SECOND FIVE-YEAR REVIEW REPORT FOR ALCOA (POINT COMFORT)/LAVACA BAY SUPERFUND SITE POINT COMFORT, CALHOUN COUNTY, TEXAS

JUNE 2016

Prepared by

U.S. Environmental Protection Agency
Region 6
Dallas, Texas

SECOND FIVE-YEAR REVIEW REPORT
ALCOA (POINT COMFORT)/LAVACA BAY SUPERFUND SITE
EPA ID#: TXD 008123168
POINT COMFORT, CALHOUN COUNTY, TEXAS

This memorandum documents the U.S. Environmental Protection Agency's performance, determinations, and approval of the Alcoa (Point Comfort)/Lavaca Bay (Site) second five year review under Section 121 (e) of the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S. Code Section 9621(c), as provided in the attached Second Five-Year Review Report.

Summary of the Second Five-Year Review Report

As part of this five-year review, the Government Performance and Results Act Measures have also been reviewed. The measures and their status are as follows:

Environmental Indicators

Human Health: Current Human Exposure Controlled and Protective Remedy in Place

Groundwater Migration: Contaminated Groundwater Migration Under Control

Actions Needed

The following actions must be taken in order to determine the long term remedy protectiveness:

- Conduct studies to evaluate site-specific marsh conditions where enhanced methylation and uptake can occur;
- Undertake studies to evaluate whether additional uptake pathways cause mercury levels in red drum in the Closed Area to remain elevated;
- Carry out a study to understand sediment and mercury transport from the Witco and Alcoa channels and Witco Cut to the area north of Dredge Island;
- Conduct a high-resolution water column sampling program in the vicinity of the Alcoa and Witco channels and Mainland Shoreline No. 3 to evaluate dissolved and particulate mercury levels;
- Further characterize mercury concentrations in near-shore and at-depth sediments;
- Utilize results from the above actions to update and refine the site conceptual model and incorporate the results of the studies into a remedial action plan that once implemented, would reduce mercury levels in red drum.

Determination

I have determined that the remedy for the Alcoa (Point Comfort)/Lavaca Bay Superfund Site is protective of human health and the environment in the short term. A determination of the long term protectiveness of the remedy for the Alcoa (Point Comfort)/Lavaca Bay Superfund Site cannot be made at this time until further information is obtained. This five-year review report specifies the actions that need to be taken for EPA to determine the long term remedy protectiveness.

Pam Phillips, Acting — 7/8/16

Carl E. Edlund, P.E.
Director, Superfund Division
U.S. Environmental Protection Agency Region 6

Date

CONCURRENCES

SECOND FIVE-YEAR REVIEW REPORT
ALCOA (POINT COMFORT)/LAVACA BAY SUPERFUND SITE
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Gary Baumgarten
Remedial Project Manager

6/10/16
Date

Carlos A. Sanchez
Chief, AR/TX Section

6/21/16
Date

John C Meyer
Chief, Superfund Remedial Branch

6/22/16
Date

Pamela Travis
Attorney, Office of Regional Counsel

23 June 2016
Date

Mark A Peycke
Chief, Superfund Branch, Office of Regional Counsel

06/24/16
Date

Pamela Phillips
Deputy Director, Superfund Division

7/8/16
Date

ISSUES/RECOMMENDATIONS

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Issues/Recommendations

Issues and Recommendations Identified in the Five-Year Review:				
OU(s): Sitewide	**Issue Category: Remedy Performance**			
	Issue: Total mercury levels in the Causeway marsh sediments are approaching levels in the Adjacent Open Area of Lavaca Bay, however, there has not been a corresponding reduction in the mercury levels in red drum and juvenile blue crab in the vicinity of these marshes It is unknown whether there are site-specific conditions in the marshes where enhanced methylation and uptake into red drum and juvenile blue crab can occur even in the presence of low total mercury concentrations in the surface sediment			
	Recommendation: Conduct the following studies to evaluate site-specific marsh conditions where enhanced methylation and uptake can occur. • Focused sediment sampling in and near marshes • Expanded methylation study during the peak mercury methylation period			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
Yes	Yes	PRP	EPA/State	12/1/2016

OU(s): Sitewide	**Issue Category: Remedy Performance**			
	Issue: It is uncertain whether red drum may be accumulating a significant level of their mercury through an uptake pathway not being monitored Additional mercury uptake pathways need to be considered in evaluating options to reduce elevated mercury levels in red drum			
	Recommendation: The following studies should be conducted to evaluate whether additional uptake pathways cause mercury levels in red drum in the Closed Area to remain elevated • Focused prey sampling in marshes • Methylmercury Sediment Sampling in Open Water			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
Yes	Yes	PRP	EPA/State	12/1/2016

OU(s): Sitewide	Issue Category: Remedy Performance			
	Issue: It is uncertain whether there are additional sources of mercury on sediments that are transported into areas where conditions are favorable for enhanced methylation and uptake into the food web			
	Recommendation: Conduct a study to understand sediment and mercury transport from the Witco and Alcoa channels and Witco Cut to the area north of Dredge Island			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
Yes	Yes	PRP	EPA/State	12/1/2016

OU(s): Sitewide	Issue Category: Remedy Performance			
	Issue: Residual sources of mercury may exist in sediments and soils in the vicinity of Mainland Shoreline No. 3, the shallows adjacent to the Alcoa and Witco channels (including the Witco Harbor) and along the northwest edge of Dredge Island			
	Recommendation: • Conduct a high-resolution water column sampling program in the vicinity of the Alcoa and Witco channel areas and Mainland Shoreline No 3 to evaluate dissolved and particulate mercury levels.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
Yes	Yes	PRP	EPA/State	12/1/2016

OU(s): Sitewide	Issue Category: Remedy Performance			
	Issue: Concentrations of mercury in red drum from the Closed Area continue to be elevated when compared to the Adjacent Open Area.			
	Recommendation: Utilizing results of the above recommendations, update and refine the site conceptual model and incorporate the results of the studies into a remedial action plan, that once implemented, would reduce mercury levels in red drum.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
Yes	Yes	PRP	EPA/State	3/31/2017

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LIST OF ABBREVIATIONS & ACRONYMS

CAPA	Chlor-Alkali Process Area
CDF	Confined Disposal Facility
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Chemical of Concern
CSM	Conceptual Site Model
DNAPL	Dense Nonaqueous Phase Liquid
EPA	U S Environmental Protection Agency
ESD	Explanation of Significant Differences
FYR	Five-Year Review
IC	Institutional Control
MeHg	Methylmercury
mg/kg	milligram per kilogram
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OMMP	Operation, Maintenance and Monitoring Plan
PAH	Polycyclic Aromatic Hydrocarbon
PCO	Point Comfort Operations
ppm	parts per million
PRP	Potentially Responsible Party
RA	Remedial Action
RAAER	Remedial Action Annual Effectiveness Report
RAO	Remedial Action Objective
RD	Remedial Design
RDR	Remedial Design Report
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
Site	Alcoa (Point Comfort)/Lavaca Bay Superfund Site
TCEQ	Texas Commission on Environmental Quality
TDH	Texas Department of Health
TDSHS	Texas Department of State Health Services

I. INTRODUCTION

The purpose of a Five-Year Review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy is and will continue to be protective of human health and the environment The methods, findings, and conclusions of reviews are documented in five-year review reports such as this one In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them

The U S Environmental Protection Agency (EPA) is preparing this five-year review pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, consistent with the National Contingency Plan (NCP) (40 CFR Section 300 430(f)(4)(ii)), and considering EPA policy

This is the second FYR for the Alcoa (Point Comfort)/Lavaca Bay Superfund Site. The triggering action for this statutory review is the completion date of the previous FYR The FYR has been prepared due to the fact that hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure (UU/UE) The Site consists of one operable unit which is addressed in this FYR

The Alcoa (Point Comfort)/Lavaca Bay Superfund Site Five-Year Review was led by Gary Baumgarten, the EPA Region 6 RPM Participants included Jon Rauscher, toxicologist, EPA Region 6, and Anna Lund, the state agency representative The PRP, Alcoa, was notified of the initiation of the five-year review The review began on 2/10/2016

Site Background

The Alcoa Point Comfort Operations (PCO) facility is situated adjacent to Lavaca Bay near the towns of Point Comfort and Port Lavaca as shown on Figure 1-Appendix B PCO comprises approximately 3,500 acres The land areas not used for the process areas are for the most part used for the process lake system PCO also includes several docks, and Alcoa currently maintains a ship and barge channel from the Matagorda Ship Channel to the docks. Dredge Island is an island in Lavaca Bay, west of the process area, which is approximately 420 acres Dredge Island was historically used to dispose of dredge material, gypsum, and wastewater from the chlor-alkali process area (CAPA)

