 1, 22, 27, 46, 98; 22, pp. 7, 119
	BRC001-AB005-0001-01	0–1	1/21/16	350	0.85	21, pp. 1, 22, 46, 98; 22, pp. 7, 124
	BRC001-AB009-0001-01	0–1	1/20/16	310	0.63	21, pp. 1, 23, 46, 98; 22, pp. 7, 129
	BRC001-AB010-0001-01	0–1	1/20/16	120	0.65	21, pp. 1, 23, 46, 98; 22, pp. 7, 130
	BRC001-AB015-0106-01	1–6	1/21/16	210	0.72	21, pp. 1, 24, 46, 98; 22, pp. 7, 136
	BRC001-AB016-0001-01	0–1	1/21/16	1,400	0.68	21, pp. 1, 24, 46, 98; 22, pp. 7, 138
	BRC001-AB017-0001-01	0–1	1/21/16	960	0.70	21, pp. 1, 24, 46, 98; 22, pp. 7, 141
	BRC001-AB018-0001-01	0–1	1/21/16	760	0.69	21, pp. 1, 25, 46, 98; 22, pp. 7, 144
	BRC001-AB019-0001-01	0–1	1/21/16	90	0.63	21, pp. 1, 25, 46, 98; 22, pp. 8, 145
	BRC001-AB019-0001-02	0–1	1/21/16	94	0.63	21, pp. 1, 25, 27, 46, 98; 22, pp. 8, 146

TABLE 4. CONTAMINATED SAMPLES, SOURCE 3						
Hazardous Substance	**Sample ID**	**Depth (in.)**	**Sample Date**	**Result (mg/kg)**	**RL (mg/kg)**	**References**
Arsenic (concluded)	BRC001-SB026-0001-01	0–1	1/14/16	150	0.78	21, pp. 1, 7, 46, 98; 22, pp. 6, 101
	BRC001-SB027-0001-01	0–1	1/14/16	150	0.79	21, pp. 1, 7, 46, 98; 22, pp. 6, 102
	BRC001-SB028-0001-01	0–1	1/14/16	76	0.68	21, pp. 1, 7, 46, 98; 22, pp. 6, 104
	BRC001-SB032-0001-01	0–1	1/19/16	190	0.67	21, pp. 1, 17, 46, 98; 22, pp. 9, 174
	BRC001-SB060-0001-01	0–1	1/20/16	730	0.78	21, pp. 1, 22, 46, 98; 22, pp. 10, 202
	BRC001-SB061-0001-01	0–1	1/20/16	750	0.72	21, pp. 1, 22, 46, 98; 22, pp. 10, 204
	BRC001-SB061-0612-01	6–12	1/20/16	240	0.73	21, pp. 1, 22, 46, 98; 22, pp. 10, 205
Cadmium	BRC001-AB001-0001-01	0–1	1/20/16	27	0.30	21, pp. 1, 22, 46, 98; 22, pp. 6, 118
	BRC001-AB002-0001-01	0–1	1/20/16	33	0.28	21, pp. 1, 22, 46, 98; 22, pp. 7, 119
	BRC001-AB002-0001-02	0–1	1/20/16	27	0.27	21, pp. 1, 22, 27, 46, 98; 22, pp. 7, 120
	BRC001-AB005-0001-01	0–1	1/21/16	51	0.32	21, pp. 1, 22, 46, 98; 22, pp. 7, 124
	BRC001-AB008-0001-01	0–1	1/20/16	18	0.25	21, pp. 1, 23, 46, 98; 22, pp. 7, 128
	BRC001-AB009-0001-01	0–1	1/20/16	68	0.24	21, pp. 1, 23, 46, 98; 22, pp. 7, 129
	BRC001-AB010-0001-01	0–1	1/20/16	19	0.24	21, pp. 1, 23, 46, 98; 22, pp. 7, 130
	BRC001-AB014-0001-01	0–1	1/20/16	14	0.26	21, pp. 1, 24, 46, 98; 22, pp. 7, 136
	BRC001-AB015-0106-01	1–6	1/21/16	36	0.27	21, pp. 1, 24, 46, 98; 22, pp. 7, 137
	BRC001-AB016-0001-01	0–1	1/21/16	110	0.26	21, pp. 1, 24, 46, 98; 22, pp. 7, 138
	BRC001-AB017-0001-01	0–1	1/21/16	84	0.26	21, pp. 1, 24, 46, 98; 22, pp. 7, 141
	BRC001-AB018-0001-01	0–1	1/21/16	65	0.26	21, pp. 1, 25, 46, 98; 22, pp. 7, 144
	BRC001-AB019-0001-01	0–1	1/21/16	12	0.24	21, pp. 1, 25, 46, 98; 22, pp. 8, 145
	BRC001-AB019-0001-02	0–1	1/21/16	11	0.24	21, pp. 1, 25, 27, 46, 98; 22, pp. 8, 146
	BRC001-AB020-0001-01	0–1	1/21/16	11	0.25	21, pp. 1, 25, 46, 98; 22, pp. 8, 148
	BRC001-AB023-0612-01	6–12	1/21/16	9.9	0.28	21, pp. 1, 25, 46, 98; 22, pp. 8, 151
	BRC001-AB024-0001-01	0–1	1/21/16	11	0.26	21, pp. 1, 25, 46, 98; 22, pp. 8, 152
	BRC001-GB005-0001-01	0–1	1/15/16	25	0.23	21, pp. 1, 10, 46, 98; 22, pp. 3, 24

TABLE 4. CONTAMINATED SAMPLES, SOURCE 3						
Hazardous Substance	**Sample ID**	**Depth (in.)**	**Sample Date**	**Result (mg/kg)**	**RL (mg/kg)**	**References**
Cadmium (concluded)	BRC001-GB030-0001-01	0–1	1/16/16	19	0.24	21, pp. 1, 14, 46, 98; 22, pp. 4, 49
	BRC001-GB041-0001-01	0–1	1/18/16	13	0.30	21, pp. 1, 16, 46, 98; 22, pp. 8, 164
	BRC001-GB042-0612-01	6–12	1/18/16	19	0.29	21, pp. 1, 16, 46, 98; 22, pp. 8, 165
	BRC001-GB043-0106-01	1–6	1/18/16	42	0.26	21, pp. 1, 16, 46, 98; 22, pp. 8, 166
	BRC001-GB044-0001-01	0–1	1/18/16	190	0.38	21, pp. 1, 16, 46, 98; 22, pp. 8, 167
	BRC001-GB045-0001-01	0–1	1/18/16	92	0.29	21, pp. 1, 16, 46, 98; 22, pp. 8, 168
	BRC001-GB046-0106-01	1–6	1/19/16	16	0.29	21, pp. 1, 17, 46, 98; 22, pp. 8, 169
	BRC001-SB011-0001-01	0–1	1/13/16	9.1	0.28	21, pp. 1, 4, 46, 98; 22, pp. 5, 75
	BRC001-SB021-0001-01	0–1	1/13/16	9.1	0.27	21, pp. 1, 6, 46, 98; 22, pp. 6, 93
	BRC001-SB026-0001-01	0–1	1/14/16	24	0.29	21, pp. 1, 7, 46, 98; 22, pp. 6, 101
	BRC001-SB027-0001-01	0–1	1/14/16	66	0.30	21, pp. 1, 7, 46, 98; 22, pp. 6, 102
	BRC001-SB028-0001-01	0–1	1/14/16	13	0.26	21, pp. 1, 7, 46, 98; 22, pp. 6, 104
	BRC001-SB032-0001-01	0–1	1/19/16	34	0.25	21, pp. 1, 17, 46, 98; 22, pp. 9, 174
	BRC001-SB036-0001-01	0–1	1/19/16	11	0.26	21, pp. 1, 17, 46, 98; 22, pp. 9, 178
	BRC001-SB060-0001-01	0–1	1/20/16	81	0.29	21, pp. 1, 22, 46, 98; 22, pp. 10, 202
	BRC001-SB061-0001-01	0–1	1/20/16	67	0.27	21, pp. 1, 22, 46, 98; 22, pp. 10, 204
	BRC001-SB061-0612-01	6–12	1/20/16	9.4	0.27	21, pp. 1, 22, 46, 98; 22, pp. 10, 205
Lead	BRC001-AB001-0001-01	0–1	1/20/16	77,000	16	21, pp. 1, 22, 46, 98; 22, pp. 6, 118
	BRC001-AB002-0001-01	0–1	1/20/16	47,000	7.5	21, pp. 1, 22, 46, 98; 22, pp. 7, 119
	BRC001-AB002-0001-02	0–1	1/20/16	52,000	7.3	21, pp. 1, 22, 27, 46, 98; 22, pp. 7, 120
	BRC001-AB004-0001-01	0–1	1/20/16	15,000	7.1	21, pp. 1, 22, 46, 98; 22, pp. 7, 122
	BRC001-AB004-0612-01	6–12	1/20/16	22,000	6.8	21, pp. 1, 22, 46, 98; 22, pp. 7, 123
	BRC001-AB005-0001-01	0–1	1/21/16	70,000	8.5	21, pp. 1, 22, 46, 98; 22, pp. 7, 125
	BRC001-AB008-0001-01	0–1	1/20/16	12,000	6.6	21, pp. 1, 23, 46, 98; 22, pp. 7, 128
	BRC001-AB009-0001-01	0–1	1/20/16	67,000	13	21, pp. 1, 23, 46, 98; 22, pp. 7, 129

