

Second Explanation of Significant Differences

North Alcoa Site Operable Unit 1 East Saint Louis, Illinois September 2015

Introduction to the Site and Statement of Purpose

The United States Environmental Protection Agency (EPA) is issuing this Explanation of Significant Differences (ESD) for the North Alcoa alternative Superfund Site (Site) pursuant to Section 117 (c) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) and Section 300.435 (c)(2)(i) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) to document a significant change to a portion of the remedy selected in the Record of Decision (ROD) issued on July 26, 2012 for Operable Unit 1 (OU 1) at the Site. EPA is issuing this Second ESD to describe and explain the significant modifications to the OU 1 ROD and First ESD described below. EPA issued an ESD for OU-1 on October 22, 2014, that allowed the excavation of materials from Area IB-4C (IB refers to investigative block designation applied during the remedial investigation, as discussed further below) in the OU-2 portion of the Site for on-Site consolidation as part of the OU-1 remedy construction.

Original ROD Remedy

The OU-1 ROD selected, among other remedy components, consolidation of waste within OU-1 and the construction of a cover over the waste. The OU-1 ROD addressed Site contamination by clearing vegetation as necessary to accommodate consolidation of waste, regrading soil and constructing a two-foot cover using imported clean fill in compliance with State of Illinois solid waste landfill requirements (35 IAC 807.305 (c) and 35 IAC 807.502). In addition, the OU-1 ROD remedy components enhance control of surface storm water by re-contouring the edges of existing ponds and creating newly designed storm water management structures; backfilling gullies; constructing ditches, piping, dikes, and berms; restricting access by constructing a fence around OU-1 and the pond areas; and ensuring long-term protection of the constructed remedy by placing industrial/commercial use environmental restrictive covenants over the OU-1 area, precluding disturbance of the remedy components.

On October 22, 2014, EPA signed an ESD, calling for the excavation and consolidation of bauxite waste materials from area IB-4C in the OU-2 area for use as general fill in the OU-1 remedy cover construction. This ESD calls for a similar action for portions of IB-3a and IB-3b in the OU-2 area.

Modified OU-1 Remedy

This Second ESD will allow consolidation of bauxite waste into OU-1, area IB-1, that currently exists on-Site in portions of IB-3a and IB-3b of OU-2 (See Figure 1). The record documents that this bauxite waste from IB-3a and IB-3b is sufficiently similar to OU-1, IB-1 bauxite waste, as

reported in the field investigation results that are listed below and in the summary investigation report (August 2015). Since the bauxite waste in both IB-1 and IB-3a and IB-3b are sufficiently similar, and the bauxite wastes will remain entirely on-Site, these bauxite wastes are one area of contamination.

Except as provided in the preceding paragraph, which allows the use of IB-3a and IB-3b bauxite waste as general fill in IB-1, this ESD does not alter the selected OU-1 remedy, remedy design, or remedy construction. In particular, this ESD does not allow any waste consolidation into IB-1 from any other location and, to comply with the "area of contamination" provision, requires that the bauxite waste consolidated into OU-1's IB-1 cannot leave the boundaries of the Site at any time, including during excavation, transportation and consolidation. The analysis presented in this ESD uses existing remedy construction information and existing remedial investigation data.

OU-1 Second ESD Impacts on OU-2

A. Reduction of OU-2 Bauxite Waste Mass

This action will reduce the mass of bauxite waste in IB-3a and IB-3b of OU-2 by allowing the excavation and removal of surficial bauxite waste material from an approximately 21-acre portion of IB-3a and IB-3b to a depth of two feet (See Figure 3).

B. Temporary OU-2 Area IB-3a and IB-3b Remedy Construction

Following removal of the material from IB-3a and IB-3b, a temporary remedy will be constructed over the excavation area until the OU-2 remedial investigation/feasibility study (RI/FS), and ROD remedy are completed. This temporary remedy will consist of a barrier marker over remaining waste in the excavation area, if any, followed by clean fill to the existing Site elevations with the objective of achieving positive drainage from northwest to southeast as has been desired by the Site owner. This temporary remedy will have no impacts on the current construction of the OU-1 remedy immediately adjacent to areas IB-3a and IB-3b.