Surrounding land uses are industrial, residential, and agricultural (pasture) Land uses adjacent to the Alcoa facility are principally industrial, including Formosa Hydrocarbons Production Corporation and Calhoun Port Authority Agricultural pasturelands are located to the east of the Alcoa property

Lavaca Bay is used for both commercial and recreational purposes The area is attractive to industry because of the availability of navigable waterways, including a deep-water port at Point Comfort that is served by the 38-foot deep Matagorda Ship Channel Recreational fishing as well as commercial shrimping, fishing, crabbing, and oystering occur in Lavaca Bay There are numerous fishing facilities located in or near Lavaca Bay, including boat ramps, piers, docks, and bait shops

The following paragraphs provide a background on the history of contamination at the site

Chlor-Alkali Process Area (CAPA) From 1966 until 1979, Alcoa operated a chlor-alkali production plant to produce sodium hydroxide (caustic) and chlorine Part of the chlor-alkali process involved the use of mercury cathodes The main purpose of operating the chlor-alkali plant was to produce caustic that was necessary in the bauxite refining operations Between 1966 and 1970, wastewater from the chlor-alkali plant that contained mercury, was transported to an offshore gypsum lagoon located on Dredge Island After a settling period, the overflow from the gypsum lagoon was discharged to Lavaca Bay from two outfalls on Dredge Island As a result of the past operations at CAPA, both soil and shallow groundwater were contaminated with mercury

Dredge Island Dredge Island is located in Lavaca Bay west of the plant site The Island has been used for the management and disposal of dredge material since 1957 and has also been used for the disposal of gypsum,

treated wastewater effluent from the CAPA and dredge materials from the Industrial Channel Mercury was placed on Dredge Island when wastewater from CAPA went to the Placement Areas and dredge spoil from Alcoa's Industrial Channel was deposited in the Placement Areas The dredge materials may have contained mercury as a result of discharges from CAPA Wastewater from CAPA went to the Placement Areas for a short period of time during 1969 and 1970 The overflow from the Placement Areas was discharged into Lavaca Bay from July 1965 to 1981

Former Witco Processing Area Witco Chemical Corporation began operations in 1964 within the boundaries of the PCO Plant Witco processed coal tar for the manufacture of electrode binder pitch and creosote Operations at the Witco area included a coal tar tank farm, a creosote storage area, a binder pitch storage area, and a distillation area Witco discontinued operations in December 1985

Lavaca Bay Lavaca Bay is an estuary of the Matagorda Bay system and has a surface area of approximately 60 square miles The Bay has several uses ranging from commercial and industrial to a natural habitat for aquatic and avian species Both commercial and recreational fishing for various finfish, blue crabs, and oysters take place in the bay. Lavaca Bay is also used for shipping and as a source of industrial cooling water Sediments in a portion of Lavaca Bay have elevated levels of mercury and PAHs.

The Texas Department of State Health Services (TDSHS) (formerly the Texas Department of Health) has sampled fish, crabs, and oysters in Lavaca Bay since the 1970s. In the early 1970s, mercury levels in oysters and crabs were significantly elevated Based on these findings, TDSHS closed parts of Lavaca Bay to the harvesting of oysters At that time, TDSHS did not have the authority to prohibit crabbing or fishing. The ban on oystering was lifted in October 1971 Periodic sampling and analysis by TDSHS of finfish and shellfish in Lavaca Bay continued after 1970 and showed the problem of elevated mercury levels in finfish and shellfish to be persistent. On April 20, 1988, TDSHS issued an order closing an area of approximately 1 square mile of Lavaca Bay to the taking of finfish and crabs. On January 13, 2000, TDSHS reopened a portion of the closure area (Cox Bay) The closure for Cox Bay was removed because sampling showed that levels of mercury in finfish and crabs had decreased to a level acceptable for human consumption based on TDSHS's risk characterization

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Alcoa (Point Comfort)/Lavaca Bay Superfund Site		
EPA ID: TXD 008123168		
Region: 6	**State:** TX	**City/County:** Point Comfort/Calhoun County
SITE STATUS		
NPL Status: Final		
Multiple OUs? No	**Has the site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: EPA *[If "Other Federal Agency", enter Agency name]:*		
Author name (Federal or State Project Manager): Gary A Baumgarten		
Author affiliation: U S EPA Region 6		
Review period: 2/10/2016 - 6/28/2016		

Date of site inspection: 2/10/2016
Type of review: Statutory
Review number: 2
Triggering action date: 6/28/2011
Due date *(five years after triggering action date)*: 6/28/2016

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

On March 16, 2000, the remedial investigation (RI) report for the site was approved by EPA The RI focused on three distinct but interrelated areas at the site: (1) the Bay System, which includes Lavaca Bay, Cox Bay, and parts of adjacent bays, (2) Dredge Island, and (3) the Plant/Mainland, which includes all process and other areas Focused investigations were conducted at the former Witco Process Area and the CAPA. Extensive sediment sampling was conducted in the Bay System and samples were analyzed for a large number of contaminants Based on the sampling results, only mercury and total polycyclic aromatic hydrocarbons (PAHs) were identified as chemicals of concern (COCs) in Lavaca Bay.

The risk assessment showed the following potential noncarcinogenic hazard indices greater than one, cumulative excess lifetime carcinogenic risks exceeding one in ten thousand (1×10^{-4}), and environmental impacts

- noncarcinogenic risk to a potential future industrial worker, future construction worker, and current maintenance worker exposed to mercury-contaminated soils within the footprint of the R-300 building at the CAPA;
- noncarcinogenic risk to a woman of childbearing age consuming fish from within Lavaca Bay and the Closed Area of Lavaca Bay,
- carcinogenic risk to a potential future industrial worker in the Witco Area, and
- potential ecological impacts to organisms from direct contact with mercury-contaminated sediment and to fish from behavioral and reproductive effects

Response Actions

Pre-ROD Activities

During the RI, Alcoa conducted several early response actions under EPA oversight In April 1998, an Action Memorandum was signed by EPA under which Alcoa conducted a non-time critical removal action at Dredge Island The purpose of the removal action was to relocate and contain mercury-contaminated soils on the Island and fortify the Island to protect against possible damage during a severe storm event The non-time critical removal action began in September 1998 and was completed during the summer of 2001

Alcoa also installed a groundwater extraction system in 1998 at CAPA as part of a treatability study The extraction system was installed to evaluate the effectiveness of hydraulically controlling the discharge of mercury-contaminated groundwater from CAPA into Lavaca Bay In addition, Alcoa conducted a dredging treatability study in two separate areas of Lavaca Bay. The first phase of the dredging treatability study took place in August 1998 while the second phase occurred in January 1999 Approximately 80,000 cubic yards of sediments were dredged and disposed of in Alcoa's disposal lakes and on Dredge Island during the treatability study.

Remedial Action Objectives

Per the 2001 ROD, the remedial action objectives (RAOs) for Lavaca Bay are:

- eliminate or reduce to the maximum extent practical mercury loading from on-going unpermitted sources to Lavaca Bay,

- reduce to an appropriate level mercury in surface sediments in sensitive habitats, and
- reduce to an appropriate level mercury in surface sediments in open-water that represent a pathway by which mercury may be introduced into the food chain

These objectives are designed to allow the reduction of mercury levels in fish tissue such that the overall risk throughout Lavaca Bay will approach that which would be present but for the historic Point Comfort Operations The ultimate result of remedial actions in Lavaca Bay will be the reduction of mercury in upper trophic level fish/shellfish to levels that would be protective of human consumption and not pose an unacceptable ecological risk.

The RAOs for Lavaca Bay have two quantitative target cleanup goals, depending on the location of the sediment The target cleanup goals are:

- sediments in marsh-type habitat 0 25 ppm mercury
- sediments in open-water habitat 0 5 ppm mercury.