TABLE 4. CONTAMINATED SAMPLES, SOURCE 3						
Hazardous Substance	**Sample ID**	**Depth (in.)**	**Sample Date**	**Result (mg/kg)**	**RL (mg/kg)**	**References**
Lead (continued)	BRC001-AB010-0001-01	0–1	1/20/16	21,000	6.5	21, pp. 1, 23, 46, 98; 22, pp. 7, 130
	BRC001-AB011-0001-01	0–1	1/20/16	4,600	0.68	21, pp. 1, 23, 46, 98; 22, pp. 7, 131
	BRC001-AB011-0001-02	0–1	1/20/16	5,900	0.65	21, pp. 1, 23, 27, 46, 98; 22, pp. 7, 132
	BRC001-AB013-0001-01	0–1	1/20/16	11,000	6.9	21, pp. 1, 24, 46, 98; 22, pp. 7, 134
	BRC001-AB014-0001-01	0–1	1/20/16	14,000	7.0	21, pp. 1, 24, 46, 98; 22, pp. 7, 136
	BRC001-AB015-0106-01	1–6	1/21/16	40,000	7.2	21, pp. 1, 24, 46, 98; 22, pp. 7, 137
	BRC001-AB016-0001-01	0–1	1/21/16	52,000	6.8	21, pp. 1, 24, 46, 98; 22, pp. 7, 139
	BRC001-AB016-1824-01	18–24	1/21/16	12,000	7.5	21, pp. 1, 24, 46, 98; 22, pp. 7, 140
	BRC001-AB017-0001-01	0–1	1/21/16	45,000	7.0	21, pp. 1, 24, 46, 98; 22, pp. 7, 142
	BRC001-AB017-1218-01	12–18	1/21/16	4,700	0.71	21, pp. 1, 24, 46, 98; 22, pp. 7, 143
	BRC001-AB018-0001-01	0–1	1/21/16	42,000	14	21, pp. 1, 25, 46, 98; 22, pp. 7, 144
	BRC001-AB019-0001-01	0–1	1/21/16	17,000	6.3	21, pp. 1, 25, 46, 98; 22, pp. 8, 145
	BRC001-AB019-0001-02	0–1	1/21/16	16,000	6.3	21, pp. 1, 25, 27, 46, 98; 22, pp. 8, 146
	BRC001-AB020-0001-01	0–1	1/21/16	12,000	6.8	21, pp. 1, 25, 46, 98; 22, pp. 8, 148
	BRC001-AB024-0001-01	0–1	1/21/16	25,000	6.9	21, pp. 1, 25, 46, 98; 22, pp. 8, 152
	BRC001-AB026-0612-01	6–12	1/21/16	5,500	0.69	21, pp. 1, 26, 46, 98; 22, pp. 8, 156
	BRC001-GB005-0001-01	0–1	1/15/16	8,100	3.1	21, pp. 1, 10, 46, 98; 22, pp. 3, 24
	BRC001-GB030-0001-01	0–1	1/16/16	7,500	3.2	21, pp. 1, 14, 46, 98; 22, pp. 4, 50
	BRC001-GB044-0001-01	0–1	1/18/16	33,000	10	21, pp. 1, 16, 46, 98; 22, pp. 8, 167
	BRC001-GB045-0001-01	0–1	1/18/16	18,000	7.7	21, pp. 1, 16, 46, 98; 22, pp. 8, 168
	BRC001-SB003-0612-01	6–12	1/11/16	3,800	0.77	21, pp. 1, 2, 46, 98; 22, pp. 4, 63
	BRC001-SB005-1824-01	18–24	1/12/16	15,000	3.7	21, pp. 1, 2, 46, 98; 22, pp. 5, 66
	BRC001-SB010-0001-01	0–1	1/13/16	10,000	7.2	21, pp. 1, 3, 46, 98; 22, pp. 5, 73
	BRC001-SB011-0001-01	0–1	1/13/16	8,100	7.5	21, pp. 1, 4, 46, 98; 22, pp. 5, 75
	BRC001-SB015-1218-01	12–18	1/13/16	9,500	7.0	21, pp. 1, 4, 46, 98; 22, pp. 5, 83

TABLE 4. CONTAMINATED SAMPLES, SOURCE 3						
Hazardous Substance	**Sample ID**	**Depth (in.)**	**Sample Date**	**Result (mg/kg)**	**RL (mg/kg)**	**References**
Lead (concluded)	BRC001-SB016-0001-01	0–1	1/13/16	4,800	0.74	21, pp. 1, 5, 46, 98; 22, pp. 5, 85
	BRC001-SB020-1218-01	12–18	1/13/16	8,900	6.6	21, pp. 1, 5, 46, 98; 22, pp. 6, 92
	BRC001-SB021-0001-01	0–1	1/13/16	5,100	0.71	21, pp. 1, 6, 46, 98; 22, pp. 6, 93
	BRC001-SB026-0001-01	0–1	1/14/16	29,000	7.8	21, pp. 1, 7, 46, 98; 22, pp. 6, 102
	BRC001-SB027-0001-01	0–1	1/14/16	43,000	7.9	21, pp. 1, 7, 46, 98; 22, pp. 6, 102
	BRC001-SB028-0001-01	0–1	1/14/16	7,600	6.8	21, pp. 1, 7, 46, 98; 22, pp. 6, 104
	BRC001-SB029-0612-01	6–12	1/14/16	6,600	0.75	21, pp. 1, 7, 46, 98; 22, pp. 6, 107
	BRC001-SB032-0001-01	0–1	1/19/16	33,000	6.7	21, pp. 1, 17, 46, 98; 22, pp. 9, 175
	BRC001-SB036-0001-01	0–1	1/19/16	7,200	6.9	21, pp. 1, 17, 46, 98; 22, pp. 9, 178
	BRC001-SB038-0001-01	0–1	1/19/16	3,700	0.73	21, pp. 1, 18, 46, 98; 22, pp. 9, 180
	BRC001-SB049-0612-01	6–12	1/20/16	14,000	15	21, pp. 1, 19, 46, 98; 22, pp. 9, 191
	BRC001-SB051-0001-01	0–1	1/20/16	13,000	8.4	21, pp. 1, 20, 46, 98; 22, pp. 9, 193
	BRC001-SB052-0001-01	0–1	1/20/16	5,300	1.5	21, pp. 1, 20, 46, 98; 22, pp. 9, 195
	BRC001-SB052-0001-02	0–1	1/20/16	5,500	1.5	21, pp. 1, 20, 31, 46, 98; 22, pp. 9, 196
	BRC001-SB060-0001-01	0–1	1/20/16	79,000	31	21, pp. 1, 22, 46, 98; 22, pp. 10, 202
	BRC001-SB061-0001-01	0–1	1/20/16	80,000	29	21, pp. 1, 22, 46, 98; 22, pp. 10, 204
	BRC001-SB061-0612-01	6–12	1/20/16	28,000	15	21, pp. 1, 22, 46, 98; 22, pp. 10, 205

RL = Reporting limit based on MDLs, CRQLs, and sample characteristics including matrix and dilution; meets HRS definition of sample quantitation limit [Refs. 1, Sections 1.1 and 2.3; 22, p. 11; 43, pp. 29, 36].

2.4.2 Hazardous Waste Quantity

2.4.2.1.1 Tier A – Hazardous Constituent Quantity

The hazardous constituent quantity for Source 1 could not be adequately determined according to the HRS requirements; that is, the total mass of all Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) hazardous substances in the source and releases from the source is not known and cannot be estimated with reasonable confidence [Ref. 1, Section 2.4.2.1.1]. There are insufficient historical and current data (manifests, PRP records, State records, permits, waste concentration data, etc.) available to adequately calculate the total or partial mass of all CERCLA hazardous substances in the source and the associated releases from the source. Therefore, there is insufficient information to evaluate the associated releases from the source to calculate the hazardous constituent quantity for Source 1 with reasonable confidence. As a result, the evaluation of hazardous waste quantity proceeds to the evaluation of *Tier B*, Hazardous Wastestream Quantity [Ref 1, Section 2.4.2.1.1].

Hazardous Constituent Quantity (C) Value: NS

2.4.2.1.2 Tier B – Hazardous Wastestream Quantity

The hazardous wastestream quantity for Source 1 could not be adequately determined according to the HRS requirements; that is, the total mass of all hazardous wastestreams plus the mass of any additional CERCLA pollutants and contaminants in the source and releases from the source is not known and cannot be estimated with reasonable confidence [Ref. 1, Section 2.4.2.1.2]. There are insufficient historical and current data (manifests, PRP records, State records, permits, waste concentration data, etc.) available to adequately calculate the total mass or partial mass of the hazardous wastestreams plus the mass of all CERCLA pollutants and contaminants in the source and the associated releases from the source. Therefore, there is insufficient information to evaluate the associated releases from the source to calculate the hazardous wastestream quantity for Source 1 with reasonable confidence. Scoring proceeds to the evaluation of *Tier C*, Volume [Ref. 1, Section 2.4.2.1.2].

Hazardous Wastestream Quantity (W) Value: NS

2.4.2.1.3 Tier C – Volume

Sampling and analytical results show that soil at the TBRCI facility is contaminated with heavy metals (see **Sections 2.2.1 and 2.2.2**). However, the volume of contaminated soil is unknown. Therefore, the volume of the source is assigned a value of zero [Ref. 1, Section 2.4.2.1.3].

Volume (V) Assigned Value: 0

2.4.2.1.4 Tier D – Area

Sampling and analytical results show that soil at the TBRCI facility is contaminated with heavy metals (see **Sections 2.2.1** and **2.2.2**). The total area of the contaminated soil, which extends throughout most of the property, is 515,729.89 square feet (ft^2) [**Figure 2**]. The source type is "Contaminated Soil", so the area value is divided by 34,000 to obtain the assigned value shown below [Ref. 1, Section 2.4.2.1.4].

Dimensions of source = 515,729.89 ft^2
Area (A) Assigned Value: 515,729.89/34,000 = 15.16

2.4.2.1.5 Source Hazardous Waste Quantity Value

The source hazardous waste quantity value for Source 3 is 15.16 for Tier D – Area [Ref. 1, Section 2.4.2.1].

Source Hazardous Waste Quantity Value: 15.16

SITE SUMMARY OF SOURCE DESCRIPTIONS

TABLE 5. HAZARDOUS WASTE QUANTITY AND CONTAINMENT					
Source Number	Source Hazardous Waste Quantity Value	Containment			
		Ground Water	Surface Water	Air	
				Gas	Particulate
1A	1,485.15	NS	10	N/A	10
1B	3,329.60	NS	10	10	10
2	996.15	NS	10	N/A	10
3	15.16	NS	10	N/A	10

NS = Not Scored
N/A = Not Applicable (i.e., gaseous contaminants are not present in source)

4.1 OVERLAND/FLOOD MIGRATION COMPONENT

4.1.1.1 Definition of Hazardous Substance Migration Path for Overland/Flood Component

Storm water runoff primarily flows in an easterly direction across the TBRCI facility to the onsite drainage ditch, which discharges to the east lot ditch [Refs. 21, p. 46; 27, pp. 3–4, 9–10]. Sample analytical results show that both ditches are contaminated (see **Section 4.1.2.1.1**). The onsite drainage ditch is the western spur of an isolated wetland that extends throughout a significant portion of the east lot ditch [Refs. 27, p. 9; 35, pp. 3–6, 13]. Therefore, the probable point of entry (PPE) to surface water is the western end of the wetland along the onsite drainage ditch. The wetland lies adjacent to Source 3 (contaminated soil), so the distance to surface water is 0 feet. The locations of the site sources, PPE, and isolated wetland are shown in **Figure 3**.