The clean fill material will be imported from off-Site, and will comply with the clean fill material requirements applicable to OU-1. The OU-1 specification for clean fill requires the material to meet the requirements of 35 IAC 807.305 (c) and 807.502. This temporary remedy will also include appropriate means to identify the location and horizontal and vertical boundaries for the waste remaining, such as markers, GPS coordinates and/or property surveys.

C. Impacts on Final OU-2 Remedy

EPA has not yet determined whether a reduction in the mass of IB-3a and IB-3b bauxite waste through this ESD will affect the OU-2 ROD remedy. EPA will complete the OU-2 RI/FS before determining what, if any, remediation is necessary in areas IB-3a and IB-3b. EPA may or may not accept the constructed temporary cover as a final remedy component depending on the results of the RI/FS and remedy selection process.

Remedy Selection Process

EPA Region 5 is the lead agency for the Site, working with the Illinois Environmental Protection Agency (IEPA) as the support agency. In accordance with the NCP Section 300.825(a) (2), this Second ESD, and all of the technical information and related data, shall become part of the administrative record for the Site. The Site's administrative record is available to the public at the following locations:

City Hall
City Clerk's Office
City of East St. Louis
301 River Park Drive
East St. Louis, Illinois
Monday-Friday 8:30am-4:30pm

US EPA Region 5
7th Floor Records Center
77 West Jackson Boulevard
Chicago, Illinois
Monday-Friday 8:15am-4:45pm

East St. Louis Public Library
5300 State Street
East St. Louis, Illinois
Monday-Thursday 9:00am-8:00pm
Friday-Saturday 9:00am-5:00pm

Site information can also be found online at <http://www.epa.gov/region5/cleanup/northalcoa> and at <http://www.eaststlouisredevelopment.com>.

Site History, Contamination and Selected Remedy

The Site is located in East. St. Louis, St. Clair County, Illinois. From approximately 1903 to 1957, Alcoa, Inc. conducted aluminum manufacturing and production operations at the former East St. Louis Works facility on the south side of Missouri Avenue. Alcoa operated the facility primarily for the purpose of refining bauxite into alumina using the Bayer process, which used hot sodium hydroxide in a pressurized digester to separate the aluminum liquor from the insoluble bauxite residue (red mud). In addition, the former East St. Louis Works produced fluoride, as well as bauxite and fluoride based chemicals, including cryolite, aluminum fluorides and sodium acid fluoride. The residue remaining after alumina extraction during bauxite refining is known as "red mud" or after further processing, "brown mud." Alcoa disposed of both forms of bauxite at the Site.

Beginning in the early 1900s, Alcoa placed the red and brown mud from manufacturing operations in disposal areas north of Missouri Avenue. Initially, Alcoa disposed the bauxite residue at the edges of the former Pittsburgh Lake. Over time, Alcoa constructed residual disposal areas (RDAs) at the Site, in the footprint of Pittsburgh Lake, that were contained within gypsum berms, to prevent the red and brown mud from migrating away from the RDAs. Alcoa generated the gypsum from their hydrofluoric acid production process which reacted fluorspar with sulfuric acid. Bauxite residue and gypsum are the primary waste products remaining at the Site. These RDAs are adjacent to each other and form a triangular shape in the middle of the Site.

The bauxite residue generally consists of fine-grained red or brown clay/silt material. The residue has high moisture content, and just below the surface, is a semi-solid. The bauxite residue is plastic, and is not suitable for use as subgrade for building construction or redevelopment without extensive engineering. The material is thick under normal conditions, but thins or liquefies when shaken, agitated, or otherwise stressed. The residue has poor trafficability when wet and can be difficult to access without special equipment, even in dry conditions.

The approved design for OU-1 for the Site included the consolidation of waste material within the RDAs to accommodate the remedy cover. This included significant amounts of fill necessary for several areas in the RDAs with difficult topography. These areas, as shown on Figure 1, include large canyons that must be cut back and regraded in order to support the appropriate design grades for the remedy soil cover.