The RAO for CAPA soils is to reduce the future exposure potential of site workers (e g , construction worker, general industrial worker, and maintenance worker) to mercury in soils in the Building R-300 vicinity The RAO for soils in the Witco Area is to reduce the future exposure potential of site workers (e g , construction worker, general industrial worker, and maintenance worker) to PAHs in surficial soils at the Stormwater Sump and Separator Area and Former Tank Farm Area

Remedy Components

2001 Record of Decision (ROD)
EPA signed the ROD for the Site on December 20, 2001 The ROD set forth the selected remedy for the Site, which included actions to address mercury- and PAH- contaminated sediments in Lavaca Bay, ongoing unpermitted discharges of mercury and PAHs into Lavaca Bay, soil contamination at the former Chlor-alkali Process Area, and soil contamination at the former Witco area

The major components of the remedy as described in the 2001 ROD were

Bay System

- **Extraction and Treatment of Chlor-Alkali Process Area (CAPA) Groundwater** - CAPA groundwater will be hydraulically controlled by a series of four extraction wells Treatment of the extracted groundwater will be performed by aeration using an air stripper, followed by carbon adsorption for mercury removal The treated groundwater will be discharged to Lavaca Bay
- **Installation of a DNAPL Collection or Containment System at the Witco Area** – West of the former Witco Tank Farm Area, a collection trench or containment system will be installed for the purpose of intercepting dense non-aqueous phase liquid (DNAPL) potentially migrating to Lavaca Bay Recovered DNAPL will be collected and sent off site for treatment and disposal at a licensed disposal facility The DNAPL will not be treated or stabilized on site prior to off site disposal
- **Dredging of the Witco Channel** - approximately 200,000 cubic yards of mercury contaminated sediment will be dredged and disposed of in an on site confined disposal facility located on Dredge Island The dredged sediments will not be treated or stabilized before disposal
- **Remediation of the Witco Marsh by Dredging or Filling** - the Witco Marsh would be remediated by dredging or filling to address the concern of biological uptake of mercury.
- **Enhanced Natural Recovery North of Dredge Island** - the areas north of Dredge Island would receive a thin cap over the entire area to accelerate the natural recovery process currently observed occurring in Lavaca Bay
- **Natural Recovery of Sediments** - sediments that are not actively remediated will recover to acceptable levels through natural sedimentation It is estimated that surficial sediment mercury levels in all areas are expected to decline to levels in the current range of open areas of the Bay within a 5 to 10 year time frame.

- **Institutional Controls to Manage Exposure to Finfish/Shellfish** - the fish closure originally established by the Texas Department of Health in 1988 and updated in January 2000 will remain in place to control the consumption of finfish and shellfish for the "Closed Area".
- **Monitoring** - long term monitoring of sediments and fish will be required to confirm the natural recovery of sediment and fish tissue to acceptable levels In addition, monitoring of surface water will be conducted to evaluate the effectiveness of the CAPA hydraulic containment system

Chlor-Alkali Process Area Soils

- **Building R-300 Removal** - the walls and roof of Building R-300 will be removed and hauled off-site
- **Capping of Building R-300 Area** - The building slab and the area immediately west of Building R-300 will be capped with a clay sublayer covered by crushed rock
- **Institutional Controls to Manage Exposure to Soil**- Excavation of any soils below or immediately west of Building R-300 would only be permitted after a worker safety program is developed for the specific excavation activity and repair of the cap would be required after excavation. The Building R-300 area would be deed recorded as containing soils with elevated mercury levels

Former Witco Area Soils

- **Capping** - the Stormwater Sump and Separator Area and Former Tank Farm Area will be capped with soil caps
- **Institutional Controls to Manage Exposure to Soil** - future excavation of any soils in these areas would only be permitted after a worker safety program is developed for the specific excavation activity and repair of the cap would be required after excavation These areas would be deed recorded as containing soils with elevated PAH concentrations

2007 Explanation of Significant Differences

On May 23, 2007, EPA issued an Explanation of Significant Differences (ESD) to document the difference of one component of the remedy selected in the 2001 ROD. Physical construction of all of the remedy components described in the ROD for the bay system, except Enhanced Natural Recovery North of Dredge Island, were completed and operating as designed Enhanced Natural Recovery was selected as part of the bay system remedy to help accelerate the natural recovery of sediment in open water areas of Lavaca Bay. The target sediment remediation goal for sediment in open water areas of Lavaca Bay is 0 5 ppm mercury Based on sediment sampling conducted by Alcoa under the terms of the CERCLA Consent Decree, by 2007 the open water sediment cleanup goal of 0 5 ppm mercury was achieved Since the mercury remediation goal for sediment in the open water areas of Lavaca Bay had already been met, there was no need to construct a thin-layer cap to accelerate natural recovery in the open water area of the bay

Status of Implementation

The remedy components discussed above were constructed by Alcoa in phases Details about the construction activities for each project are discussed below

Bay System

Extraction and Treatment of Chlor-Alkali Process Area (CAPA) Groundwater

As part of the CAPA groundwater treatability study initiated in 1998, four groundwater extraction wells were installed and operated to provide hydraulic control of groundwater migration to Lavaca Bay The treatment system has operated continuously since 1998 The effluent standards for this discharge are met prior to the water being discharged to Lavaca Bay

The effectiveness of the CAPA groundwater extraction and treatment system is evaluated through water level monitoring data, measured groundwater extraction rates, and effluent sampling results Sampling results are used to ensure that hydraulic control of CAPA groundwater continues to be achieved by the system

Installation of a DNAPL Collection System at the Witco Area
Construction at the Witco area was conducted from March 8, 2006 to December 29, 2006

Dredging of the Witco Channel
The dredging of the Witco Channel was performed in conjunction with dredging of the Alcoa Point Comfort Operations Industrial Channel Dredging of the Witco Channel began in mid-December 2001 and was completed by late January 2002.

Remediation of the Witco Marsh by Dredging
The Witco Marsh was dredged between January 2006 to April 2006. The total volume of material dredged was estimated at 57,200 cubic yards

Monitoring / Natural Recovery of Sediments
Annual long-term monitoring focuses on monitoring sediment mercury concentrations from open water and marsh areas within the Closed Area and comparing them to the habitat-specific remediation goals Separate remediation goals were developed for sediments in marsh areas and open water areas of the bay The sediment cleanup goal identified in the ROD was 0 5 mg/kg mercury for open water sediments and 0 25 mg/kg mercury for sediments in nearshore marsh habitats

Long-term tissue monitoring of red drum and juvenile blue crab occurs annually to evaluate the recovery of mercury levels in finfish and shellfish, and to demonstrate the effectiveness of remedial actions implemented at the Site to reduce exposure levels and risk. The ultimate goal of the remedial actions is to reduce mercury levels in fish tissue such that the overall risk throughout Lavaca Bay approaches that which would be present but for the historic Point Comfort Operations

Chlor-Alkali Process Area Soils
Building R-300 Removal / Capping of Building R-300 Area
Between December 1999 and February 2000, the R-300 building was removed, and this area was capped To limit usage of the area by Plant and contractor personnel, three feet by six feet warning signs were placed on the north and west sides of the capped area Additionally, a memo was distributed plant-wide to inform workers of the upgrades made to the area, restrictions on the capped portion of CAPA, and disciplinary actions as a result of not complying with restrictions.

Former Witco Area Soils
Capping
Construction at the Witco area took place from March 8, 2006 to December 29, 2006

Under the terms of the Consent Decree, Alcoa prepares a Remedial Action Annual Effectiveness Report (RAAER). The RAAER evaluates the effectiveness of the remedial action including, but not limited to, an evaluation of the performance of the hydraulic control system at CAPA, natural recovery of sediments in Lavaca Bay, trends in fish/shellfish tissue values, and O&M activities The RAAER is submitted to EPA and Texas Commission on Environmental Quality (TCEQ) annually in March

Institutional Controls
Prior to receiving a Certificate of Completion of the Remedial Action, Alcoa will implement the institutional controls specified in the ROD for the soils in the Chlor-Alkali Process Area and the Former Witco Area The deed records shall.

- identify the location of caps, barriers, and containment systems constructed as part of the Remedial Action to notify future purchasers or users of the property that excavation in these areas may cause a release of hazardous substances to the environment
- restrict the construction of any buildings, wells, pipes, roads, ditches, fences, channels, cables, or any other structures - fixtures or otherwise - by any person in a manner not consistent with the ROD

Alcoa issues updated memoranda to plant staff and contractors to note that construction activities were conducted at the Witco and CAPA areas as part of the Superfund cleanup activities Plant personnel and contractors are reminded that they should not drive in the capped areas and that if they do drive in those areas they face severe discipline up to and including dismissal.

The fish closure order, originally established by the Texas Department of Health (TDH) in 1988 and updated in January 2000, remains in place to control the consumption of finfish and shellfish from the "Closed Area".