The site sources are located in a 100-year floodplain; when the area floods, there can be sheet flow in an easterly direction across the entire area [Refs. 27, pp. 4, 8–9; 32, p. 12]. The nearest perennial surface water beyond the isolated wetland is the irrigation channel along the southeastern edge of Caño Tiburones Natural Reserve (i.e., "the south channel"), located approximately 0.5 mile east of site sources [Ref. 27, pp. 4, 9]. Caño Tiburones Natural Reserve is Puerto Rico's largest wetland estuary; it is a State-designated natural area that contains HRS-eligible wetlands and habitat for endangered and threatened species [Refs. 36, pp. 1–4; 37, p. 1; 38, pp. 11–12, 29]. The south channel is a fishery (blue mud crabs and other species) and it is mapped as critical wildlife habitat [Refs. 27, pp. 7–8; 36, p. 3]. The south channel flows north and merges with the Caño Tiburones Natural Reserve main channel before it flows to the Atlantic Ocean [Ref. 36, pp. 3–4].

The fishery and sensitive environments associated with Caño Tiburones are potentially affected by the surface water releases from the site. However, due to the presence of upland areas between the isolated wetland and the south channel, and the discontinuous nature of the flow path, the isolated wetland and Caño Tiburones are considered to be separate watersheds. The isolated wetland watershed achieves an overland/flood migration component score of 53.33 based on actual contamination of more than 0.8 mile of wetland frontage. For the Caño Tiburones watershed, the potential to release by overland flow is assigned a value of 0 because no overland segment of the hazardous substance migration path can be defined for the watershed [Ref. 1, Section 4.1.2.1.2.1]. In addition, actual contamination of human food chain and environmental targets is not documented for the watershed. Given these circumstances, the Caño Tiburones watershed would receive a maximum overland/flood migration component score of 50.9 based on potential to release by flood. Since the Level II concentrations in the isolated wetland result in a higher overland/flood migration component score, the overland/flood migration component score for the isolated wetland watershed is assigned as the overland/flood migration component score for the site [Ref. 1, Section 4.1.1.3].

4.1.2.1 Likelihood of Release

4.1.2.1.1 Observed Release

An observed release to surface water is documented by chemical analysis.

Chemical Analysis

Sampling and analysis by EPA in January 2016 and May 2016 show the presence of antimony, arsenic, cadmium, and lead at concentrations significantly above background in the isolated wetland. In January 2016, EPA advanced soil borings and collected soil samples for lead screening throughout the property, including the onsite drainage ditch [Refs. 21, pp. 1–31, 39–46; 22, pp. 3–10]. XRF screening, as well as confirmation at an off-site laboratory for about 20% of samples, showed that lead is present at elevated concentrations in the onsite drainage ditch to depths of 3 feet or more below ground surface [Refs. 21, pp. 2–31, 46, 98; 22, pp. 22–111, 118–205]. Background levels were not specifically characterized for the January 2016 onsite drainage ditch samples.

Samples collected by EPA within the east lot ditch (i.e., the isolated wetland downstream of the PPE) in May 2016 document that hazardous substances (i.e., antimony, arsenic, cadmium, and lead) are present in sediment at levels that meet the criteria for observed release by chemical analysis [Ref. 1, Section 4.1.2.1.1]. The sediment samples were collected from depth intervals of 0–3 or 0–6 inches at each location throughout the isolated wetland [Refs. 27, pp. 14–30; 30, pp. 6–7, 12]. EPA Region 2 Laboratory analyzed the sediment samples for Target Analyte List (TAL) Metals and for total organic carbon (TOC) and validated the results [Ref. 31, pp. 4–6]. All of the sediment samples were field-characterized, and some samples were lab-analyzed, for grain size distribution [Refs. 27, pp. 14–30; 31, pp. 4–6]. XRF screening during the May 2016 sampling event confirmed the presence of lead at elevated levels throughout the isolated wetland. The zone of contamination extends from the PPE to sediment sampling locations 0322-SED030 and 0322-SED069 and encompasses approximately 4,428 feet (perimeter) of the isolated wetland [**Figure 3**; Ref. 30, p. 12].

Because they are located in a similar environment as the observed release samples (i.e., drainage ditches), EPA sediment sampling locations 0322-SD003, 0322-SD034, and 0322-SD049 are evaluated as representing background conditions [Ref. 30, p. 12]. In order to show that the increase in contaminant concentrations are not due to any of the differences between background and release sediment sample characteristics, release concentrations are compared to the maximum reported background concentration in the observed release evaluation.

Notes on sample similarity:

- Sampling Methods: The background and release samples were all collected from the drainage ditches by EPA, using standard procedures, during the same sampling event in May 2016. Samples were collected from depth intervals of 0-3 or 0-6 inches at all locations [Refs. 27, pp. 7–28; 28, pp. 1–13].
- Sample Characteristics: The predominant grain sizes of all background and release samples based on field characterization were silt and clay [Ref. 27, pp. 14–23]. The samples that were lab-analyzed for grain size distribution confirm the similarity based on the predominance of silt and clay: percent total fines (silt, clay and colloids) ranged from 51% to 85% in the background sediment samples and from 58% to 79% in the release sediment samples [Ref. 31, pp. 10–19, 24–29]. TOC concentrations in the background sediment samples ranged from 15,000 mg/kg to 35,000 mg/kg in the background sediment samples, and from 9,600 mg/kg to 32,000 mg/kg in the release sediment samples with one exception [Ref. 31, pp. 10–19, 24–29]. The exception was sample 0322-SD060, which was collected near the eastern end of the onsite drainage ditch showed similar grain size distribution as the background samples and showed a TOC concentration of 87,000 mg/kg [Ref. 31, pp. 25–26]. This TOC concentration is approximately 2.5 times the highest background level, whereas the contaminant concentration in the sample ranged from 12.9 to 844.4 times the maximum background levels (see **Tables 6 and 7**). Based on these considerations, sample 0322-SD060 is considered to meet the criteria for observed release.
- Analytical Procedures: The background and release samples were all analyzed for TAL Metals via EPA Laboratory Method EPA 200.7 SOP C-109 Rev3.3 (E-Metals ICP TAL) by the same laboratory (i.e., the EPA Region 2 Laboratory) [Ref. 31, pp. 4–6].

EPA Background Sediment Samples, May 2016

TABLE 6. BACKGROUND SAMPLE CONCENTRATIONS, SURFACE WATER PATHWAY									
Field Sample ID	0322-SD003			0322-SD034			0322-SD049		
Lab Sample ID	1605042-04			1605042-11			1605060-02		
Sample Date	05/16/2016			05/17/2016			05/19/2016		
Depth (in. bgs)	0-6			0-3			0-3		
Soil Description	silt with roots and organics			silt with trace clay, roots, and gravel			clayey silt with trace roots		
Analyte	**Result**	**Q**	**RL**	**Result**	**Q**	**RL**	**Result**	**Q**	**RL**
Antimony (mg/kg)	2.0	U	2.0	*3.5*		1.8	2.1	U	2.1
Arsenic (mg/kg)	2.8		0.78	3.6		0.72	*17*		0.85
Cadmium (mg/kg)	0.53		0.29	*1.2*		0.27	0.57		0.32
Lead (mg/kg)	22		0.78	79		0.72	*90*		0.85
Total Organic Carbon (mg/kg)	35,000		1,000	15,000		1,000	35,000		1,000
% Gravel & Larger >2.0 mm	1.0			15			8.8		
% Very Coarse Sand >1 - 2 mm	1.2			8.4			4.5		
% Coarse Sand >.5 - 1 mm	2.1			8.1			4.7		
% Medium Sand >.25 - .5 mm	2.5			6.2			5.8		
% Fine Sand >.125 - .25 mm	4.2			6.0			5.6		
% Very Fine Sand >.0625 - .125 mm	4.6			4.8			6.1		
% Silt	58			33			44		
% Clay & Colloids	27			18			21		
% Fines (calculated) *	85			51			65		
References	Refs. 27, p. 14; 30, pp. 6, 12, 17, 21; 31, pp. 4, 10–11, 50–51			Refs. 27, p. 18; 30, pp. 6, 12, 17, 21; 31, pp. 4, 18–19, 53			Refs. 27, p. 21; 30, pp. 7, 12, 18, 22; 31, pp. 4, 23–24, 55		

in. bgs = inches below ground surface
mg/kg = milligrams per kilogram
Q = Validation qualifier
RL = Reporting limit based on MDLs, CRQLs, and sample characteristics including matrix and dilution; meets HRS definition of sample quantitation limit [Refs. 1, Sections 1.1 and 2.3; 22, p. 11; 43, pp. 29, 36].
U = The analyte was not detected at or above the Reporting Limit [Ref. 31, pp. 3, 50–56].