In order to augment or replace the volume of materials required to fill in the canyon areas, an area of waste material in the IB-3a and IB-3b areas (See Figure 3) with similar characteristics as those found in the RDAs has been identified. This area is located within the OU-2 area of the Site but is immediately contiguous to OU-1.

EPA drew the OU-1 boundary for the OU-1 ROD to accommodate potential future solar redevelopment in OU-1 at the Site, not to segregate waste types or even waste accumulation. Areas on both sides of the boundary line are impacted by former Site operations and the waste materials are sufficiently similar in both areas.

Site Characteristics

The Site contains four main disposal areas, each with a number of subareas. The focused feasibility study (FFS) for OU-1 refers to individual areas as investigative blocks, or IB areas. The disposal areas were listed in the OU-1 ROD (See Figure 1) and are as follows:

IB-1A (RDA 1) Old Pond

IB-1B (RDA 2) Brown Mud Pond

IB-1C (RDA 3) Red Mud Pond

IB-2 Gypsum Dike Areas

IB-3A Brick Works/Childs Property

IB-3B Redevelopment Area

IB-3C SPL Stockpile Area

IB-4A North Wet Area

IB-4B Triangle Wet Area

IB-4C Ball Fields Area

IB-4D Berm Wet Area

IB-4E Active Commercial Area

Nature and Extent of Contamination

EPA approved a FFS for the OU-1 Site area. Alcoa used the 2009 Site-wide draft RI report to prepare the OU-1 FFS. The draft Site-wide RI report contains information on the nature and extent of contamination that Alcoa collected during the original RI field activities.

Additional bauxite residue exists outside of the OU-1 boundary but within the overall Site area. Specifically, Site RI sampling identified bauxite residue at and near the surface in the IB-3a and IB-3b area, directly adjacent to the OU-1 area. Alcoa continues to implement additional investigations in OU-2 pursuant to EPA an approved workplan (March 2015) to complete the Site-wide RI characterization, including additional investigations in the IB-3a and IB-3b area.

Bauxite at the Site is not considered a RCRA hazardous waste. Solid waste from the extraction, beneficiation and processing of ores and minerals is excluded from the definition of hazardous waste under the Bevill Amendment (Section 3001(b) (3) (A) (ii) of RCRA and 40 C.F.R. § 261.47(b) (7).

Known contaminants of concern (COCs) at the Site, as documented in the OU-1 FFS, include lead, vanadium, and radium-226 and radium-228. The RI for OU-1 at the Site found red and brown mud contaminated with a combination of radium 226 (ranging from 0.19 pCi/g to 9.7 pCi/g) and radium 228 (ranging from 0.64 pCi/g to 40 pCi/g) exceeding the standards listed at 40 C.F.R. Part 192. The RI also found arsenic (ranging to 119 mg/kg), aluminum (ranging to 109,000 mg/kg), lead (ranging to 2,250 mg/kg), thallium (ranging to 195 mg/kg), and vanadium (ranging to 1,220 mg/kg) exceeding the Region 3 regional screening levels (RSLs) in soil (RSL for arsenic is 1.6 mg/kg; RSL for aluminum is 99,000 mg/kg; RSL for lead is 1,000 mg/kg; RSL for thallium is 8.2 mg/kg; and RSL for vanadium is 520 mg/kg). In addition, gypsum was found to be contaminated with lead exceeding EPA's industrial screening level of 800 parts per million (ppm).

IB-3a and IB-3b Field Investigation

Alcoa collected chemical, radiological, and geotechnical samples as part of two field investigations; during the original Site RI and during investigations approved by EPA (March 2015). Alcoa completed a total of 13 test pits with 30 samples analyzed for a suite of metals, pH and moisture content. Similar to OU-1, the data shows that the extent of contamination is governed by the nature and extent of bauxite residue. Therefore, Alcoa used all of the historical investigative data to generate maps of bauxite in this area of the Site. The horizontal extent of bauxite is segregated to the western portion of IB-3a and IB-3b (See Figure 2).

