

Explanation of Significant Differences

**North Alcoa Site
Operable Unit 1
East S. Louis, Illinois
October 2014**

I. Introduction to the Site and Statement of Purpose

The United States Environmental Protection Agency is issuing this Explanation of Significant Differences (ESD) for the North Alcoa Site (Site) pursuant to Section 117(c) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) and Section 300.430(c)(2)(i) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This ESD documents a significant change to the Record of Decision (ROD) issued on July 26, 2012 for Operable Unit 1 (OU-1) of the Site.

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 stormwater by re-contouring the edges of existing ponds and creating newly designed stormwater 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.

Modified OU-1 Remedy

This ESD is being issued to describe and explain the following significant modification to the OU-1 ROD: this ESD will allow consolidation of bauxite waste into OU-1, area IB-1, that currently exists on-Site in IB-4C of OU-2 (See Figure 1). The record documents that this IB-4C bauxite waste is sufficiently similar to OU-1, IB-1 bauxite waste, as reported in the IB-4C field investigation results that are listed below and in the summary investigation report (October 2014). Since the bauxite waste in both IB-1 and IB-4C is sufficiently similar, and the bauxite wastes will remain entirely on-Site, these bauxite waste areas are one area of contamination.

Except as provided in the preceding paragraph, which allows the use of IB-4C 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 another location and, to comply with the “area of contamination” provision, requires that the bauxite waste to be consolidated into OU-1’s IB-1 cannot leave the boundaries of the Site at any time, including excavation, transportation and consolidation. The analysis presented in this ESD uses existing remedy construction information and existing remedial investigation data.

OU-1 ESD Impacts on OU-2

A. Reduction of OU-2 Bauxite Waste Mass

This action will reduce the mass of bauxite waste material in area IB-4C of OU-2 by allowing the excavation and removal of surficial bauxite material from an approximately 22-acre portion of IB-4C to a depth of two feet (See Figure 3).

B. Temporary OU-2 Area IB-4C Remedy Construction

Following removal of the material from IB-4C, 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 waste remaining in the excavation area, if any, followed by clean fill to meet the surrounding grade. 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 35 IAC 807.502. This temporary remedy will also include appropriate means to identify the location and the horizontal and vertical boundaries for the waste remaining, such as markers, GPS coordinates and/or property surveys.

C. Impact on Final OU-2 Remedy

EPA has not determined whether a reduction in the mass of IB-4C 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 IB-4C. 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 ESD, and all of the technical information and data relating to it, 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/northalcoa>

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." Both forms of bauxite were disposed 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, the bauxite residue was disposed of at the edges of the former Pittsburgh Lake. Over time, Alcoa constructed residue 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. The gypsum was generated from Alcoa's hydrofluoric acid production process, which reacted fluorspar with sulfuric acid. Bauxite residue and gypsum are the primary waste products remaining at the Site. There are three RDAs, each approximately 40 acres, present 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 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.

Site Characteristics

The Site contains four main disposal areas, each with a number of subareas. The focused feasibility study 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 Stockpiling Area

IB-4A North Wet Area
IB-4B Triangle Wet Area
IB-4C Ball Fields
IB-4D Berm Wet Area
IB-4E Active Commercial Area

Nature and Extent of Contamination

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

Additional bauxite residue exists outside of the OU-1 boundary but within the overall Site area. Specifically, the Site RI identified bauxite residue at and near the surface in the IB-4C area, directly adjacent to the OU-1 area. Alcoa has been implementing additional investigations in OU-2 pursuant to an EPA approved workplan (May 2014) to complete the Site-wide RI report, including additional investigations in the IB-4C area.

Bauxite at the Site is not considered a RCRA hazardous waste. Solid waste from 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. Section 261.4(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 arsenic – 1.6 mg/kg; RSL aluminum – 99,000 mg/kg; RSL lead – 1,000 mg/kg; RSL thallium – 8.2 mg/kg; RSL vanadium – 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-4C field investigation

Chemical, radiological, and geotechnical samples were collected in IB-4C as part of two field investigations; during the original RI for the Site; and during a focused IB-4C investigation approved by EPA (May 2014). A total of 47 borings were completed with 38 samples analyzed for a suite of metals, pH and moisture content. Similar to OU-1, the extent of contamination appears to be governed by the nature and extent of bauxite residue. Therefore all of the historical investigation data was used to generate maps of bauxite in this area of the Site. The horizontal extent of bauxite is segregated to the eastern portion of IB-4C (See Figure 3).