EPA Release Sediment Samples, May 2016

TABLE 7. RELEASE SAMPLE CONCENTRATIONS, SURFACE WATER PATHWAY													
Field Sample ID		0322-SD005			0322-SD011			0322-SD019			0322-SD030		
Lab Sample ID		1605042-05			1605042-07			1605042-08			1605042-10		
Sample Date		05/16/2016			05/16/2016			05/17/2016			05/17/2016		
Depth (in. bgs)		0-6			0-6			0-6			0-3		
Soil Description		silty top soil and silty clay			clayey silt			silt with some clay			silt with trace clay, roots, and gravel		
Analyte	**BKG range**	**Result**	**Q**	**RL**	**Result**	**Q**	**RL**	**Result**	**Q**	**RL**	**Result**	**Q**	**RL**
Antimony (mg/kg)	2.0 U - 3.5	**64**		2.1	**12**		1.9	**27**		1.9	**20**		1.9
Arsenic (mg/kg)	2.8 - 17	---			---			---			---		
Cadmium (mg/kg)	0.53 - 1.2	**10**		0.31	**6.7**		0.28	---			**4.0**		0.28
Lead (mg/kg)	22 - 90	**2,400**		0.82	**310**		0.75	**600**		0.75	**620**		0.74
Total Organic Carbon (mg/kg)	15,000 - 35,000	17,000		1,000	9,600	J	1,000	24,000		1,000	32,000		1,000
% Gravel & Larger >2.0 mm	1.0 - 8.8	not analyzed			not analyzed			2.8			not analyzed		
% Very Coarse Sand >1 - 2 mm	1.2 - 8.4	not analyzed			not analyzed			2.8			not analyzed		
% Coarse Sand >.5 - 1 mm	2.1 - 8.1	not analyzed			not analyzed			6.6			not analyzed		
% Medium Sand >.25 - .5 mm	2.5 - 6.2	not analyzed			not analyzed			6.3			not analyzed		
% Fine Sand >.125 - .25 mm	4.2 - 6.0	not analyzed			not analyzed			5.7			not analyzed		
% Very Fine Sand >.0625 - .125 mm	4.6 - 6.1	not analyzed			not analyzed			5.7			not analyzed		
% Silt	33 - 58	not analyzed			not analyzed			47			not analyzed		
% Clay & Colloids	18 - 27	not analyzed			not analyzed			23			not analyzed		
% Fines (calculated) *	51 - 85	not analyzed			not analyzed			70			not analyzed		
References	See **Table 6**	Refs. 27, p. 15; 30, pp. 6, 12, 17, 21; 31, pp. 4, 11–12, 51			Refs. 27, pp. 15–16; 30, pp. 6, 12, 17, 21; 31, pp. 4, 13–14, 51–52			Refs. 27, p. 17; 30, pp. 6, 12, 17, 21; 31, pp. 4, 14–15, 52			Refs. 27, p. 18; 30, pp. 6, 12, 17, 21; 31, pp. 4, 16–17, 53		

in. bgs = inches below ground surface
mg/kg = milligrams per kilogram
Q = Validation qualifier
RL = Reporting limit based on MDLs, CRQLs, and sample characteristics including matrix and dilution; meets HRS definition of sample quantitation limit [Refs. 1, Sections 1.1 and 2.3; 22, p. 11; 43, pp. 29, 36].
U = The analyte was not detected at or above the Reporting Limit [Ref. 31, pp. 3, 50–56].

EPA Release Sediment Samples, May 2016

TABLE 7. RELEASE SAMPLE CONCENTRATIONS, SURFACE WATER PATHWAY (concluded)										
Field Sample ID		0322-SD060			0322-SD068			0322-SD069		
Lab Sample ID		1605060-03			1605060-04			1605060-05		
Sample Date		05/19/2016			05/19/2016			05/20/2016		
Depth (in. bgs)		0-3			0-3			0-3		
Soil Description		clay with some silt and organics			silt with some clay and organics/roots, trace gravel			clayey silt with some organics and trace gravel		
Analyte	**BKG range**	**Result**	**Q**	**RL**	**Result**	**Q**	**RL**	**Result**	**Q**	**RL**
Antimony (mg/kg)	2.0 U - 3.5	**880**		2.4	**47**		1.9	**44**		1.8
Arsenic (mg/kg)	2.8 - 17	**220**		0.95	---			---		
Cadmium (mg/kg)	0.53 - 1.2	**210**		0.36	**18**		0.28	**28**		0.27
Lead (mg/kg)	22 - 90	**76,000**		19	**1,900**		0.75	**860**		0.71
Total Organic Carbon (mg/kg)	15,000 - 35,000	87,000		1,000	21,000		1,000	19,000		1,000
% Gravel & Larger >2.0 mm	1.0 - 8.8	2.4			5.5			12		
% Very Coarse Sand >1 - 2 mm	1.2 - 8.4	2.0			3.9			6.9		
% Coarse Sand >.5 - 1 mm	2.1 - 8.1	3.4			4			7.3		
% Medium Sand >.25 - .5 mm	2.5 - 6.2	3.3			3.5			6.0		
% Fine Sand >.125 - .25 mm	4.2 - 6.0	4.2			3.8			5.1		
% Very Fine Sand >.0625 - .125 mm	4.6 - 6.1	5.1			4.8			5.3		
% Silt	33 - 58	57			48			40		
% Clay & Colloids	18 - 27	22			27			18		
% Fines (calculated) *	51 - 85	79			75			58		
References	See **Table 6**	Refs. 27, pp. 22–23; 30, pp. 7, 12, 18, 22; 31, pp. 4, 25–26, 55			Refs. 27, p. 23; 30, pp. 7, 12, 18, 22; 31, pp. 4, 26–27, 55–56			Refs. 27, p. 24; 30, pp. 7, 12, 18, 22; 31, pp. 4, 27–29, 56		

in. bgs = inches below ground surface
mg/kg = milligrams per kilogram
Q = Validation qualifier
RL = Reporting limit based on MDLs, CRQLs, and sample characteristics including matrix and dilution; meets HRS definition of sample quantitation limit [Refs. 1, Sections 1.1 and 2.3; 22, p. 11; 43, pp. 29, 36].
U = The analyte was not detected at or above the Reporting Limit [Ref. 31, pp. 3, 50–56].

Attribution

The TBRCI site is located in a rural area. There are no other known significant sources of lead in the area [Ref. 32, pp. 4, 11–12, 42–45]. The site sources are significant contributors of lead and other heavy metals to the environment. Source 3 (contaminated soil) lies adjacent to the isolated wetland. EPA observed waste material in the onsite drainage ditch (i.e., in the isolated wetland).

TBRCI was founded and began operations at the Arecibo location in 1994 for the collection and recycling of lead-acid batteries [Refs. 4, p. 4; 10, p. 3]. Until 2004, TBRCI performed small-scale battery breaking and lead smelting [Ref. 10, p. 4]. Between 2004 and 2005, the facility increased operations and became a large-scale secondary smelter [Refs. 4, p. 4; 10, p. 4]. Operations at the facility included breaking and sorting lead-acid batteries and refining the lead to be resold [Refs. 10, p. 3; 11, p. 4]. TBRCI reports recycling about 55,000 metric tons of used batteries and producing an average of 27,500 metric tons of secondary lead annually [Refs. 4, p. 4; 12, p. 6]. EPA determined that TBRCI processed more than 47 million pounds of lead and 605,000 pounds of antimony from 2006 to 2008 [Refs. 14, pp. 7–10; 15, p. 14; 16, pp. 2–3, 7, 9]. Through EPA's Toxics Release Inventory (TRI) system, TBRCI has reported air emissions releases of more than 4,800 pounds of CERCLA hazardous substances (i.e., antimony, lead, lead compounds, and sulfuric acid) from the facility [Refs. 1, Section 1.1; 5, pp. 45–47, 61–166; 17, pp. 84–85; 18, pp. 6, 11–12, 21–23]. The operations at TBRCI have generated large quantities of battery acid and lead-contaminated waste; improper handling of the hazardous materials and hazardous wastes by the company has led to high levels of lead contamination at and near the facility [Refs. 10, pp. 28–38; 11, p. 4; 12, pp. 6–12].

Historical topographic maps and aerial photographs show that there were no buildings on the subject property until sometime between 1964 and 1977 [Refs. 33, pp. 4–6; 34, pp. 5–11]. The property was used by Puerto Rico Chemical Co. (PRCC) for the manufacture of organic chemicals from the mid-1960s until October 1979, when an explosion led to plant closure [Refs. 7, pp. 2, 5; 9, p. 58; 10, p. 4]. The chemical plant used o-xylene in its process to produce phthalic anhydride, and generated fumaric acid and phthalic acid as byproducts [Refs. 7, pp. 2–3; 9, p. 58]. In the years that followed the 1979 explosion and plant shutdown, several activities occurred at the former chemical plant, including partial dismantling, waste removal activities, backfilling of low-lying areas of the property with crushed limestone, inspections, investigations, and regulatory actions [Ref. 7, pp. 5–7]. After TBRCI began operating at the former PRCC facility, PREQB completed a Preliminary Assessment in January 1996 and EPA conducted a sampling investigation in January 1999 to evaluate the former PRCC facility [Refs. 7, pp. 31–34; 9, pp. 53–73]. Summary results for the 1999 investigation indicated that arsenic and lead were detected at maximum concentrations of 10.6 mg/kg and an estimated 117 mg/kg in soil and sediment samples collected from the property [Ref. 7, pp. 31–34]. In 2001, EPA provided file information to TBRCI and indicated that the Superfund program would not take further action at the location unless prompted by additional information at a later time [Ref. 8, p. 1].

Hazardous Substances Released:

Antimony
Arsenic
Cadmium
Lead

==========

Observed Release Factor Value: 550

4.1.4.2 Environmental Threat - Waste Characteristics

4.1.4.2.1 Ecosystem Toxicity/Persistence/Bioaccumulation

TABLE 8. ECOTOXICITY/PERSISTENCE/BIOACCUMULATION						
Hazardous Substance	**Source Number**	**Fresh Water Ecotoxicity Factor Value**	**Lake Persistence Factor Value ***	**Fresh Water Ecosystem Bioaccumulation Factor Value**	**Ecotoxicity/Persistence/ Bioaccumulation Factor Value (HRS Table 4-21)**	**References**
Antimony	1, 3, OR	1	1	5	5	Ref. 2, p. 1
Arsenic	2, 3, OR	10	1	50,000	5×10^5	Ref. 2, p. 3
Cadmium	2, 3, OR	10,000	1	50,000	5×10^8	Ref. 2, p. 5
Lead	1, 2, 3, OR	1,000	1	50,000	5×10^7	Ref. 2, p. 7
Sulfuric Acid	1	NS	NS	NS	NS	N/A

* The isolated wetland is included in the lake category [Ref. 1, Section 4.0.2].
OR = Observed release
NS = Not scored
N/A = Not applicable

4.1.4.2.2 Hazardous Waste Quantity

TABLE 9. HAZARDOUS WASTE QUANTITY, SURFACE WATER-ENVIRONMENTAL		
Source Number	**Source Hazardous Waste Quantity (HWQ) Value (HRS Section 2.4.2.1.5)**	**Is source hazardous constituent quantity data complete? (yes/no)**
1A	1,485.15	Yes
1B	3,329.60	Yes
2	996.15	No
3	15.16	No
Sum of Values:	5,826 (rounded to nearest integer as specified in HRS Section 2.4.2.2)	

The sum of hazardous waste quantity values (5,826) corresponds to a hazardous waste quantity factor value of 100 in HRS Table 2-6. Therefore, a hazardous waste quantity factor value of 100 is assigned for the surface water migration pathway environmental threat [Ref. 1, Section 2.4.2.2].