Table 1 reports the results for sampling in IB-3a and IB-3b as it compares to the previously collected IB-1 data. This comparison was completed to determine if the sampled waste in the IB-3a and IB-3b area was sufficiently similar to the waste in the IB-1 area. This comparison shows that the concentrations of COCs in the highlighted portions of the IB-3a and IB-3b area are at or below the IB-1 COC concentrations previously outlined in the 2009 draft RI and utilized in the remedy selection process for OU-1 with the exception of five analytes (cadmium, nickel, cobalt, silver and zinc). The maximum concentrations of these analytes are lower than the EPA

RSLs for both industrial and residential land use. They are also not COCs at the Site and do not contribute to the risks outlined in the OU-1 ROD.

The radiological investigation conducted at the Site included both a gamma screening survey and soil sampling for radium-226, radium-228 and uranium-238. The gamma screening survey evaluated Site conditions with respect to external radiation levels. External radiation was identified as one of the primary risk drivers for OU-1 as documented in the OU-1 FFS. EPA approved OU-1 FFS established a correlation between external exposure rate and soil concentrations, and EPA used this correlation to compare gamma screening survey information collected during the 2014/2015 field work.

EPA compared gamma screening survey and soil sample results for total radium concentrations (radium-226 and radium-228) from this focused IB-3a and IB-3b field investigation to results in the OU-1 FFS and ROD. This data compares favorably with previously collected RI data. The results of this comparison indicate that levels in the highlighted portions of IB-3a and IB-3b are lower than OU-1 levels, as outlined in the table below. Radiological results indicate the eastern portion of IB-3a and IB-3b contains total radium levels greater than 5 pCi/g above Site background levels, established in the OU-1 FFS and ROD. All of the areas exceeding these criteria are included in the area to be removed, pursuant to this ESD (See Figure 3).

Parameter	IB-1a			IB-3a and IB-3b Area		
	Min	Max	Avg	Min	Max	Avg
Gamma Screening Survey Human Exposure Rate ($\mu\text{Rem/hr}$) ¹	0	207	71	5	144	23
Total Radium in Soil (pCi/g) ²	6	34	21	3	17	6

Alcoa also conducted geotechnical sampling on the collected data and analyzed for shear vane properties, moisture content, Atterberg limits, and fines content. Alcoa also compared these data to OU-1 geotechnical data. Based on the strength and compaction testing results, adverse stability issues associated with using this material as general fill within OU-1 are not anticipated. The geotechnical data presented in the field investigation report (September 2015) also demonstrate that the IB-3a and IB-3b material actually has equivalent or greater strength than residue alone, and would support the OU-1 remedy cover and any potential future solar panel placement in the IB-1 area.

The remedial design approved by EPA demonstrated that the short and long term protectiveness of the remedy cover over these materials is acceptable, so these materials from IB-3a and IB-3b can be safely consolidated in the IB-1 area.

¹ The First ESD for OU-1 incorrectly reported units for the gamma screening survey as millirems/hr. The correct units are $\mu\text{rems/hr}$. as stated here and in the (August 2015 data report).

² Total radium concentrations in soil greater than 5pCi/g above background, as established in the OU-1 FFS and ROD.

Selected Remedy

The July 26, 2012 selected OU-1 remedial action addresses the risks calculated for the OU-1 area of the Site and includes the following source control activities:

- Preparation of Site access roads and staging areas
- Grading/reconsolidation of on-Site soils
- Placement of two foot soil cover in compliance with 35 IAC 807.305 (c) and 807.502
- Stormwater management in stormwater basins
- Installation of clean water conveyance to manage stormwater along Lake Drive
- Fencing around ponds and around OU-1 area
- Establishment of institutional controls over OU-1 area restricting future use to industrial/commercial and preclude disturbance of the remedy components
- Operation and maintenance of the cover remedy in compliance with 35 IAC 807.502