Table 1 reports the results for sampling in IB-4C as it compares to the previously collected IB-1 data. This comparison was completed to determine if the sampled waste in the IB-4C area was sufficiently similar to the waste in the IB-1 area. This comparison shows that the concentrations of COCs in the IB-4C bauxite materials are at or below the IB-1 COC concentrations previously outlined in the 2009 draft Site-wide RI report and utilized in the remedy selection process for OU-1. There are three constituents that are slightly elevated (cobalt, nickel and zinc) when compared to IB-1 data. The maximum concentrations of these constituents are below RSLs for both residential and industrial 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 survey and soil sampling for radium-226, radium-228, and uranium-238. The gamma 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. A correlation between external exposure rate and soil concentrations was originally established in the EPA approved OU-1 FFS, and this correlation was used to compare gamma survey information collected during the 2014 field work.

Gamma survey and soil concentration results from this focused IB-4C field investigation were compared to results in the OU-1 FFS and ROD. The results of this comparison indicate that levels in IB-4C are lower than OU-1 levels, as outlined in the table below. Radiological results indicate the eastern portion of IB-4C contains total radium levels greater than 5 pCi/g above Site background levels, which were established in the OU-1 FFS. All of the areas exceeding these criteria are included in the area to be removed pursuant to this ESD (See Figure 3).

| Parameter | IB-1 | | | IB-4C | | |
|--------------------------------------|---------|---------|---------|---------|---------|---------|
| | Minimum | Maximum | Average | Minimum | Maximum | Average |
| Gamma Exposure Rate (millirems/hour) | 0 | 207 | 71 | 6 | 137 | 19 |
| Total Radium (pCi/g) | 6 | 34 | 21 | 3 | 31 | 11 |

The IB-4C field and laboratory data compare favorably with the previously collected RI data. Geotechnical sampling was also conducted on the collected data and analyzed for shear vane properties, moisture content, Atterberg limits and fines content. These data were also compared 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 (October 2014) also demonstrate that the IB-4C material actually has greater strength than residue alone and would be more than satisfactory to 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-4C can be safely consolidated in the IB-1 area.

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 cover remedy construction, Alcoa recognized an opportunity to use the IB-4C bauxite material 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 RI found that a portion of Area IB-4C, located

immediately adjacent to the OU-1 boundary but within the overall Site boundary, contains similar waste materials as found in OU-1. Both areas (IB-4C and IB-1) are located in the historical footprint of Pittsburgh Lake. Removal and use of the surficial bauxite in IB-4C (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 portion of IB-4C (See Figures 2 and 3). There was no residue observed at the surface in the western portion of IB-4C.

Removal and consolidation of the IB-4C 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 71,000 yards.

Description of Significant Differences

The OU-1 remedy includes import of a significant amount of fill material, which in combination with material consolidation, is being utilized to build the OU-1 remedy in conformance with the approved design. Recent field investigations have identified surficial bauxite in the IB-4C area, immediately adjacent to the OU-1 boundary line.

This modification to the OU-1 remedy calls for excavation of surficial bauxite from IB-4C to a depth of two feet. The bottom of the excavation will be surveyed and noted in the final RI for the Site. The excavation will be backfilled with two feet of cover soil and graded to the existing elevation. 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 IB-4C area. The excavated IB-4C bauxite will be used 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-4C 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 area via temporary on-Site haul roads. This excavated material will not leave the overall Site boundary at any time (See Figure 1), will be consolidated and compacted within OU-1, and covered with the two-foot remedy cover in accordance with the EPA approved RA workplan.

The overall cost to implement the OU-1 remedy will be decreased by approximately \$200,000 by utilizing the IB-4C materials, as described in this ESD.

Support Agency Comments

IEPA staff have been intimately 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 construction. As such, they are intimately familiar with the proposed remedy modifications and State concurrence with the ESD is anticipated. Their concurrence letter will be added to the administrative record when received.