4.1.4.2.3 Waste Characteristics Factor Category Value

Cadmium associated with Sources 2 and 3, which have surface water pathway containment factor values greater than 0 for the watershed, corresponds to an ecotoxicity/persistence factor value of 10,000 and bioaccumulation potential factor value of 50,000, as shown above [Refs. 1, Section 4.1.4.2.1.4; 2, p. 5].

(Ecotoxicity/persistence factor value) x (hazardous waste quantity factor value) = $10,000 \times 100 = 1 \times 10^6$
(Subject to a maximum of 1×10^8) [Ref. 1, Section 4.1.4.2.3]

(Ecotoxicity/persistence factor value x hazardous waste quantity factor value) x
(bioaccumulation potential factor value) = $(1 \times 10^6) \times (50,000) = 5 \times 10^{10}$
(Subject to a maximum of 1×10^{12}) [Ref. 1, Section 4.1.4.2.3]

The resulting waste characteristics product of 5×10^{10} corresponds to a waste characteristics factor category value of 320 in Table 2-7 of the HRS [Ref. 1, Section 2.4.3.1].

Ecosystem Toxicity/Persistence/Bioaccumulation Factor Value: 5×10^8
Hazardous Waste Quantity Factor Value: 100
Waste Characteristics Factor Category Value: 320

4.1.4.3 Environmental Threat - Targets

The zone of contamination (i.e., the segment of isolated wetland where observed release by chemical analysis is documented) along the surface water migration pathway downstream of the site sources extends from the PPE east and north to sediment sample location 0322-SD030, and east and south to sediment sample location 0322-SD068, which covers the full extent of the isolated wetland as delineated [**Figure 3**; Refs. 30, p. 12; 35, p. 13]. This HRS-eligible wetland is located along the hazardous substance migration path, and the total wetland frontage considered as subject to actual contamination is 4,428 feet [Refs. 1, Section 4.1.4.3.1; 35, pp. 3–6, 13]. The contaminated sediment sample locations in Table 7 define the hazardous substance migration path [**Figure 3**]. There are no media-specific benchmarks for sediment, so the target wetland is subject to Level II concentrations [Ref. 1, Sections 2.5 and 4.1.4.3].

4.1.4.3.1 Sensitive Environments

4.1.4.3.1.1 Level I Concentrations

The Level I concentrations factor value is 0 because there are no sensitive environments subject to Level I concentrations [Ref. 1, Section 4.1.4.3.1.1].

==========

Level I Concentrations Factor Value: 0

4.1.4.3.1.2 Level II Concentrations

The target wetlands are subject to Level II concentrations because they are located in a Level II zone of contamination delineated by samples meeting observed release criteria [Ref. 1, Sections 2.5 and 4.1.4.3].

Sensitive Environments

There are currently no known sensitive environments other than wetlands that are considered as subject to Level II concentrations [Ref. 1, Section 4.1.4.3].

Wetlands

There is an HRS-eligible wetland along the zone of contamination, and the total wetland frontage subject to actual contamination is greater than 0.1 mile [Ref. 1, Section 4.1.4.3.2; 35, p. 13].

TABLE 11. LEVEL II CONCENTRATIONS – WETLANDS

Wetland	Wetland Frontage	Wetlands Rating Value (HRS Table 4-24)	Reference
Isolated wetland along drainage ditches	4,428 feet (0.84 mile)	25	Ref. 30, p. 12; 35, pp. 3–6, 13

Wetland Value: 25

Sum of Sensitive Environments Value + Wetland Value: 25

==========

Level II Concentrations Factor Value: 25

4.1.4.3.1.3 Potential Contamination

The fishery and sensitive environments associated with the Caño Tiburones watershed are potentially affected by the surface water releases from the site (see **Section 4.1.1.1**); however, the potential contamination factor value is not scored because the watershed being scored consists solely of the isolated wetland, which is subject to Level II concentrations.

Sensitive Environments

The sensitive environment value (S_j) is not scored.

Wetlands

The wetland frontage value (W_j) is not scored.

==========

Potential Contamination Factor Value: NS

6.0 AIR MIGRATION PATHWAY

The air migration pathway is scored on the basis of observed releases by direct observation and chemical analysis; waste characteristics associated with the uncontained sources described previously; and target populations subject to Level I concentrations in the 0 mile and Greater than 0 to ¼ mile distance categories.

6.1 LIKELIHOOD OF RELEASE

As shown below, an observed release to the atmosphere is established; therefore, potential to release is not scored.

6.1.1 Observed Release

Toxics Release Inventory (TRI) data reported to EPA by TBRCI and a documented release to the atmosphere in November 2015 establish observed releases by direct observation. Sample analytical results reported in EPA's Air Quality System (AQS) for the period from 2012 to 2015 form the basis for observed release by chemical analysis.

Direct Observation

Basis for Direct Observation

Materials containing one or more hazardous substances have been reported and seen entering the atmosphere directly, establishing observed releases by direct observation [Ref. 1, Section 6.1.1], as described below.

According to records maintained by EPA in its TRI database, TBRCI reported releasing 4,814.75 pounds of hazardous substances via air emissions from 2004 through 2013 [Ref. 5, pp. 61–166]. The following chemicals are reported by TBRCI as being released through fugitive and stack air emissions (Sources 1A and 1B):

TABLE 12. TOXICS RELEASE INVENTORY DATA

Year	Chemical	CAS#	Fugitive or Non-Point Air Emissions (lb.)	Stack or Point Air Emissions (lb.)	References
2004	Lead	7439-92-1	2.14	608.15	Ref. 5, pp. 164-166
2005	Antimony	7440-36-0	2.62	66.79	Ref. 5, pp. 154-156
2005	Lead	7439-92-1	2.63	746.49	Ref. 5, pp. 159-161
2006	Antimony	7440-36-0	3.17	66.79	Ref. 5, pp. 149-151
2006	Lead	7439-92-1	3.07	872.36	Ref. 5, pp. 144-146
2007	Antimony	7440-36-0	4.06	66.79	Ref. 5, pp. 134-136
2007	Lead	7439-92-1	3.93	160.80	Ref. 5, pp. 139-141
2008	Antimony	7440-36-0	0.95	36.90	Ref. 5, pp. 123-125
2008	Lead	7439-92-1	4.59	88.84	Ref. 5, pp. 128-130
2009	Antimony	7440-36-0	0.95	31.37	Ref. 5, pp. 118-120
2009	Lead	7439-92-1	4.59	61.20	Ref. 5, pp. 113-115
2009	Sulfuric Acid	7664-93-9	588.00	N/A	Ref. 5, pp. 108-110
2010	Antimony	7440-36-0	1.54	47.94	Ref. 5, pp. 103-105
2010	Lead	7439-92-1	7.44	98.61	Ref. 5, pp. 93-95
2010	Sulfuric Acid	7664-93-9	588.00	N/A	Ref. 5, pp. 98-100
2011	Antimony	7440-36-0	15.88	59.24	Ref. 5, pp. 83-85
2011	Lead Compounds	N420	123.86	131.60	Ref. 5, pp. 88-90
2012	Antimony	7440-36-0	5.94	64.56	Ref. 5, pp. 72-74
2012	Lead Compounds	N420	71.07	45.91	Ref. 5, pp. 77-79
2013	Antimony	7440-36-0	4.77	42.68	Ref. 5, pp. 67-69
2013	Lead Compounds	N420	45.95	32.58	Ref. 5, pp. 61-63
		Subtotal	**1,485.15**	**3,329.60**	

Basis for Direct Observation (continued)

In addition to the air releases reported by TBRCI, EPA has directly observed an air release on at least one occasion. On November 9, 2015, EPA observed and videotaped an air release of particulate matter—the release occurred during performance of a waste handling operation by TBRCI employees at the western waste storage pile (Source 2) [Refs. 27, p. 3; 29, pp. 1–4]. As determined by TBRCI and as observed and reported by EPA, these types of handling operations outside the main process building resulted in resuspension of loose dust containing lead and other heavy metals [Refs. 10, p. 24; 12, pp. 9–10; 17, pp. 82–83]. Analytical results for two samples of the solid waste in this pile during the same timeframe (November 2015) showed elevated levels of lead (34,241 milligrams per kilogram [mg/kg]; 35,411 mg/kg), arsenic (434 mg/kg; 431 mg/kg), and cadmium (77.3 mg/kg; 109 mg/kg) [Refs. 19, pp. 10, 16; 20, pp. 3, 5, 11, 14]. Subsequent analysis with an XRF elemental analyzer confirmed the presence of lead at percent levels in the waste storage piles [Ref. 21, pp. 36–37, 46].

As captured on video and shown in images excerpted from the videos, EPA observed TBRCI personnel handling waste material at the western waste storage pile. During the waste handling operation, EPA observed and videotaped the following conditions:

- The operators were not using any water for dust suppression;
- A release to the atmosphere of particulate matter containing hazardous substances was occurring during the operation; and
- The particulate matter plume traveled off the waste storage pile in a westerly direction [Ref. 29, pp. 1–4].

The information presented above is considered to constitute an observed release by direct observation to the 0 mile and Greater than 0 to ¼ mile distance categories in the air migration pathway, as specified in HRS Section 6.1.1.

Chemical Analysis:

PREQB manages the collection and analysis of lead samples at two air monitoring stations in the vicinity of the TBRCI facility; for the period from 2011 to 2015, lead samples were also collected at air monitoring stations in Bayamon and Salinas, located east and southeast of Arecibo, respectively [Refs. 26, pp. 1–13]. The lead sampling stations use federal reference method monitors to collect air monitoring data that comply with the Clean Air Act [Refs. 17, pp. 3–4, 15–16, 22; 44, pp. 6–8]. The lead samplers in Puerto Rico are operated on a year-round basis and the measurements are sent quarterly to the EPA's Air Quality System (AQS) [Refs. 17, p. 15; 44, p. 8]. EPA oversees the Puerto Rico air monitoring program and subsequent AQS data to ensure compliance with the Clean Air Act and accurate reporting to Congress [Refs. 24, pp. 1, 5; 25, pp. 1–3; 26, p. 5].

Each air monitoring station has a location-specific AQS Site ID number. Air monitoring station 72-013-0001 is located approximately 0.21 mile north-northwest of site sources, and station 72-013-0002 is located less than 0.1 mile west of site sources; both are located in the predominant downwind directions from the TBRCI facility [**Figure 4**; Refs. 17, pp. 15–16, 86; 25, pp. 7–9; 26, pp. 8–11]. AQS data are available that show observed releases at both Arecibo air monitoring stations for the period from 2011 to 2015. For that timeframe, the stations downwind of the TBRCI facility repeatedly showed concentrations that far exceed the levels at the other Puerto Rico samplers and exceed the National Ambient Air Quality Standard (NAAQS) of 0.15 micrograms per cubic meter ($\mu g/m^3$) [Refs. 17, pp. 4, 22; 26, pp. 14–45]. Air quality modeling by PREQB shows that the TBRCI facility is the primary source causing the high lead concentrations at the downwind monitoring stations, and that the contribution of other lead emission sources in the area is insignificant [Ref. 17, p. 22].