Basis for the Document

During RI field activities and concurrent with OU-1 soil remedy cover construction, Alcoa recognized an opportunity to use bauxite material in portions of IB-3a and IB-3b as general fill material under the OU-1 remedy cover, instead of importing clean fill from the EPA approved off-site source. Investigations from the ongoing RI found that a portion of IB-3a and IB-3b, located immediately adjacent to the OU-1 boundary but within the overall Site boundary, contains similar waste materials as found in OU-1. Areas IB-3a, IB-3b and IB-1) are located in the historical footprint of Pittsburgh Lake. Removal and use of the surficial bauxite in portions of IB-3a and IB-3b (See Figure 3) will provide OU-1 remedy construction with general fill that is similar in composition to the existing OU-1 bauxite waste material.

Field investigations found that the horizontal extent of the bauxite at the surface is segregated to the eastern portions of IB-3a and IB-3b (See Figures 2 and 3). There was no residue observed at the surface in the western portions of IB-3a and IB-3b.

Removal and consolidation of the IB-3a and IB-3b bauxite waste material will make the remedy construction operation in OU-1 more efficient and cost effective, and will reduce the amount of imported general fill required to build the OU-1 remedy by approximately 66,000 cubic yards.

Description of Significant Differences

The OU-1 remedy includes import of a significant amount of fill material, which in combination with material consolidation, Alcoa is using to build the OU-1 remedy in conformance with the EPA approved design. Recent field investigations identified surficial bauxite in portions of the IB-3a and IB-3b area, immediately adjacent to the OU-1 boundary line.

This modification to the OU-1 remedy calls for the excavation of surficial bauxite from portions of IB-3a and IB-3b to a depth of two feet. The bottom of the excavation will be surveyed and noted in the final RI for the Site. The revised remedy requires backfilling the excavation with two feet of cover soil to existing elevations and sloping the temporary cover from northwest to

southeast at the request of the current property owner. Prior to placement of the clean backfill, a barrier layer will cover the excavation to separate the clean fill from the remaining bauxite waste. The soil cover placed over the excavation is considered a temporary cover until a final remedy is selected for the area. The revised remedy uses the excavated bauxite from IB-3a and IB-3b to fill in low areas in IB-1, replacing a portion of the material required for import, as identified in the EPA approved OU-1 RA workplan.

The use of IB-3a and IB-3b materials for OU-1 remedy construction will reduce traffic impacts on area roadways and reduce truck emissions in the surrounding area. The bauxite will be excavated, loaded onto haul trucks and transported to the OU-1 construction area via temporary on-Site haul roads. The revised remedy requires that this excavated material not leave the overall Site boundary at any time (See Figure 1), consolidation and compaction of the material within OU-1, and covering it with the two-foot remedy cover in accordance with the EPA approved RA workplan.

This modification to the existing remedy will allow for the removal of approximately 66,000 cubic yards of waste material from the IB-3a and IB-3b area with consolidation of the material into the canyon areas of the RDAs and grading to achieve the appropriate design slope. The two foot remedy cover will then be placed over the newly consolidated area within the RDAs in full compliance with the OU-1 ROD and consent decree.

This ESD results in the decrease of the overall cost to implement the OU-1 remedy by approximately \$200,000 by utilizing the IB-3a and IB-3b materials, as described above.

Support Agency Comments

IEPA staff have been closely involved with the Site, including attendance at all technical progress meetings, review and comment on all Site technical documents, and frequent field oversight of the OU-1 remedy cover construction. As such, they are thoroughly familiar with the proposed remedy modifications and EPA anticipates that the State will concur with the ESD. EPA will add IEPA's concurrence letter to the administrative record when EPA receives the letter.

Statutory Determinations

EPA believes the remedy for the North Alcoa Site, OU-1, as modified by this ESD, satisfies CERCLA Section 121 and remains protective of human health and the environment, complies with federal and State requirements as identified in the OU-1 ROD as applicable, or relevant and appropriate to the remedial action, is cost effective, and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

Public Participation Compliance

EPA will publish a notice in the local newspaper in accordance with the requirements set out in NCP Section 300.435(c) (2) (i).