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

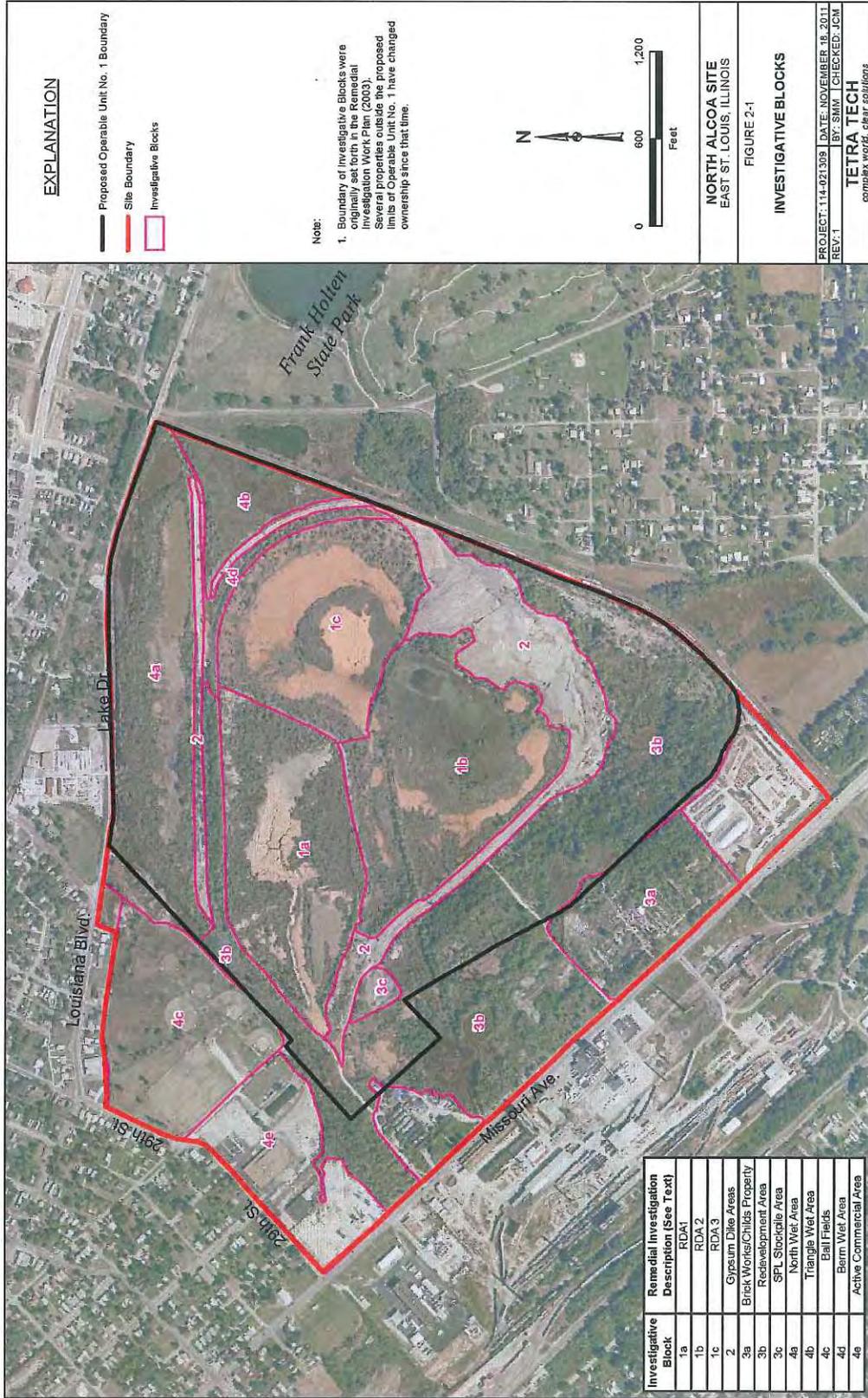


Richard C. Karl, Director
Superfund Division



Date

Figure 1
Investigative Block Map-North Alcoa Site