Based on these considerations, the exceedingly high lead releases recorded at the downwind air monitoring stations are considered to be attributable to the TBRCI site and sources. A sample collected at station 72-013-0002 on July 21, 2013 had a lead concentration of 8.216 $\mu g/m^3$; this was the highest lead concentration during calendar year 2013 for the entire AQS database. The background and observed release concentrations, as downloaded from the AQS database, are shown below. All background and release samples for each sampling date were collected according to the same sampling method and schedule, and were analyzed according to the same analytical procedures [Refs. 26, pp. 18–45; 45, pp. 23, 26, 43; 46, pp. 11–12, 18–19, 22, 38; 47, pp. 10, 22–23, 25, 40; 48, pp. 8–9, 24–25, 39, 41].

Applicable benchmarks for the hazardous substances detected in the observed release are as follows (all benchmarks are presented in µg/m^3 for consistency with reported data; **boldface type** denotes the lowest applicable benchmark concentration for each hazardous substance):

TABLE 13. HRS BENCHMARKS – AIR MIGRATION PATHWAY					
Substance	**NAAQS (µg/m^3)**	**NESHAPS (µg/m^3)**	**Cancer Risk (µg/m^3)**	**Non-Cancer Risk (µg/m^3)**	**Reference(s)**
Antimony	---	---	---	**0.2**	2, p. 2
Arsenic	---	---	**0.00065**	0.015	2, p. 4
Cadmium	---	---	**0.0015**	0.01	2, p. 6
Lead	**0.15**	---	---	---	2, p. 8
Sulfuric Acid	---	---	---	---	N/A

NAAQS = National Ambient Air Quality Standard [Ref. 1, Table 6-14].
NESHAPS = National Emission Standard for Hazardous Air Pollutants [Ref. 1, Table 6-14].

Background Levels and Release Concentrations

Notes about the following table:

- Results were downloaded directly from the AQS online database. They are daily (24-hour) lead results in micrograms per cubic meter (µg/m^3).
- Blank cells indicate no AQS data for the station/POC on that date.
- Regular font indicates background level.
- --- indicates that the reported concentration does not meet observed release criteria (i.e., not 3 times or more above the background concentration).
- **Bold font** indicates Level II concentration.
- **Bold font and underline** indicates exceedance of the NAAQS of 0.15 µg/m^3 for lead (i.e., Level I concentration).

TABLE 14. BACKGROUND AND RELEASE LEAD CONCENTRATIONS – AIR PATHWAY							
	BACKGROUND		**RELEASE**				
	AQS Site ID 72-021-0010 (Bayamon)	**AQS Site ID 72-123-0002 (Salinas)**	**AQS Site ID 72-013-0001 (Arecibo; NW of TBRCI)**		**AQS Site ID 72-013-0002 (Arecibo; West of TBRCI)**		
Date	**POC 1**	**POC 1**	**POC 1**	**POC 2**	**POC 1**	**POC 2**	**References**
4/9/2011	0.01		**0.19**	**0.19**			Ref. 26, pp. 14–15
5/9/2011	0.01		**0.08**	**0.08**			Ref. 26, pp. 14–15
6/20/2011	0.01		**0.44**	**0.35**			Ref. 26, pp. 14–15
6/26/2011	0.01		**0.08**	**0.08**			Ref. 26, pp. 14–15
9/30/2011	0.01		**0.12**	**0.12**			Ref. 26, pp. 16–17
10/24/2011	0.01	0	**0.08**	**0.12**			Ref. 26, pp. 16–17
12/29/2011	0.01	0.01	**0.2**				Ref. 26, pp. 18–19
3/4/2012	0.01	0	**0.72**	**0.76**			Ref. 26, pp. 18–19
3/10/2012	0.01	0.01	**0.04**	**0.04**			Ref. 26, pp. 18–19
5/3/2012	0	0.01	**0.11**	**0.12**			Ref. 26, pp. 20–21
6/20/2012	0	0.01	**0.06**	**0.07**			Ref. 26, pp. 20–21
6/26/2012	0	0.01	**0.22**	**0.25**			Ref. 26, pp. 20–21
7/20/2012	0.01	0	**0.07**	**0.07**			Ref. 26, pp. 22–23
8/19/2012	0.01	0	**0.05**	**0.06**	**1.98**		Ref. 26, pp. 22–23
10/12/2012	0.01	0	---	---	**0.3**		Ref. 26, pp. 22–25
10/18/2012	0.01	0.01	---	---	**0.22**		Ref. 26, pp. 24–25

TABLE 14. BACKGROUND AND RELEASE LEAD CONCENTRATIONS – AIR PATHWAY							
	BACKGROUND		RELEASE				
	AQS Site ID 72-021-0010 (Bayamon)	AQS Site ID 72-123-0002 (Salinas)	AQS Site ID 72-013-0001 (Arecibo; NW of TBRCI)		AQS Site ID 72-013-0002 (Arecibo; West of TBRCI)		
Date	POC 1	POC 1	POC 1	POC 2	POC 1	POC 2	References
10/24/2012	0	0.01	**0.17**	**0.17**	**0.18**		Ref. 26, pp. 24–25
11/11/2012	0.01	0.01	**0.05**	**0.08**	**1.33**		Ref. 26, pp. 24–25
11/17/2012	0.01	0	**0.08**	**0.1**	**0.45**		Ref. 26, pp. 24–25
11/29/2012	0.01	0.02	**0.07**	---	**1.18**		Ref. 26, pp. 24–25
12/17/2012	0	0.01	---	---	**0.34**		Ref. 26, pp. 24–25
12/29/2012	0.01	0	**0.29**	**0.32**	**1.2**		Ref. 26, pp. 24–27
1/4/2013	0.015	0	**0.047**	**0.049**	**0.578**		Ref. 26, pp. 26–27
1/10/2013		0.011	**0.134**	**0.103**	**1.132**		Ref. 26, pp. 26–27
1/16/2013	0.003	0.007	**0.309**	**0.337**	**0.352**		Ref. 26, pp. 26–27
1/28/2013	0.007	0.004	**0.074**	**0.073**	**0.94**		Ref. 26, pp. 26–27
2/3/2013	0.011	0.012	---	---	**1.596**		Ref. 26, pp. 26–27
2/9/2013	0.008	0.001	---	---	**0.841**		Ref. 26, pp. 26–27
2/21/2013	0.009	0.008	**0.074**	---	**0.761**		Ref. 26, pp. 26–27
2/27/2013	0.001	0.009	**0.068**	**0.068**	**0.36**		Ref. 26, pp. 26–27
3/5/2013	0.003	0.003	---	---	**0.199**		Ref. 26, pp. 26–27
3/11/2013	0	0.036	---	---	**0.662**		Ref. 26, pp. 26–27
3/17/2013	0.003	0.003	**0.046**	**0.072**	**0.887**		Ref. 26, pp. 26–27
4/10/2013		0.005	**0.033**	**0.029**	**1.438**		Ref. 26, pp. 28–29
4/28/2013		0.008	**0.087**	**0.087**	**1.027**		Ref. 26, pp. 28–29
5/4/2013		0.165	---	---	**0.762**		Ref. 26, pp. 28–29
5/22/2013	0.008	0.003	**0.044**	**0.047**	**1.59**		Ref. 26, pp. 28–29
5/28/2013	0.003		**0.036**	**0.034**	**2.12**		Ref. 26, pp. 28–29
6/9/2013	0.005		**0.034**	**0.031**	**2.273**		Ref. 26, pp. 28–29
6/21/2013		0.015	---	---	**2.617**		Ref. 26, pp. 28–29
6/27/2013	0.004	0.007	**0.056**		**0.665**		Ref. 26, pp. 28–29
7/3/2013	0.008	0.009	**0.095**	**0.12**	**3.068**		Ref. 26, pp. 28–31
7/9/2013	0.008	0.013	**0.097**	**0.093**	**1.723**		Ref. 26, pp. 30–31
7/15/2013	0.011	0.011	**0.114**	**0.119**	**0.497**		Ref. 26, pp. 30–31
7/21/2013	0.015	0.009	**0.051**	**0.054**	**8.216**		Ref. 26, pp. 30–31
7/27/2013	0.007	0.011	---	---	**1.994**		Ref. 26, pp. 30–31
8/2/2013	0.012	0.03	---	---	**5.605**		Ref. 26, pp. 30–31
8/8/2013	0.011	0.011	**0.034**	---	**1.524**		Ref. 26, pp. 30–31
8/14/2013	0.012	0.007	**0.062**	**0.064**	**2.922**		Ref. 26, pp. 30–31
8/20/2013	0.009	0.009	**0.168**	**0.136**	**0.283**		Ref. 26, pp. 30–31
8/26/2013	0.012	0.01	**0.036**	**0.044**	**2.021**		Ref. 26, pp. 30–31
9/1/2013	0.009	0.011	---		**2.1**		Ref. 26, pp. 30–31
9/7/2013	0.008	0.009	**0.266**		**0.074**		Ref. 26, pp. 30–31
9/13/2013	0.009	0.008	---		**2.26**		Ref. 26, pp. 30–31
9/19/2013	0.009	0.012	**0.105**		---		Ref. 26, pp. 30–31
9/25/2013	0.007	0.007	**0.142**		**0.868**		Ref. 26, pp. 30–33
10/7/2013		0.005	**0.136**		**1.151**		Ref. 26, pp. 32–33
10/13/2013	0.008	0.001	**0.036**		**0.348**		Ref. 26, pp. 32–33
10/19/2013	0.001	0	**0.052**	**0.054**	**0.059**		Ref. 26, pp. 32–33
10/25/2013	0.002	0.005	**0.095**	**0.111**	**1.276**		Ref. 26, pp. 32–33
10/31/2013	0	0.007	**0.094**	**0.111**	**0.519**		Ref. 26, pp. 32–33
11/6/2013	0	0.01	**0.07**	**0.067**	**0.341**		Ref. 26, pp. 32–33
11/12/2013	0.001	0.003	**0.064**		**3.264**		Ref. 26, pp. 32–33