Authorizing Signature

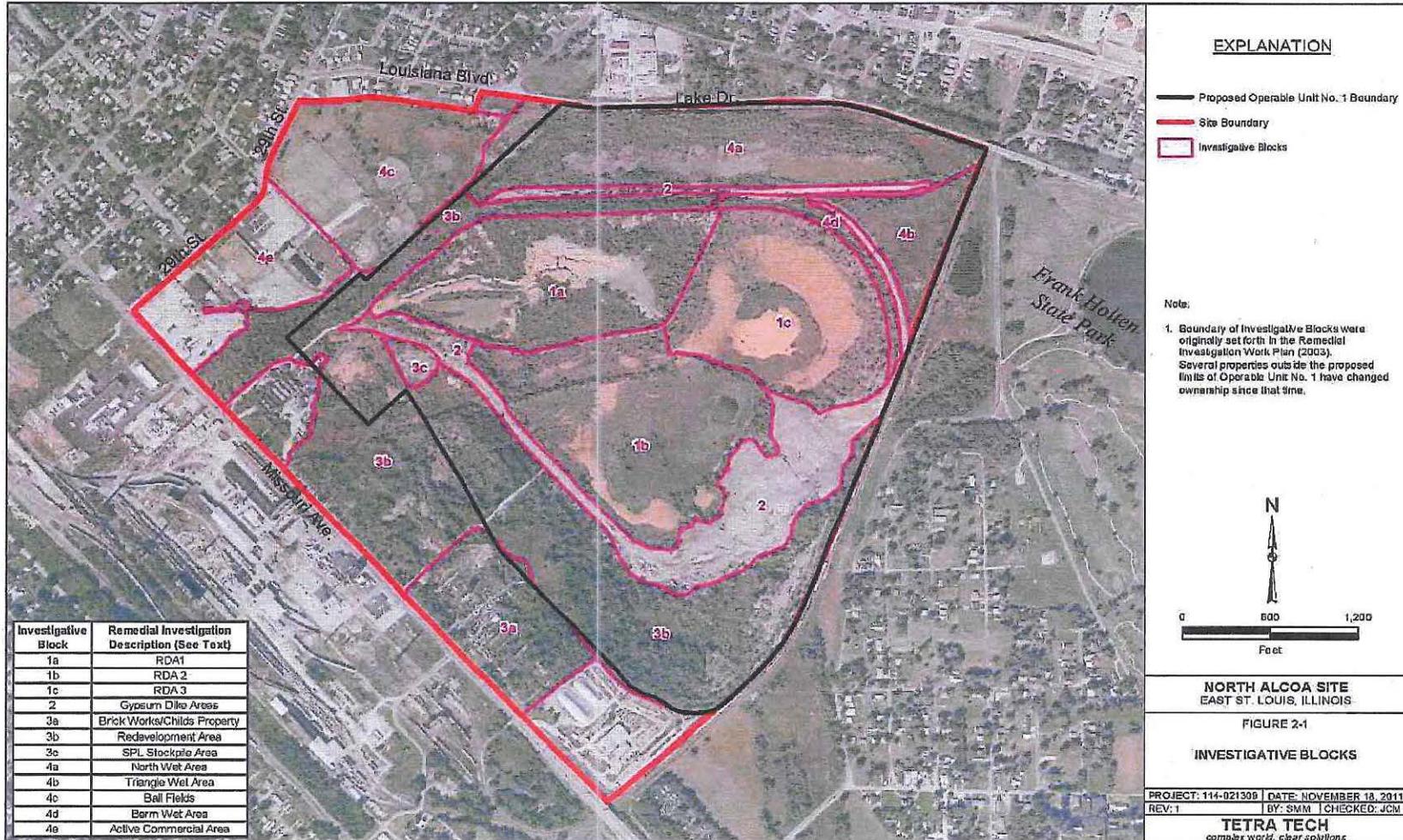
Richard C. Karl

Richard C. Karl, Director
Superfund Division

9-10-15

Date

Figure 1
Extent of Surficial Bauxite in IB-3a and IB-3b



Path: E:\ESL1021308\Figures Draft\Figure 2-1 Investigative Blocks.mxd