Table 1 – Institutional Control (IC) Summary Table

Media, engineered controls, and areas that do not support UU/UE based on current conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
sediments	Yes	Yes	Closed Area of Lavaca Bay as defined by the TDH fish closure area	The fish closure order is in place to control the consumption of finfish and shellfish from the "Closed Area" of Lavaca Bay	Texas Department of Health Order No. AL-1 issued April 21, 1988 Order No AL-13 Modification issued January 13, 2000

Systems Operations/Operation & Maintenance

The CAPA groundwater extraction and treatment system began full-scale operation in May 1998 The system has operated continuously since 1998 with only minor interruptions for maintenance or trouble-shooting, or during power interruptions at the PCO facility Operations, maintenance, and monitoring are conducted in accordance with the CAPA approved Operations, Maintenance and Monitoring Plan (OMMP). In 2015, piping that connects the extraction wells to the treatment system was replaced

Between 1998 and 2001 Alcoa conducted a non-time critical removal action on Dredge Island to minimize the potential for the release of mercury from the Island and fortify the Island to protect against possible damage during a severe storm event The requirements to maintain the Dredge Island are included in a OMMP. As discussed in in Section III, Dredge Island maintenance issues identified in the First Five-Year Review were addressed during a maintenance event conducted in 2011

III. PROGRESS SINCE THE LAST REVIEW

This section includes the protectiveness determinations and statements from the last five-year review as well as the recommendations from the last five-year review and the current status of those recommendations

Table 2 - Protectiveness Determinations/Statements from the 2011 FYR

OU #	Protectiveness Determination	Protectiveness Statement
Sitewide	Will be Protective	The remedy implemented at the Alcoa / Lavaca Bay Superfund Site currently protects human health and the environment All remedial actions have been constructed in accordance with the requirements of the ROD and ESD and are operating as designed Long-term protectiveness of the remedy will be verified by continued monitoring of the CAPA groundwater extraction system, open water sediment, marsh sediment, finfish, and shellfish in accordance with the RDRs and OMMPs The remedy is expected to be fully protective when the sediment and fish tissue remedial action objectives are achieved

Table 3 - Status of Recommendations from the 2011 FYR

OU #	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
Sitewide	Empirical sediment recovery rates indicate that natural recovery of open-water sediment mercury concentrations is occurring, but at a somewhat slower rate than predicted in the Feasibility Study The Marsh 14 Island left by the Dredge Island non-time critical removal action, and perhaps to a lesser extent Mainland Shoreline No. 3 and the Witco Harbor and channel appear to serve as an ongoing source of mercury-contaminated soil and sediment to Lavaca Bay. These soils and sediment appear to be decreasing the rate of sediment recovery predicted in the Feasibility Study	Develop a plan to perform a focused, additional remedial measure in the area of the Dredge Island stabilization project, in order to assess whether the rate of finfish /shellfish tissue recovery can be accelerated	Completed	During June 2013 dredging operations were performed to accomplish the response actions described in the Remedial Action Plan for the Marsh 14 area. Dredged sediment was pumped to the Confined Disposal Facility (CDF) at Dredge Island. The dredging operations resulted in the mass removal of approximately 148,300 cubic yards of sediment, including the material that contained elevated total mercury levels based on prior characterization sampling and analysis The dredging operations, therefore, fulfilled the EPA recommendation that focused, additional remedial measures be conducted in the area of Dredge Island in order to help accelerate the rate of finfish /shellfish tissue recovery	9/25/2013

OU #	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
Sitewide	Due to bimodal and/or outlier data distributions, it is difficult to determine temporal trends in marsh sediment concentrations In order to calculate an accurate average sediment concentration in marshes, it is appropriate to review the statistical design of the marsh sediment monitoring program to assess whether the number and placement of samples should be modified to better capture the variability in sediment concentrations and to improve the understanding of temporal trends	Assess the statistical design of the marsh sediment monitoring program to determine whether the number and placement of samples can be modified to better capture the variability in sediment concentration and to improve the understanding of temporal trends.	Completed	On September 27, 2011, EPA approved Alcoa's plan to evaluate the marsh sediment sampling program to further evaluate temporal trends in marsh sediment concentrations The evaluation began with the Fall 2011 monitoring event As documented in the 2012 Remedial Action Annual Effectiveness Report, the data were evaluated for outliers. Outliers identified using this procedure are retained in the database, but are not included in graphs to depict temporal trends in marsh sediment concentrations, nor in the calculation of the mean marsh concentration that is compared to the remedial action objective of 0 25 mg/Kg.	9/27/2011
Sitewide	Mercury studies performed at the beginning of the remedial investigation (RI) indicated that methylation occurs at a shallow depth (often one or two centimeters). A smaller core sample interval, closer to the sediment surface may provide more useful information about where and how methylmercury enters the food web.	Evaluate a smaller core sample interval, closer to the sediment surface for future sediment sampling to provide more useful information about where and how methylmercury enters the food web	Completed	On September 27, 2011, EPA approved Alcoa's plan to evaluate a smaller core sample The marsh methylmercury (MeHg) and total organic carbon (TOC) samples were initially collected from a depth interval of 0-5 cm depth. In accordance with the recommendations of the EPA First 5-Year Review, the marsh sediment sample depth interval was changed in 2011 from 0-5 cm to 0-2 cm	9/27/2011

OU #	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
Sitewide	Inspections at Dredge Island are conducted quarterly and indicate that the island is in good shape and the performance objectives are met Erosion of the interior side slopes of the CDF (confined disposal facility) caused by wave action of water in the CDF continues to be the most significant maintenance issue Other items that need to be addressed on Dredge Island include 1) erosion of the un-vegetated areas of the exterior side-slopes, 2) possible damage to the northeast decant structure below the mud line; 3) corrosion of metal portions of the decant structures; and 4) vegetation within the stone armor on the exterior side-slopes	Address the following issues related to the Dredge Island Stabilization Project • Erosion of the interior side slopes of the CDF caused by wave action of water in the CDF continues to be the most significant maintenance issue • Erosion of the un-vegetated areas of the exterior side-slopes. • Possible damage to the northeast decant structure below the mud line • Corrosion of metal portions of the decant structures • Vegetation within the stone armor on the exterior side-slopes.	Completed	A maintenance event was conducted in the third quarter of 2011. The following items were addressed during the maintenance event • Interior side slope erosion - Approximately 1,800 feet of the interior levee side slope on the north end of the CDF was repaired. Soil that had eroded from the side slope into the CDF was picked up, placed on the levee, and compacted. The slope was then re-seeded. • Erosion on the north entrance ramp - The exterior side slopes of the entrance ramp on the north end of the island were repaired. Soil that had eroded from the side slope was picked up, placed on the ramp, and compacted. Hay bales were placed along the slope to control erosion • Northeast decant structure - Excavation of sediment from around the decant structure was conducted and showed that several of the boards were damaged These boards were replaced with new boards and the entire decant structure on the inside of the CDF was wrapped with fresh plastic to keep water and/or sediment from entering the structure below the water/sediment line The outfall pipe was also found to be clogged with sediment, and was removed The outfall flap valve was also repaired • Southwest decant structure - The southwest decant structure was inspected and found to be in good condition. No boards were replaced The structure was wrapped in fresh plastic	3/31/2012

OU #	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
				• Vegetation on the exterior and interior side-slopes: All large trees and brush were removed along the entire exterior and interior side slopes of the CDF levee	

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

A public notice was made available by placing a notice in the *Port Lavaca Wave* and the *Victoria Advocate*, on 2/10/2016 and 2/9/2016 respectively, stating that there was a five-year review and inviting the public to submit any comments to the U S EPA The results of the review and the report will be made available at the Site information repository located at the Calhoun County Public Library, 200 West Mahan, Port Lavaca, TX 77979 A copy of the newspaper notices are included in Appendix A

During the FYR process, interviews were conducted to document any perceived problems or successes with the remedy that has been implemented to date. The results of these interviews are summarized below and the completed interview forms are included in Appendix B Attempts were made to obtain interviews from representatives of the community, however, members of the community either did not respond to questionnaires sent to them or want to fill out a questionnaire in person. EPA in cooperation with Alcoa will make plans to hold a meeting with the community in the fall 2016. During the meeting, EPA will provide an update on the findings from the five-year review and discuss results of any work that Alcoa has completed based on recommendations in this report

Based on the interview form received, the effectiveness of the remedy in reducing mercury levels in finfish and shellfish was identified

Data Review

EPA reviewed the information contained in the Remedial Action Annual Effectiveness Reports (RAAERs) submitted by Alcoa The RAAERs, which are submitted annually in March, present the results of the previous year's performance monitoring and provide an integrated assessment of the progress towards achieving the overall Site remediation goals A discussion of the data reviewed for the various aspects of site remediation are discussed below. A list of the documents reviewed are identified in Appendix C

Chlor-Alkali Process Area

The concentrations of mercury and carbon tetrachloride in the samples from the recovery wells have decreased over time since the groundwater extraction and treatment system has been operating. Prior to startup of the extraction system, concentrations of mercury in the recovery wells ranged from 0 98 mg/L to 5 8 mg/L. Based on samples collected in September 2015, mercury concentrations in the recovery wells ranged from 0.004 mg/L to 0 6 mg/L Monitoring results for the CAPA groundwater extraction and treatment system presented in the RAAERs show that the discharged groundwater does not exceed the discharge standards Table 1 in Appendix D presents the approximate mass of mercury removed from the groundwater hydraulic control wells Potentiometric data presented on Figure 2 in Appendix D shows the hydraulic barrier created by the four extraction wells is effectively reducing the potential for migration of mercury-impacted groundwater from CAPA to Lavaca Bay.