TABLE 14. BACKGROUND AND RELEASE LEAD CONCENTRATIONS – AIR PATHWAY							
	BACKGROUND		RELEASE				
	AQS Site ID 72-021-0010 (Bayamon)	AQS Site ID 72-123-0002 (Salinas)	AQS Site ID 72-013-0001 (Arecibo; NW of TBRCI)		AQS Site ID 72-013-0002 (Arecibo; West of TBRCI)		
Date	POC 1	POC 1	POC 1	POC 2	POC 1	POC 2	References
11/18/2013	0.004	0.004	**0.23**	**0.229**	**0.389**		Ref. 26, pp. 32–33
11/30/2013	0.001	0	**0.207**	**0.225**			Ref. 26, pp. 32–33
12/6/2013	0.006	0	**0.204**	**0.195**	**0.733**		Ref. 26, pp. 32–33
12/12/2013	0	0.007	**0.066**	**0.072**	**1.554**		Ref. 26, pp. 32–33
12/18/2013	0.013	0.007	**0.058**	**0.042**	**1.283**		Ref. 26, pp. 32–33
12/24/2013	0.004	0.008	**0.192**	**0.192**	**0.612**		Ref. 26, pp. 32–33
12/30/2013	0.011	0.002	**0.182**	**0.16**	**2.098**		Ref. 26, pp. 34–35
1/5/2014	0.001	0.003	**0.055**	**0.058**	**1.129**		Ref. 26, pp. 34–35
1/11/2014	0.001	0.001	**0.136**	**0.134**	**0.647**		Ref. 26, pp. 34–35
1/17/2014	0.005	0.001	**0.048**	**0.051**	**2.348**		Ref. 26, pp. 34–35
1/23/2014	0.003	0.002	**0.027**	**0.026**			Ref. 26, pp. 34–35
1/29/2014		0.002	**0.025**	**0.027**	**1.182**		Ref. 26, pp. 34–35
2/4/2014		0.004	**0.092**	**0.097**	**2.262**		Ref. 26, pp. 34–35
2/10/2014	0.007	0.005	**0.119**	**0.103**	**3.196**		Ref. 26, pp. 34–35
2/16/2014	0.005	0.005	**0.066**	**0.073**	**3.123**		Ref. 26, pp. 34–35
2/22/2014	0.004	0.006	**0.287**	**0.318**	**2.328**		Ref. 26, pp. 34–35
2/28/2014	0.004	0.005	**0.187**	**0.166**	**4.521**		Ref. 26, pp. 34–35
3/6/2014	0.007	0.005	**0.15**	**0.164**	**1.633**		Ref. 26, pp. 34–35
3/12/2014	0.013	0.004	**0.228**	**0.282**	**4.607**		Ref. 26, pp. 34–35
3/18/2014	0.005	0.004	**0.032**	**0.035**	**1.089**		Ref. 26, pp. 34–37
3/24/2014	0.007	0.009	---	---	**0.188**		Ref. 26, pp. 36–37
3/30/2014	0.007	0.006	**0.058**	**0.06**	**0.977**		Ref. 26, pp. 36–37
4/5/2014	0.005	0.005	**0.056**	**0.054**	**1.14**		Ref. 26, pp. 36–37
4/11/2014	0.003	0.009	---	---	**0.868**		Ref. 26, pp. 36–37
4/17/2014	0.005	0.005		---	**0.462**		Ref. 26, pp. 36–37
4/23/2014	0.007	0.005	---	---	**0.06**		Ref. 26, pp. 36–37
4/29/2014	0.007	0.007	---	---	**0.908**		Ref. 26, pp. 36–37
5/5/2014	0.007		---	---	**0.035**		Ref. 26, pp. 36–37
5/11/2014	0.005	0.004	---	---	**0.021**		Ref. 26, pp. 36–37
5/17/2014	0.005	0.007	---	---	**0.056**		Ref. 26, pp. 36–37
5/23/2014	0.005	0.005	---	---	**0.498**		Ref. 26, pp. 36–37
5/29/2014	0.004	0.003	**0.021**	---	**0.901**		Ref. 26, pp. 36–37
6/4/2014		0.017	---	---	**0.115**		Ref. 26, pp. 36–37
6/10/2014	0.005	0.004	---	---	**0.219**		Ref. 26, pp. 36–39
6/16/2014	0.009	0.007	---	---	**0.141**		Ref. 26, pp. 38–39
6/22/2014	0.009	0.006	---	---	**0.07**		Ref. 26, pp. 38–39
6/28/2014	0.007	0.004	---	---	**0.659**		Ref. 26, pp. 38–39
7/4/2014	0.005	0.005	---	---	**0.146**		Ref. 26, pp. 38–39
7/10/2014	0.005		---	---	**0.285**		Ref. 26, pp. 38–39
7/16/2014	0.005	0.005	---	---	**0.017**		Ref. 26, pp. 38–39
7/22/2014	0.005	0.005	---	---	**0.195**		Ref. 26, pp. 38–39
7/28/2014	0.005	0.005	---	---	**0.195**		Ref. 26, pp. 38–39
8/3/2014	0.005	0.005	---	**0.06**	**0.121**		Ref. 26, pp. 38–39
8/9/2014	0.005	0.005	---	**0.062**	**0.06**		Ref. 26, pp. 38–39
8/15/2014	0.005	0.005	**0.043**		**0.172**		Ref. 26, pp. 38–39
8/27/2014	0.005	0.005	---	---	**0.231**		Ref. 26, pp. 38–39
9/2/2014	0.005	0.005	---	---	**0.053**		Ref. 26, pp. 38–41

TABLE 14. BACKGROUND AND RELEASE LEAD CONCENTRATIONS – AIR PATHWAY							
	BACKGROUND		RELEASE				
	AQS Site ID 72-021-0010 (Bayamon)	AQS Site ID 72-123-0002 (Salinas)	AQS Site ID 72-013-0001 (Arecibo; NW of TBRCI)		AQS Site ID 72-013-0002 (Arecibo; West of TBRCI)		
Date	POC 1	POC 1	POC 1	POC 2	POC 1	POC 2	References
10/2/2014	0.005	0.005	---		**0.04**	**0.036**	Ref. 26, pp. 40–41
10/14/2014	0.005	0.005	---		**0.03**		Ref. 26, pp. 40–41
10/20/2014	0.005	0.005	---		**0.05**	**0.056**	Ref. 26, pp. 40–41
11/7/2014	0.005	0.005	---		**0.023**	**0.021**	Ref. 26, pp. 40–41
11/13/2014	0.005		---		**0.017**	**0.018**	Ref. 26, pp. 40–41
11/19/2014	0.005	0.005	---		**0.082**		Ref. 26, pp. 40–41
11/25/2014	0.007	0.005	---		**0.042**	**0.078**	Ref. 26, pp. 40–41
12/1/2014		0.005	---		**3.068**	**3.525**	Ref. 26, pp. 42–43
12/7/2014	0.005	0.005	---		**0.433**	**0.019**	Ref. 26, pp. 42–43
1/12/2015		0.005	---		**0.016**	**0.02**	Ref. 26, pp. 42–43
2/5/2015		0.005	---		**0.066**	**0.064**	Ref. 26, pp. 42–43
2/23/2015		0.005	---		**0.035**	**0.038**	Ref. 26, pp. 42–43
3/19/2015		0.002	---		**0.064**	**0.069**	Ref. 26, pp. 42–43
3/25/2015		0.005	---		**0.028**	**0.036**	Ref. 26, pp. 42–45
3/31/2015		0.005	**0.017**		**0.085**	**0.097**	Ref. 26, pp. 44–45
4/6/2015		0.067	---		**1.948**	**2.663**	Ref. 26, pp. 44–45
4/12/2015		0.006	---		**0.272**	**0.219**	Ref. 26, pp. 44–45
4/18/2015		0.01	---		**0.292**	**0.292**	Ref. 26, pp. 44–45
4/24/2015		0.003	---		**0.053**	**0.106**	Ref. 26, pp. 44–45
4/30/2015		0.002	---		**0.046**	**0.04**	Ref. 26, pp. 44–45
5/6/2015		0.005	---		**0.278**	**0.285**	Ref. 26, pp. 44–45
5/12/2015		0.003	---		**0.272**	**0.298**	Ref. 26, pp. 44–45
5/18/2015		0.001	---		**0.08**	**0.08**	Ref. 26, pp. 44–45
5/24/2015	0.001	0.001	---		**0.066**	**0.073**	Ref. 26, pp. 44–45
6/5/2015	0.005		---		**0.106**	**0.08**	Ref. 26, pp. 44–45
6/23/2015	0.003		---		**0.093**	**0.093**	Ref. 26, pp. 44–45
6/29/2015	0.005		---		**0.172**		Ref. 26, pp. 44–45

Hazardous Substances Released:

Antimony (direct observation)
Arsenic (direct observation)
Cadmium (direct observation)
Lead (direct observation and chemical analysis)
Sulfuric Acid (direct observation)

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Air Observed Release Factor Value: 550

6.2 WASTE CHARACTERISTICS

6.2.1 Toxicity/Mobility

TABLE 15. TOXICITY/MOBILITY – AIR MIGRATION PATHWAY						
Hazardous Substance	**Source Numbers**	**Toxicity Factor Value**	**Gas Mobility Factor Value***	**Particulate Mobility Factor Value****	**Toxicity/Mobility Factor Value (HRS Table 6-13)**	**References**
Antimony	1, OR	10,000	N/A	0.02	200	Refs. 1, Section 6.2.1.2; 2, p. 2
Arsenic	2, 3, OR	10,000	N/A	0.0002	2	Refs. 1, Section 6.2.1.2, Fig. 6-3; 2, p. 3
Cadmium	2, 3, OR	10,000	N/A	0.0002	2	Refs. 1, Section 6.2.1.2, Fig. 6-3; 2, p. 5
Lead	1, 2, 3, OR	10,000	N/A	0.02	200	Refs. 1, Section 6.2.1.2; 2, p. 72
Sulfuric Acid	1, OR	NS	1	N/A	NS	Ref. 5, pp. 98–100, 108–110

Notes:
* Mobility factor value of 1 is assigned to each gaseous hazardous substance that meets the criteria for observed release [Ref. 1, Section 6.2.1.2].
** Mobility factor value of 0.02 is assigned to each particulate hazardous substance that meets the criteria for observed release [Ref. 1, Section 6.2.1.2].
OR = Observed Release
NS = Not Scored
N/A = Not Applicable

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Toxicity/Mobility Factor Value: 200

6.2.2 Hazardous Waste Quantity

TABLE 16. HAZARDOUS WASTE QUANTITY – AIR MIGRATION PATHWAY		
Source Number	**Source Hazardous Waste Quantity (HWQ) Value (HRS Section 2.4.2.1.5)**	**Is source hazardous constituent quantity data complete? (yes/no)**
1A	1,485.15	Yes
1B	3,329.60	Yes
2	996.15	No
3	15.16	No
Sum of Values:	5,826 (rounded to nearest integer as specified in HRS Section 2.4.2.2)	

The sum of hazardous waste quantity values (5,826) corresponds to a hazardous waste quantity factor value of 100 in HRS Table 2-6. Therefore, a hazardous waste quantity factor value of 100 is assigned for the air pathway [Ref. 1, Section 2.4.2.2].