Figure 2
Extent of Bauxite Waste in IB-3a and IB-3b



Figure 3
Extent of Bauxite Consolidation Plan

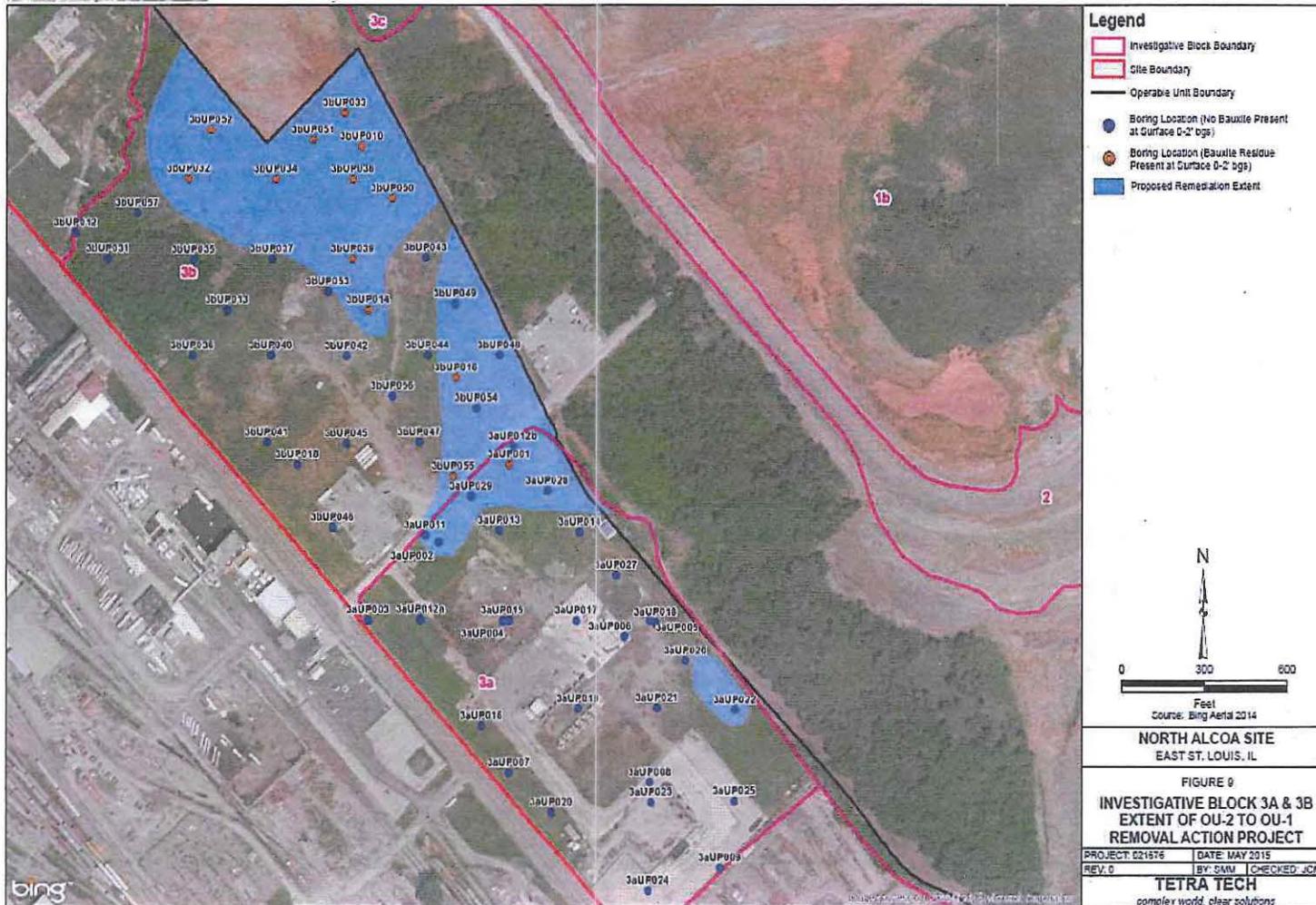


Table 1
Comparison of Metals Results (IB-3a/3b to OU-1)