Lavaca Bay Sediment Monitoring

The Consent Decree requires that the open water sediment monitoring program be performed until a mean mercury concentration of less than 0 5 mg/kg (ppm) dry weight is measured in the Closed Area in two consecutive years As documented in the 2005 RAAER, this occurred in 2004 and 2005 when average concentrations of 0 293 ppm and 0.276 ppm, respectively, were measured in open water surface sediment samples from the Closed Area Thus the performance objective of the open water sediment monitoring program established in the Consent Decree has been met However, Alcoa has elected to continue monitoring of the northern half of the open water sediment sampling grid on a voluntary basis as part of its ongoing effort to better understand trends in fish tissue concentrations in the Closed Area of Lavaca Bay The most recent open water sampling event occurred in December 2015 With the exception of one outlier (2 88 mg/kg mercury), the mercury concentrations in the open water sediment ranged from 0.05 mg/kg to 0 46 mg/kg The average open water sediment concentration from all 58 samples (including the one outlier) was 0 25 mg/kg.

For sediment located in a marsh, the objective is to attain an average mercury concentration in each marsh of less than 0 25 mg/kg dry weight Monitoring occurs annually until the remediation goals are met for two consecutive events If the marsh sediment monitoring data attain the remediation goal for two consecutive annual events in a given marsh, monitoring of that marsh is complete, even if monitoring of other marshes continues. All of the marshes except Marshes 7 and 15 had met the remediation goal for two consecutive years by 2014. The 2015 marsh sampling data show that both Marsh 7 and 15 achieved the cleanup objective The 2015 average total mercury concentration in most marshes is below 0 1 ppm Table 2 in Appendix D summarizes the marsh sediment mercury concentrations

Finfish/Shellfish Monitoring

The purpose of the finfish and shellfish monitoring program is to collect and evaluate data to determine whether the mercury levels in fish tissue have been reduced such that the overall risk throughout Lavaca Bay approaches that which would be present but for the historic Point Comfort Operations Mercury concentrations in red drum tissue are used as a surrogate of risk, and the remediation goal for Lavaca Bay will be met when the mean mercury concentration of red drum collected in the Closed Area has recovered to the mean level measured in red drum collected from the Adjacent Open Area As discussed in the Finfish and Shellfish OMMP, a statistical approach is used to compare the mercury concentrations of red drum in the Closed Area with those in the Adjacent Open Area To support the statistical comparison, 60 red drum tissue samples are analyzed annually for mercury (30 from the Closed Area and 30 from the Adjacent Open Area) Using the most recent red drum tissue sampling results (Fall 2015), the mean mercury concentration of red drum from the Closed Area (1 32 mg/kg) is significantly higher than the mean of the Adjacent Open Area samples (0 42 mg/kg)

Short-term trends of mercury levels in juvenile blue crab are used to qualitatively evaluate the remedy effectiveness Juvenile blue crab are selected for this purpose because, being a lower trophic level organism with a much smaller foraging range than red drum, they should demonstrate a more focused response than red drum to changes in the availability of mercury

A summary of the mean mercury concentrations in red drum and juvenile blue crab measured since 1997 is presented in Table 3 in Appendix D Figure 3 in Appendix D presents the trends in red drum mercury concentrations in the Open Area and Closed Area of Lavaca Bay

Site Inspection

The inspection of the Site was conducted on 2/10/2016. In attendance were Gary Baumgarten (EPA), Jon Rauscher (EPA), and Anna Lund (TCEQ) In addition, the following Alcoa representatives and contractors were also in attendance. Larry McShea (Alcoa), Kari Fluegel (Alcoa), Kirk Gribben (Alcoa), Kevin Riggs (Alcoa), Keith Schmidt (Alcoa), Ronald Weddell (Tetra Tech), Rachael Weddell (Tetra Tech), and Matt Wickham (Pastor, Behling & Wheeler). The purpose of the inspection was to assess the protectiveness of the remedy

During the site inspection the following areas of the site were visited:

- **Chlor-alkali Process Area:** the water treatment system was operating and all components of the system were in good shape and the area was well maintained All of the recovery wells were locked to ensure access by authorized personnel. The soil cap at CAPA was in good condition and the required signage warning people not to disturb the cap was in place and in good condition
- **Former Witco Processing Area:** the soil cap was in good condition and no damage was observed The required signage warning people not to disturb the cap was in place and in good condition
- **Dredge Island:** the armor stone around the island is in good condition A weed control program has been implemented to prevent vegetation overgrowth on the armor stone Erosion of the structural steel was observed at the north decant structure Access to the decant structure is restricted until a thorough structural and safety inspection can be completed Erosion of the interior side slope of the confined disposal facility (CDF) cause by wave action of water in the CDF continues to be the most significant maintenance issue, but no repairs are required at this time
- **Lavaca Bay:** the inspection team took a boat tour through portions of Lavaca Bay and around Dredge Island The exterior armoring system on Dredge Island was in good shape In addition, signs noting the Closed Area fishing ban were observed The signs were in good condition

The "Site Inspection Checklist" and photographs taken during the site inspection are presented in Appendix E.

V. TECHNICAL ASSESSMENT

QUESTION A: Is the remedy functioning as intended by the decision documents?

Question A Summary:

Bay System.
As discussed in the ROD, the RAOs for Lavaca Bay are (1) eliminate or reduce to the maximum extent practical mercury loading from on-going unpermitted sources to Lavaca Bay, (2) reduce to an appropriate level mercury in surface sediments in sensitive habitats, and (3) reduce to an appropriate level mercury in surface sediments in open-water that represent a pathway by which mercury may be introduced into the food chain These objectives are designed to allow the reduction of mercury levels in fish tissue such that the overall risk throughout Lavaca Bay will approach that which would be present but for the historic Point Comfort Operations

The remedial actions implemented to date have been effective in reducing the level of mercury in sediment for sensitive habitats and open water areas This is evidenced by the fact that the cleanup goals for sediment in marshes and open water areas have been achieved Furthermore, operation of the groundwater recovery system at CAPA is effective in reducing mercury loading to Lavaca Bay

Results from the annual juvenile blue crab sampling show that recovery is ongoing in the majority of the Closed Area as evidenced by downward trends in mercury levels

Based on annual finfish sampling conducted, average mercury concentrations in red drum in the Closed Area do not show similar trends of recovery As documented in the RAAERs, the RAO of having mean mercury concentrations in the Closed Area and the Adjacent Open Area being comparable has not been achieved

Chlor-Alkali Process Area Soils
The remedy for this area is functioning as intended by the ROD The cap that was installed in 2000 is well maintained and no maintenance issues were identified Warning signs are in place to prevent usage of the area by plant and contractor personnel

Former Witco Area Soils
All components of the remedy implemented at the former Witco Area are functioning as intended by the ROD No DNAPL has been observed in the collection sump since its installation The soil cap is functioning as designed and no damage has been observed Warning signs are in place to prevent usage of the area by plant and contractor personnel

Institutional Controls
The TDSHS fish closure order is identified in the ROD as an institutional control to manage exposure to finfish and crabs Under the closure order, it is illegal to keep fish or crabs that are caught within the closure area However, catch and release fishing is allowed within the closure area.

From June 23-26, 2014, TDSHS conducted an education campaign and handed out informational brochures and educational items to local residents through door-to-door activities in local neighborhoods. TDSHS personnel also met one-on-one with individuals fishing in the Closed Area Informational brochures and educational items were also distributed at libraries, city halls, chambers of commerce, RV parks, bait shops, hotels, city parks, boat ramps, and marinas. Approximately 3,000 brochures were distributed and TDSHS staff spoke to about 300 residents and fishermen

In addition, TDSHS representatives spoke with a local Texas Parks and Wildlife Department (TPWD) Game Warden about the educational campaign TPWD game wardens are responsible for enforcing the closure and issuing citations to people caught taking fish or crabs from the closure area TDSHS also met with the Calhoun County Extension Office and provided them educational brochures for use in their educational campaigns Additional outreach conducted by TDSHS included meeting with a local Burmese physician who agreed to provide the Burmese speaking population with educational materials about the fish closure

Based on input from TDSHS and the City of Point Comfort, Alcoa installed new fish closure warning signs in areas where people fish from the shoreline in the closure area The new signs were installed in November 2014 and present information about the fish closure in three languages (English, Spanish and Vietnamese)

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

Question B Summary:
As discussed above, the RAO for red drum mercury concentrations in the Closed Area and the Adjacent Open Area being comparable has not yet been achieved Given the fact that: 1) sediment cleanup goals for mercury in marshes and open water have been achieved, 2) currently known sources of mercury loading to Lavaca Bay have been addressed, and 3) areas of Lavaca Bay with high levels of mercury in sediment have been dredged, it is unclear why concentrations of mercury in red drum from the Closed Area continue to be elevated when compared to the Adjacent Open Area. To better understand why mercury levels in red drum from the Close Area continue to be elevated, some of the elements of the conceptual site model (CSM) used at the time of the ROD may no longer be valid