6.2.3 Waste Characteristics Factor Category Value

The hazardous substance with the highest toxicity/mobility factor values are antimony and lead, which correspond to a toxicity/mobility factor value of 200, as shown previously (see **Section 6.2.1**).

Toxicity/Mobility Factor Value (200) x Hazardous Waste Quantity Factor Value (100): 2×10^4

The product 2×10^4 corresponds to a Waste Characteristics Factor Category Value of 10 in HRS Table 2-7 [Ref. 1, Section 2.4.3.2].

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Hazardous Waste Quantity Factor Value: 100
Waste Characteristics Factor Category Value: 10

6.3 TARGETS

As shown in **Section 6.1.1**, all samples that meet the criteria for Level I or Level II concentrations were collected from air monitoring stations 72-013-0001 and 72-013-0002, which are located 0.21 mile and 0.1 mile from site sources, respectively (see **Figure 4**). In addition, the observed releases by direct observation are at or in the immediate vicinity of site sources. Therefore, air monitoring station 72-013-0001, located 0.21 mile north of site sources, is the most distant sample location or direct observation location that meets the criteria for Level I concentrations and for Level II concentrations [**Figure 4**; Ref. 1, Section 6.3].

Based on these considerations, the target populations within the 0 Mile and Greater than 0 to ¼ mile distance categories are considered as subject to Level I concentrations, and the target populations within all other distance categories are considered as subject to potential contamination [Ref. 1, Section 6.3 and Table 6-15].

Level I Distance Categories

Farthest Level I Sample
Sample ID: Site ID 72-013-0001, POC 1 and POC 2, multiple dates
Location: Air monitoring station 72-013-0001, north-northwest of TBRCI
Nearest Source: Source 1A (Air Emissions)
Distance from the source in miles: 0.21
Reference: 17, p. 85; 26, pp. 18–27, 30–35; also see **Figure 4** and **Section 6.1.1**

Distance categories subject to Level I concentrations:

0 mile
Greater than 0 to ¼ mile

Level II Distance Categories

Farthest Level II Sample
Sample ID: Site ID 72-013-0001, POC 1 and POC 2, multiple dates
Location: Air monitoring station 72-013-0001, north-northwest of TBRCI
Nearest Source: Source 1A (Air Emissions)
Distance from the source in miles: 0.21
Reference: 17, p. 85; 26, pp. 18–27, 30–35; also see **Figure 4** and **Section 6.1.1**

Distance categories subject to Level II concentrations:

0 mile
Greater than 0 to ¼ mile

TABLE 17. ACTUAL AND POTENTIAL CONTAMINATION DISTANCE CATEGORIES

Actual Contamination Distance Categories	Potential Contamination Distance Categories
0 mile	Greater than ¼ to ½ mile
Greater than 0 to ¼ mile	Greater than ½ to 1 mile
	Greater than 1 to 2 miles
	Greater than 2 to 3 miles
	Greater than 3 to 4 miles

6.3.1 Nearest Individual Factor

As described in **Section 6.3.2.2**, the TRBCI worker population of 90 employees is considered as subject to Level I concentrations in the 0 Mile distance category. Also, as shown in **Figure 4**, there are multiple residences and regularly occupied workplaces located within ¼ mile of sources associated with The Battery Recycling Company site [Refs. 27, pp. 10–12; 28, pp. 1–2]. As described in **Section 6.3**, target populations in the 0 Mile and Greater than 0 to ¼ mile distance category are considered as subject to Level I concentrations. Therefore, a nearest individual factor value of 50 is assigned [Ref. 1, Section 6.3.1].

Nearest Individual - Level I Concentrations

Residence, building or area subject to Level I concentrations:

The TBRCI worker population are considered to be subject to Level I concentrations in the 0 Mile distance category (see **Section 6.3.2.2**).

Location:	work areas within the boundaries of site sources
Nearest Source:	Source 1
Distance from nearest source (miles):	0
References:	see **Section 6.3.2.2**

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Nearest Individual Factor Value: 50

6.3.2 Population

6.3.2.2 Level I Concentrations

Due to the observed release at Level I concentrations to the air migration pathway at site source locations and as far as 0.21 mile outside the source boundaries, the populations within the 0 Mile and Greater than 0 to ¼ mile distance categories are considered as subject to Level I concentrations [Ref. 1, Sections 2.5, 6.1.1, and 6.3].

According to TBRCI on its website, the facility "operates 24 hours a day, 365 days a year … and our workforce is of over 100 associates" [Ref. 4, p. 4]. The number of workers has also been reported as ranging between 90 and 120 full-time employees [Refs. 10, p. 4; 12, p. 6]. Work areas coincide with source areas at the site [Refs. 10, pp. 15–38; 39, pp. 1–32]. Beginning in 2011, there have been federal enforcement actions requiring TBRCI to address violations of environmental regulations, including hazardous substance releases and contamination [Refs. 5, pp. 2–4, 10–13, 16–30; 11, pp. 7–42; 12, pp. 5–47; 16, pp. 2–9]. In June 2014, EPA placed a federal lien on the TBRCI property for the company's potential liability under CERCLA [Ref. 13, pp. 2–4]. From 2011 to 2014, the market price of lead did not make any steep declines [Refs. 40, p. 1; 41, p. 1]. Based on these considerations, any reductions in workforce since 2011 and the current inactivity at the TBRCI facility are considered to be driven by site-related contamination and releases, and the TBRCI worker population as previously reported is considered as subject to Level I concentrations in the 0 Mile distance category; a worker population of 90 workers is used for scoring purposes [Ref. 1, Section 6.3.2].

There is a small neighborhood of five residences located approximately 0.2 to 0.23 mile north of the uncontained sources at The Battery Recycling Company site; the total residential population in the neighborhood is 11 people [**Figure 4**; Ref. 27, p. 10]. There are also a few regularly occupied workplaces located between 0 and ¼ mile of uncontained site sources, with a total population of 46 full-time workers [Refs. 27, pp. 10, 12; 28, pp. 1–2]. The locations of the residences and workplaces are shown in **Figure 4**; the populations are listed below:

TABLE 18. TARGET POPULATIONS, GREATER THAN 0 TO ¼ MILE

Business	Distance/direction from sources	Resident/Worker Population	References
Residences	0.2 to 0.23 mile north	11	27, p. 10
Hardware store	0.1 mile west	21	27, p. 10
Concrete block business	0.07 mile west	14	27, p. 12; 28, p. 1
Horse stable	0.07 mile west	1	27, p. 12; 28, p. 1
Pest control business	0.2 mile northwest	5	27, p. 12; 28, p. 2
Garden center	0.14 mile south	5	27, p. 10; 28, p. 2
Total population, Greater than 0 to ¼ mile		**57**	

Based on the above considerations, the population subject to Level I concentrations in the 0 Mile and Greater than 0 to ¼ mile distance categories is 90 + 57 = 147 people [Refs. 4, p. 4; 10, p. 4; 12, p. 6; 27, pp. 10–12; 28, pp. 1–2]. The sum is multiplied by 10 and a Level I concentrations factor value of 1,470 is assigned [Ref. 1, Section 6.3.2.2].

6.3.2.3 Level II Concentrations

All populations subject to Level II concentrations are already counted under the Level I concentrations factor; therefore, the Level II concentrations factor value is 0 [Ref. 1, Section 6.3.2.3].

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Population Exposed to Level I Concentrations: 147
Level I Concentrations Factor Value: 1,470
Level II Concentrations Factor Value: 0

6.3.2.4 Potential Contamination

Available information indicates that there is a residential population of more than 50,000 people within 4 miles of the TBRCI facility and associated site sources [**Figure 4**; Ref. 36, pp. 1–2, 4]. These populations are potentially affected by the air releases from the site; however, since Level I concentrations in the 0 Mile and Greater than 0 to ¼ mile distance categories result in a maximum score of 100.00 for the air migration pathway, the potential contamination factor value is not scored.

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Distance-weighted Population Subject to Potential Contamination: NS
Potential Contamination Factor Value: NS

6.3.3 Resources

There are commercial agricultural enterprises within one-half mile of uncontained sources at The Battery Recycling Company site, including a cattle ranch to the north and a palm tree farm and garden center to the south [**Figure 4**; Refs. 10, pp. 2–3; 27, p. 10]. However, since Level I concentrations in the 0 Mile and Greater than 0 to ¼ mile distance categories result in a maximum score of 100.00 for the air migration pathway, the potential contamination factor value is not scored.

6.3.4 Sensitive Environments

Available information indicates that there are more than 2,900 acres of wetlands and several other sensitive environments within 4 miles of the TBRCI facility [Ref. 36, pp. 1–2, 4]. Site sources are located within approximately one-half mile of critical wildlife habitat associated with Caño Tiburones Natural Reserve, Puerto Rico's largest wetland estuary [Refs. 36, p. 3; 37, p. 1; 38, pp. 11–12, 29]. Caño Tiburones Natural Reserve is a State-designated natural area that contains HRS-eligible wetlands and habitat for endangered and threatened species [Refs. 36, p. 4; 37, p. 1; 38, pp. 11–12]. These sensitive environments are potentially affected by the air releases from the site; however, since Level I concentrations in the 0 Mile and Greater than 0 to ¼ mile distance categories result in a maximum score of 100.00 for the air migration pathway, the sensitive environments actual contamination and potential contamination factor values are not scored.

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Resources Factor Value: NS
Sensitive Environment Actual Contamination Factor Value: NS
Sensitive Environments Potential Contamination Factor Value: NS