Path: E:\ESL\021308\Figures Draft\Figure 2-1 Investigative Blocks.mxd

Figure 2
Extent of Surficial Bauxite in IB-4C

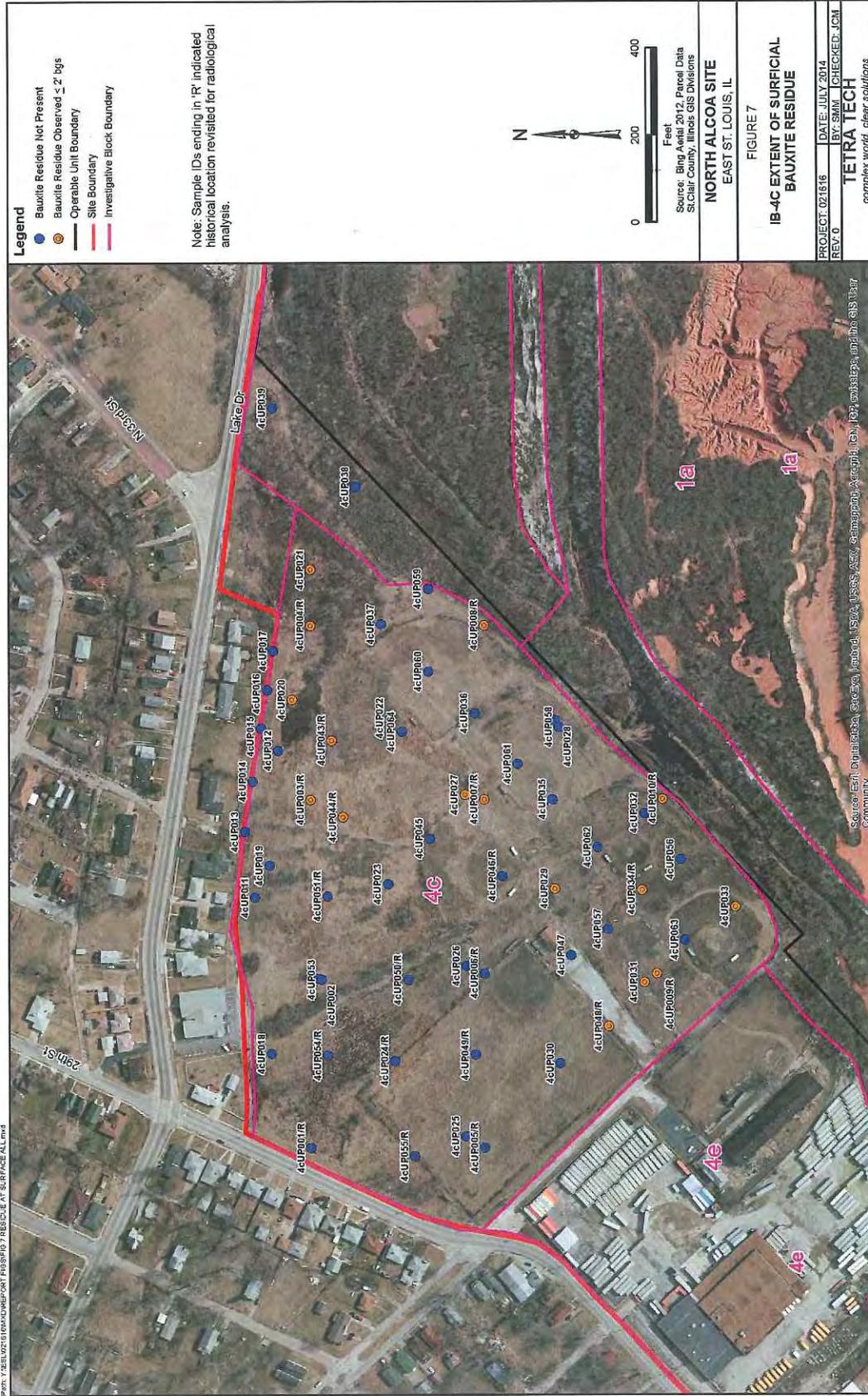


Figure 3
Extent of Bauxite Consolidation Plan



Table 1
Comparison of Metals Results (IB-4C to IB-1)