Results from annual remedial action effectiveness sampling confirm that the primary elements of the conceptual site model (CSM) that supported the 2001 ROD are valid. Primary elements of the CSM supported by the data are

- Mercury in biota is primarily derived from a sediment based food web,
- Marsh areas tend to have higher bioaccumulation potential than open water areas,
- Reduction in total mercury concentrations can be accelerated by control of ongoing sources,
- Major ongoing sources were identified during the RI,
- Burial is the principal mechanism by which sediment mercury concentrations decline;

New findings relevant to the CSM include the following

- Half-lives (time required for the average mercury concentration to decrease to half of its initial value) have been about 10 to 12 years, which is slower than the 1 to 9 years estimated in the Feasibility Study,
- Sediment and biota in a portion of the Closed Area are recovering more slowly than other parts of the Closed Area,
- Residual mercury sources may exist in sediments and soils in Lavaca Bay. The mechanism to transport residual mercury sources may include natural and vessel-induced resuspension, groundwater inflow, sloughing along channel slopes and erosion from soils adjacent to Lavaca Bay,
- Site-specific conditions in the marshes may be areas of enhanced methylation where uptake of mercury can occur even in the presence of low total mercury concentrations in surface sediment,
- Red drum may be accumulating a portion of their mercury through an uptake pathway not currently being monitored,

Given the above findings, Alcoa is undertaking or will undertake additional studies to answer the following questions·

- Are there site-specific conditions in the marshes where enhanced methylation and uptake of mercury can occur even in the presence of low total mercury concentrations in surficial sediment?
- Could red drum be accumulating a significant portion of their mercury burden through an uptake pathway not being monitored?
- Are there ongoing sources of inorganic mercury on sediments transported into areas where conditions are favorable for enhanced methylation and uptake into the food web?
- Are the fundamental findings from the mercury reconnaissance study conducted in 1996 still valid in terms of the depth of methylation and the locations in the bay system where high rates of mercury methylation and uptake are believed to occur?

The studies planned include

- Studies to evaluate site-specific marsh conditions where enhanced methylation and uptake can occur·
  - Focused sediment sampling in and near marshes – the study will provide additional information on potential areas in and near the marshes where juvenile blue crab have elevated mercury concentrations
  - Expanded methylation study during the peak mercury methylation period - the study would be designed to help understand why methylmercury levels may not be declining in areas where total mercury levels have achieved the cleanup goals and understand what specific site conditions are associated with high levels of methylmercury.
- Studies to evaluate whether additional uptake pathways cause mercury levels in red drum in the Closed Area to remain elevated.
  - Focused prey sampling in marshes - the purpose of this study is to expand the understanding of potential sources of mercury to red drum by including prey items, which are significant components of the red drum diet but have not routinely been collected and may contribute to the uptake of mercury to red drum
  - Methylmercury Sediment Sampling in Open Water – information from the study will be used to evaluate the potential for methylmercury uptake in the open water areas north and east of Dredge Island
- Study to understand sediment and mercury transport from the Witco and Alcoa channels and Witco Cut to the area north of Dredge Island
  - The information for this study will help determine whether mercury mobilized via re-suspension of sediments plays a role in slowing recovery in the Causeway marshes and the associated methylmercury levels in red drum and juvenile blue crab
- Conduct a high-resolution water column sampling program in the vicinity of the Alcoa and Witco channel areas and Mainland Shoreline No 3

- This study will evaluate dissolved and particulate mercury levels This data will be used to identify potential residual sources of mercury,
- Utilize results from the above study to further characterize mercury concentrations in near-shore sediments areas (e.g , Mainland Shoreline No. 3) and at-depth sediments (e g., Alcoa and Witco channels)

QUESTION C: Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has been identified that calls into question the protectiveness of the remedy

VI. ISSUES/RECOMMENDATIONS

Issues/Recommendations

Issues and Recommendations Identified in the Five-Year Review:				
OU(s): Sitewide	**Issue Category: Remedy Performance**			
	Issue: Total mercury levels in the Causeway marsh sediments are approaching levels in the Adjacent Open Area of Lavaca Bay, however, there has not been a corresponding reduction in the mercury levels in red drum and juvenile blue crab in the vicinity of these marshes It is unknown whether there are site-specific conditions in the marshes where enhanced methylation and uptake into red drum and juvenile blue crab can occur even in the presence of low total mercury concentrations in the surface sediment			
	Recommendation: Conduct the following studies to evaluate site-specific marsh conditions where enhanced methylation and uptake can occur • Focused sediment sampling in and near marshes • Expanded methylation study during the peak mercury methylation period			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
Yes	Yes	PRP	EPA/State	12/1/2016

OU(s): Sitewide	**Issue Category: Remedy Performance**			
	Issue: It is uncertain whether red drum may be accumulating a significant level of their mercury through an uptake pathway not being monitored Additional mercury uptake pathways need to be considered in evaluating options to reduce elevated mercury levels in red drum			
	Recommendation: The following studies should be conducted to evaluate whether additional uptake pathways cause mercury levels in red drum in the Closed Area to remain elevated • Focused prey sampling in marshes • Methylmercury Sediment Sampling in Open Water			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
Yes	Yes	PRP	EPA/State	12/1/2016

OU(s): Sitewide	Issue Category: Remedy Performance			
	Issue: It is uncertain whether there are additional sources of mercury on sediments that are transported into areas where conditions are favorable for enhanced methylation and uptake into the food web			
	Recommendation: Conduct a study to understand sediment and mercury transport from the Witco and Alcoa channels and Witco Cut to the area north of Dredge Island			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
Yes	Yes	PRP	EPA/State	12/1/2016

OU(s): Sitewide	Issue Category: Remedy Performance			
	Issue: Residual sources of mercury may exist in sediments and soils in the vicinity of Mainland Shoreline No 3, the shallows adjacent to the Alcoa and Witco channels (including the Witco Harbor) and along the northwest edge of Dredge Island			
	Recommendation: • Conduct a high-resolution water column sampling program in the vicinity of the Alcoa and Witco channel areas and Mainland Shoreline No 3 to evaluate dissolved and particulate mercury levels			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
Yes	Yes	PRP	EPA/State	12/1/2016

OU(s): Sitewide	Issue Category: Remedy Performance			
	Issue: Concentrations of mercury in red drum from the Closed Area continue to be elevated when compared to the Adjacent Open Area			
	Recommendation: Utilizing results of the above recommendations, update and refine the site conceptual model and incorporate the results of the studies into a remedial action plan, that once implemented, would reduce mercury levels in red drum			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
Yes	Yes	PRP	EPA/State	3/31/2017

OTHER FINDINGS

Although signs are posted in Lavaca Bay and on land to notify the public about the Lavaca Bay fish closure, continued outreach and education efforts are needed to prevent both local and visiting people from catching and keeping finfish and crabs from the closure area The following are recommendations that were identified during the FYR and are designed to further enhance the fish closure order, but do not affect current and/or future protectiveness

- Evaluate different methods to conduct outreach efforts to better inform people about the fish closure
- Review and update as necessary outreach materials used to inform local and visiting people about the fishing closure in Lavaca Bay
- Engage in further discussions with TPWD about enforcement of the fish closure order
- Meet with local advocates to determine more effective means to educate the fishing community about the fish closure area.

VII. PROTECTIVENESS STATEMENT

Sitewide Protectiveness Statement	
Protectiveness Determination Long Term Protectiveness Deferred	*Planned Addendum Completion Date* 9/30/2019
Protectiveness Statement The remedy for the Alcoa (Point Comfort)/Lavaca Bay Superfund Site is protective of human health and the environment in the short term due to the fish closure order in place to control the consumption of finfish and shellfish from the "Closed Area" of Lavaca Bay A long term protectiveness determination of the remedy cannot be made at this time until further information is obtained related to the exposure assumptions and understanding of potential sources of mercury used at the time of the ROD Further information will be obtained by undertaking the recommendations identified in this Five-Year Review Report. It is expected that the recommendations will take approximately three years to implement	

VIII. NEXT REVIEW

The next five-year review report for the Alcoa (Point Comfort)/Lavaca Bay Superfund Site is required five years from the completion date of this review

APPENDIX A – NEWSPAPER NOTICES

Port O'Connor board deliberates on using a management firm

By KAYLA MEYER
PORT LAVACA WAVE

The Port O'Connor Improvement District board of directors heard two presentations at a special called meeting last week.

During one presentation board members discussed the possibility of bringing in a company that provides full service operations maintenance and management of the district. No action was taken on the matter. POCID's district manager recently resigned.