TABLE 10
COMPARISON OF OU-2 (IB-3) AND IB-1 SOIL METALS DATA
NORTH ALCOA SITE, EAST ST. LOUIS, ILLINOIS

Medium	CAS Number	Chemical	RI IB-1 ⁽¹⁾		IB3 (OU2) Area Samples from Borings with Residue at any interval within 0-2'					
			Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Maximum Concentration in IB3 Residue soil lower than RDA (IS1)	Industrial RSLs ⁽²⁾ (mg/kg)	Residential RSLs ⁽²⁾ (mg/kg)	OU-2 IB3 residue soil maximum below RSLs? (i.e., acceptable risk)
Soil	7429-90-5	Aluminum	1230	127000	1500	95000	Yes			
	7440-35-0	Antimony	0.991	9.45	3.8	6.2	Yes			
	7440-38-2	Arsenic	5.04	170	3.6	32	Yes			
	7440-39-3	Barium	16.5	794	32	630	Yes			
	7440-43-9	Barium	0.0918	23.7	0.74	28	No	980	70	Yes
	7440-47-3	Chromium (total)	2.9	1100	7	940	Yes			
	7440-48-4	Cobalt	0.214	12.8	2	9.7	Yes			
	7440-50-8	Copper	0.912	243	8.6	430	No	47,000	3,100	Yes
	7439-92-1	Lead	31.6	1290	5.3	930	Yes			
	7439-96-3	Manganese	19.2	2380	9.6	1200	Yes			
	7439-97-6	Mercury	0.0261	0.91	0.016	0.58	Yes			
	7440-02-0	Nickel	0.716	26.8	4.6	29	No	22,000	1,500	Yes
	7782-49-2	Selenium	0.642	16.1	3.2	11	Yes			
	7440-22-4	Silver	0.237	4.31	1.1	6.1	No	5,800	390	Yes
	7440-28-0	Thallium	1.23	19.8	5.7	5.7	Yes			
	7440-82-2	Vanadium	4.67	1220	8.4	730	Yes			
	7440-66-6	Zinc	0.439	227	12	2100	No	350,000	23,000	Yes

OU = Operable Unit RI = Remedial Investigation RDA = Residue Disposal Area IB-1 = Low Regional Screening Level mg/kg = milligram per kilogram

⁽¹⁾ Based on maximum and minimum concentrations (0-10 ft samples) presented in Table 2-9 of Draft Baseline Human Health Risk Assessment (Alcoa, 2010).

⁽²⁾ Regional Screening Levels (USEPA, January 2015; "traditional"). RSLs are presented for the few analytes for which OU-2 residue samples had maximum detections that exceed those of IB-1 samples.

U.S. ENVIRONMENTAL PROTECTION AGENCY
REMEDIAL ACTION

ADMINISTRATIVE RECORD
FOR THE
NORTH ALCOA SITE
EAST ST. LOUIS, ST. CLAIR COUNTY, ILLINOIS

UPDATE #3
AUGUST, 2015
SEMS ID:

<u>NO.</u>	<u>SEMS ID</u>	<u>DATE</u>	<u>AUTHOR</u>	<u>RECIPIENT</u>	<u>TITLE/DESCRIPTION</u>	<u>PAGES</u>
1	478724	10/22/14	Karl, R., U.S. EPA	File	Explanation of Significant Differences (ESD) (Signed)	13
2	478974	3/19/15	Morosky, R., Alcoa Inc.	Novak, D., U.S. EPA	Email Re: Sampling Plan Approval (Field Sampling Plan Attached)	8
3	478975	8/19/15	Morosky, R., Alcoa Inc.	Novak, D., U.S. EPA	Email Re: Sampling Report/Removal Action Proposal Approval (Report Attached)	224
4			Karl, R., U.S. EPA	File	Second Explanation of Significant Differences (ESD) (PENDING)	