TABLE 7
COMPARISON OF PROPOSED BORROW SOILS (IB-4C) AND IB-1 SOIL DATA
NORTH ALCOA SITE, EAST ST. LOUIS, ILLINOIS

| Medium | CAS Number | Chemical | RI (IB-1) (0-10') | | IB-4c (0-6") (2) | | IB-4c (6"-10") (3) | | Maximum Concentration in borrow soil lower than RDA (IB-1) | Industrial RSLs (4) | Residential RSLs (4) | OU-2 borrow soil maximum below RSLs? (i.e., acceptable risk) |
|--------|------------|------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|--|---------------------|----------------------|--|
| | | | Minimum Concentration (mg/kg) | Maximum Concentration (mg/kg) | Minimum Concentration (mg/kg) | Maximum Concentration (mg/kg) | Minimum Concentration (mg/kg) | Maximum Concentration (mg/kg) | | | | |
| Soil | 7439-90-5 | Aluminum | 1230 | 127000 | 4800 | 58000 | 2100 | 120000 | Yes | | | |
| | 7440-38-0 | Antimony | 0.991 | 9.46 | 0.092 | 1.5 | 0.18 | 0.92 | Yes | | | |
| | 7440-38-2 | Arsenic | 5.04 | 170 | 3.4 | 19 | 11 | 27 | Yes | | | |
| | 7440-39-3 | Barium | 17 | 794 | 75 | 220 | 120 | 330 | Yes | | | |
| | 7440-43-9 | Bismuth | 0.0918 | 23.7 | 0.19 | 4.6 | 0.33 | 1.8 | Yes | | | |
| | 7440-47-3 | Chromium (total) | 2.9 | 1103 | 12 | 42 | 19 | 120 | Yes | | | |
| | 7440-48-4 | Cobalt | 0.214 | 12.8 | 3.3 | 9 | 1.6 | 14 | No | 350 | 23 | Yes |
| | 7440-50-8 | Copper | 0.912 | 243 | 9.5 | 60 | 5.1 | 39 | Yes | | | |
| | 7439-92-1 | Lead | 316 | 1290 | 9.2 | 500 | 23 | 1000 | Yes | | | |
| | 7439-96-5 | Manganese | 19.2 | 2380 | 47 | 620 | 110 | 600 | Yes | | | |
| | 7439-97-6 | Mercury | 0.0261 | 0.91 | 0.014 | 0.73 | 0.047 | 0.26 | Yes | | | |
| | 7440-02-0 | Nickel | 0.715 | 26.8 | 8.6 | 32 | 5.9 | 31 | No | 22,000 | 1500 | Yes |
| | 7782-49-2 | Selenium | 0.642 | 16.1 | 1 | 4.4 | 1.5 | 4.4 | Yes | | | |
| | 7440-12-4 | Silver | 0.257 | 4.31 | 0.075 | 2.2 | 0.3 | 2.4 | Yes | | | |
| | 7440-28-0 | Thallium | 1.23 | 19.8 | 0.18 | 0.74 | 0.17 | 0.53 | Yes | | | |
| | 7440-62-2 | Vanadium | 4.67 | 1220 | 19 | 120 | 43 | 210 | Yes | | | |
| | 7440-66-6 | Zinc | 0.439 | 227 | 48 | 1300 | 36 | 270 | No | 350,000 | 12000 | Yes |

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

(1) Based on maximum and minimum concentrations presented in Table 2.9 of Draft Baseline Human Health Risk Assessment (Alcoa, 2010).
 (2) Soil data from Revised Phase 2 - A. A. Dendrum Investigation for IB-4c ("Ball Field Area"). Data collected May 19-21, 2014. Sample locations UP34, UP35, UP36, UP37, UP38, UP39, UP43, UP44, UP45, UP47, UP48.
 (3) Regional Screening Levels (USEPA, May 2014, "traditional"). RSLs are presented for the few analytes for which proposed OU-2 borrow 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 #2
OCTOBER 17, 2014
SEMS ID: 915306**

| <u>NO.</u> | <u>SEMS ID</u> | <u>DATE</u> | <u>AUTHOR</u> | <u>RECIPIENT</u> | <u>TITLE/DESCRIPTION</u> | <u>PAGES</u> |
|------------|----------------|-------------|---|--|---|--------------|
| 1 | 410969 | 7/26/12 | Karl, R., U.S. EPA | File | Record of Decision (ROD) (Signed) | 58 |
| 2 | 446574 | 8/9/13 | Civil & Environmental Consultants, Inc. | Waste Management Inc. | Borrow Source Sampling Report | 451 |
| 3 | 478709 | 2/10/14 | Novak, D., U.S. EPA | Peterburs, K., Arcadis U.S. Inc. & R. Weddell, Alcoa Inc. | Final Remedial Design/Remedial Action Work Plan (Cover letter attached) | 1318 |
| 4 | 915305 | 5/8/14 | Weddell, R., Alcoa Inc. | Novak, D., U.S. EPA | Technical Memo: Re: Field Sampling Plan Addendum Investigation for IB-4C | 10 |
| 5 | 478712 | 6/4/14 | Novak, D., U.S. EPA | Weddell, R., Alcoa Inc. | Email Re: Sampling Plan Approval (Map Attached) | 6 |
| 6 | 478708 | 9/16/14 | Karl, R., U.S. EPA | - | EPA Memo: Minor Change to North Alcoa Site Remedy: Alteration of Design Grade (With Attachments) | 637 |
| 7 | 915304 | 10/1/14 | Tetra Tech | Alcoa, Inc. | Revised Phase 2 Field Sampling Plan | 987 |
| 8 | 478713 | 10/16/14 | Novak, D., U.S. EPA | McKay, C., Tetra Tech | Email Re: OU2 to OUI Summary Report | 1 |
| 9 | - | - | Karl, R., U.S. EPA | File | Explanation of Significant Differences (ESD) (PENDING) | - |