District engineer Jody Weaver said the total annual price of bringing in U.S. Water Group could cost the district approximately $540,000 to $585,000.

Board member Leon Brown asked if there was a way to compare various companies. Weaver said the proposal from USW was the only one the district received.

Brown asked if the district would still need to pay typical costs associated with POCID, and Weaver said it would. Brown stressed that bringing in an operating company with its added costs would need to be done in the best interest of the district.

Weaver also said a management company could update the district's electronics and said that a management company would have more resources in the event of an emergency such as those related to a hurricane. Other benefits of having a management company include asset management and performing preventative maintenance.

Brown said he wants to investigate the matter further based on the budget for 2015 and 2016.

"Because we've got our basic costs, still, that they're not going to cover," Brown said. "We've got to look at all of this."

He added that the district's attorney, who did not attend the meeting, would need to review the matter.

Another presentation was given by Philip Givens, a management consultant with Superior Water Management.

Givens covered board responsibilities and the possibility of rate changes, but no action was taken. Givens discussed the need for budgeting, along with having some savings for any unbudgeted needs that may arise in a district.

Board members also discussed the need for a rate study within POCID. Board member Allen Junek said the Texas Public Utilities Commission has agreed to conduct another free rate study for the district. Givens is slated to be the person to complete the rate study.

On another matter board members voted 4-1-1 to allow Imagination Monkey to start a Facebook page for the district, which will be overseen by board member Joe Newsome. Brown abstained from voting, and member Marshall Bradford cast the dissenting vote.

Junek said "facts" about the district and what is going on in the district will be the type of information posted to the Facebook page.

Brown expressed his concern about not seeing the posts as he does not have a Facebook account. Bradford inquired why the district needed a Facebook page.

Junek said the posts are for the public, allow for more transparency from the district and are a way to keep the community informed about district activities.

"It would pertain to acts and current events as they pertain to the district," Junek said, adding, that an example of a post might include information about pipes being installed in Port O'Connor.

Newsome said he would carefully oversee the page and any comments made.

"I want it to happen," Newsome said about the district getting a Facebook page. "I'm going to be very careful not to let something slide, or go by."

The board also discussed distribution of a community newsletter to ratepayers. Junek said the district newsletter would be distributed via email and posted on the POCID website, but the district would provide a hardcopy of the letter upon request. Prior to a newsletter being distributed it would be subject to board approval.

Junek said the newsletter will likely encompass more information than what is disseminated through the district's Facebook page.

Board members debated on having a quarterly newsletter or one that goes out monthly. The board ultimately decided to have a quarterly newsletter. All board members voted in favor of the matter.

In other business board members:

Voted 4-1-1 to pay an Imagination Monkey's monthly invoice for January. The invoice amount was $3,000. Bradford voted against the matter while Brown abstained.

Tabled a matter pertaining to the hiring of new district employees as district counsel was not present at the meeting.

OBITUARIES

PETRA 'BERTHA ARREDONDO FALCON

Petra "Bertha" Arredondo Falcon, 96, of Port Lavaca, passed away Feb. 5, 2016 surrounded by her loving family. She was born Aug. 8, 1919 in Waring to the late Carlos and Francisca Arredondo. She was a member of Our Lady of the Gulf Catholic Church, served on the Sacred Heart Society, was a Cub Scout den mother, a devoted Catholic and made pilgrimages around the world of all the apparitions of the Virgin Mary.

She is survived by her daughters: Mary I. Villarreal and Carol Ann Villarreal (Paul); sons: John Raymond Falcon (Kathy), Joe Angel Falcon and Jesse Ray Falcon (Lottie); son-in-law: Rudy Cardenas; 17 grandchildren and 25 great grandchildren.

She was preceded in death by her husband Ramon Falcon, daughter: Ramona Cardenas; son, Adan Carlos Falcon; parents; son-in-law Andrew Villarreal and was the last survivor of the Arredondo siblings.

A visitation was held from 1-2 p.m. Sunday, February 7 at Rich hardson-Colonial Funeral Home. A second visitation was held from 5-7 p.m. Monday, Feb. 8, at Richardson-Colonial Funeral Home on followed by a rosary at 7 p.m. A funeral Mass was held at 9:30 a.m. Tuesday, Feb. 9 at Our Lady of the Gulf Catholic Church. Interment followed after the mass at 1 p.m. at San Francisco Cemetery, located off of Hwy. 35 on Colony Road in Seadrift.

Pallbearers were John Craig Falcon, Bryan Falcon, Aaron Falcon, Zion Falcon, Michael Falcon, Xavier Archangel, Edmund Villarreal and Rudy Villarreal.

In lieu of flowers, memorial donations may be made to Our Lady of the Gulf Capital Campaign Fund, 417 W. Austin, Port Lavaca, TX 77979.

Words of comfort may be shared with the family at www.richardsoncolonial.com.

STONE from page A1

O'Connor. She has enjoyed living in Port O'Connor ever since she moved in with Susan and her late son-in-law Carl Onitsh.

"Carl and Susan purchased a place in Port O'Connor. They loved it so much I decided to move there, too, and together we made it our home. It's a perfect place at the perfect time in life for me," Stone said. "I feel so comfortable and content here while I do my hobbies."

Stone felt living in Houston was too busy, but she likes the laid back atmosphere of Port O'Connor.

"I feel safe here. I feel like the people are friends," she said.

Stone keeps busy with fun activities and visiting with friends. She likes to work with her hands making quilts, wall hangings, afghans, needlepoint, the pillows and a large variety of other handmade items.

Her crafts hang on the walls of her home.

"I enjoy the whole thing. I see a picture of something and I want to make it. It keeps my mind going. There's a lot of mathematics in making a quilt," Stone said. "I enjoy reading, playing bingo and watching the football games. I stay so busy."

Stone is proud of her independent nature.

"I am blessed with good health while enjoying my exercise program. I believe in honest living and a simple lifestyle," she said.

Stone feels her greatest accomplishment in life was raising a family.

"My contentment lies in knowing I raised my children well," she said.

Stone enjoys visits from her son, who lives in Florida as well as living with her daughter.

"Susan is my constant companion. Both are happy, healthy and successful in life," she said.

Onitsh considers it an honor to be her mother's full-time caregiver.

"My job is taking care of my 100 year old mother. We have an eternal bond of love, respect and honor. It gives me a foundation and enables me to reach out and help. I'm blessed to have her. She did so much to teach me about real life," Onitsh said.

Despite reaching this milestone, Stone is looking forward to an even longer life.

"I'm only 100 but my spirit is younger, and I have years ahead of me," she said with crossed fingers.

ALCOA/LAVACA BAY SUPERFUND SITE
PUBLIC NOTICE
Point Comfort, Calhoun County, Texas
February 2016

The U.S. Environmental Protection Agency (EPA) Region 6 will begin the second five-year review of the remedy for the Alcoa (Point Comfort)/Lavaca Bay Superfund Site (Site) in Point Comfort, Calhoun County, Texas, on February 10, 2016. The review will evaluate if the remedy continues to protect public health and the environment. The remedy, which the EPA selected in the December 2001 Record of Decision (ROD), called for actions to address sediments in Lavaca Bay contaminated by mercury and polycyclic aromatic hydrocarbons (PAHs), ongoing, unpermitted discharges of mercury and PAHs into Lavaca Bay, soil contamination at the former Chlor-Alkali Process Area, and soil contamination at the former Wirco area.

The Site, which covers approximately 1,500 acres, is located on the south side of State Highway 35, near the City of Point Comfort, Texas, and is adjacent to Lavaca Bay on the west and Cox Creek/Cox Lake on the east. Although all areas of the Site were investigated during the Remedial Investigation, the EPA determined in the 2001 ROD that only certain areas of Lavaca Bay, the Dredge Island and two on-land areas (Chlor-Alkali Process Areas and Wirco Area) required remediation. The review should take approximately three to six months to complete and the review results will be made available to the public at the following information repository:

Calhoun County Public Library
200 West Mahan
Port Lavaca, TX 77979

Information about the Alcoa (Point Comfort)/Lavaca Bay Superfund Site is available at:

http://cumulis.epa.gov/supercpad/cursites/csinfo.cfm?id=0601752

For more information about the Site, contact Gary Baumgarten, EPA Remedial Project Manager, at (214) 665-6749, toll free at 1-800-533-1508, or by email at baumgarten.gary@epa.gov.

All media inquiries should be directed to the EPA Press Office at (214) 665-2200.

VictoriaAdvocate.com

VICTORIA ADVOCATE, Tuesday, February 9, 2016 A3

CROSSROADS

EVENT

CONTRIBUTED GRAPHIC

Dog lovers, friends fight cancer with Mardi Paw

Proceeds will benefit American Cancer Society, Relay for Life

BY LAURA GARCIA
LGARCIA@VICAD.COM

It's not too late to sign up for Victoria's first Mardi Paw Bark For Life.

Families and their furry friends will celebrate the lifelong contributions of canine caregivers to cancer patients at the Mardi Gras-themed fundraiser.

The dog-friendly event will be from 4 to 8 p.m. Tuesday at the Victoria Country Club grounds, 14 Spring Creek Drive.

Keisha Smith, community manager for the American Cancer Society, said the event was organized to give people a chance to socialize with other dog owners and dogs while benefiting the American Cancer Society Relay For Life movement.

"There are a lot of people who got through their own cancer because of their furry companion," she said.

The celebration will include a dress-up contest, music, food, dog-related giveaways and a chance to win a staycation.

Chef James Fonte, of the Victoria Country Club, is sharing his jambalaya-style paella with event goers.

The event is part of the American Cancer Society Relay For Life of Victoria County, which is celebrating its 20th anniversary this year.

Funds raised help the American Cancer Society save lives by funding groundbreaking medical research, supporting education efforts and providing free information and critical services for cancer patients.

Registration at the event is $25 for the first dog and $15 thereafter with up to three dogs total.

All breeds and sizes are welcome on a leash.

"It should be a really good time," she said. "You can hang out with other people who love their dogs as much as you do."

No pup? No problem.

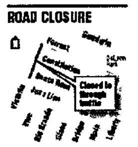
Anyone can attend the event with a donation at the door, Smith said.

IF YOU GO

Mardi Paw Bark For Life

- **WHAT:** People and canines come together for fun photos, contests, food and to honor the lifelong contributions of canine caregivers to cancer patients and survivors. Participants will raise funds to help the American Cancer Society Relay For Life.
- **WHEN:** 4 p.m.-8 p.m. Tuesday; costume contest starts at 6 p.m.
- **WHERE:** Victoria Country Club Grounds, 14 Spring Creek Drive
- **REGISTER:** Visit relayforlife.org/victoriacotx or call the American Cancer Society at 361-578-2840

ROAD CLOSURE



Starting Tuesday, the city of Victoria will close Victoria Street from Santa Rosa to [illegible] to through traffic for utility [illegible]. This road closure is expected to take 2 days, weather permitting.

ENTERTAINMENT

Musical explores 'New World' of theater

Show features 19 songs performed by cast of 4 actors

BY JON WILCOX
JWILCOX@VICAD.COM

Theatre Victoria's latest production is risky – but rewarding.

"It's not Rodgers and Hammerstein," said Scott Mohon, executive director for Theatre Victoria. "It's truly contemporary."

From Friday to Feb. 20, Victoria's most esteemed drama company will present its latest production, "Songs for a New World," an artistically daring but surprisingly relatable musical by Jason Robert Brown.

"We took a risk on producing this show and we ask our community to take a risk and come see it," Mohon said.

Composed of 19 three- to five-minute songs, this contemporary production follows 16 characters played by four actors in a variety of settings, Mohon said.

"There really is no story line," he said. "For lack of better words, I kind of call it abstract."

The production by Theater Victoria stars local actors Sarah Labadie, Michael Teer, Teresa Williams and John Michael Urbano.

Despite the assortment of times and locales, the musical finds unity in a central theme: finding promise in new worlds and possibilities.

"It's about humanity and heart and whether we listen to ourselves or we listen to other people," Mohon said.

The musical numbers are sometimes hilarious, moving and inspiring, often straddling lines between multiple emotions at once.

One humorous song follows Mrs. Claus as she ponders her own life and happiness in her relationship with Santa Claus.

Another centers on a woman voyaging to the New World across the ocean on board a sailing ship.

That song asks "What is my New World?" Mohon said, answering: "It may not always be what you think it is."

And the songs sung by the four actors are challenging and rewarding as the musical's unique format, Mohon said.

Although the vocal ranges were difficult to master and rhythms unconventional, rehearsal has been a joy for Mohon and the cast, he said.

"It has been quite a wonderful challenge," he said. "We've never done a musical like this before."

IF YOU GO

- **WHAT:** Seven performances of "Songs for a New World"
- **WHEN:** 7:30 p.m. Friday; 7:30 p.m. Saturday; 7:30 p.m. Sunday; 6:30 p.m. Feb. 16 (Brush up rehearsal); 7:30 p.m. Feb. 18; 7:30 p.m. Feb. 19 and 7:30 p.m. Feb. 20
- **WHERE:** Leo J. Welder Center at 214 N. Main St.
- **COST:** $19 to $25, available at the Leo J. Welder Center box office at 361-570-TKTS and online at weldercenter.org

For more information or to purchase tickets, call 361-570-8587 or visit theatrevictoria.org

NICOLE SALAZAR/NSALAZAR@VICAD.COM
Michael Teer sings during a rehearsal of "Songs of a New World."

COUNTY COMMISSIONERS

Airport repainting cost drops sharply

New figures beat original estimate by more than $100K

BY BIANCA R. MONTES
BMONTES@VICAD.COM

Much like the runway stripes needing to be repainted at the Victoria Regional Airport, the cost to for them also has faded.

Victoria County Commissioners approved spending about half a million dollars on the project in January. The plan included both removing old paint and restriping the miles of runway and taxiway at the airport. After changing the scope of the project, Airport Director Jason Milewski said they were able to drop the costs significantly.

"We went back and looked at all the paint and decided what exactly had to be removed and what could get a couple other layers of paint," Milewski said. "With that fixed, we estimated the bids would be about $320,000."

County Commissioners received six bids for the project Monday, ranging in price from about $157,000 to about $247,000.

All bided with the expectation that the work needed to be completed by April 1.

"The fact that they all came in significantly lower than what we estimated is very good for the county," Milewski said. "It means there's a lot of competition, and it means the contractors are eager."

Airport Manager Fred Watts said the urgency to get the markings repainted now surrounds changes made by the Federal Aviation Administration in how safety inspections are conducted.

In prior years, he said, inspectors would look at the paint and make judgments on how opaque and reflective it was by eye. This year, he said, they'll use swatches to make sure it is up to standards.

Lynn Lunsford, a public affairs manager for the FAA, said the administration has been taking steps to improve pavement marking across the nation to cut down on incidents in which confused pilots end up on the wrong runways or taxiways.

County Judge Ben Zeller said he was pleased with the bids, calling them "fantastic."

"It seems like everything in government costs more than it should and comes in over budget," he said. "But this project proved to be an exception to that rule."

Zeller said the low bids will allow the county to keep hundreds of thousands of dollars in the bank for use in providing other county services.

Commissioners also seemed shocked at the low bids. Commissioner Kevin Janak questioned, "this is for all of the work?"

Somewhat hesitant, Commissioner Danny Garcia wanted assurance the bids were correct, adding that he didn't want to see a bunch of change orders down the road.

"No change orders," he said.

Before the commissioners will select a company for the work, airport officials and representatives from Urban Engineers will review the bids to ensure accuracy.

"We will look at every number and every calculation to make sure there are no math errors," Milewski said.

Commissioners have scheduled to vote Feb. 15 on which bid to accept.

PROJECT BIDS

- American Stripers of Columbia, Tenn. – $218,406.81
- Artell's of German, Pa. – $222,133.70
- Dalton Hydroblasting of Sanford, Fla. – $246,650.52
- Eagle Airport Marking of Fillmore County – $216,209.68
- Hi-Lite Airfield Services of Adams Center, N.Y. – $156,991
- Hydro Blasting of Wills Point – $194,841.06

POP UP PARTY

- **WHEN:** 6-10 p.m. Feb. 19
- **WHERE:** Victoria Art Center Hangar, 609 Foster Field Dr.
- **WHAT:** People will be able to "fuel up" with food from the Tortilla Gourmet and Mas Cafe food trucks with cuisine inspired by a trip to South America with a nod to the glamorous days of aviation. The event is for the 21 and older crowd only.
- **BENEFITING:** American Cancer Society Relay For Life
- **CONTACT:** For more information or to sponsor Relay For Life enhancers and events, contact Keisha Smith at 361-578-2840

HOW THE VICTORIA COUNTY COMMISSIONERS VOTED 2/8/2016

Item	Line action	Votes in favor	Votes against	Abstentions	Result	Date
9	[illegible]	7	0	0	Received	2/8/2016
10	[illegible]	7	0	0	Received	2/8/2016
11	[illegible]	7	0	0	Approved	2/8/2016
12	[illegible]	7	0	0	Received	2/8/2016
13	[illegible]	7	0	0	Received	2/8/2016
14	[illegible]	7	0	0	Approved	2/8/2016
15	[illegible]	7	0	0	Approved	2/8/2016
16	[illegible]	7	0	0	Approved	2/8/2016
17	[illegible]	7	0	0	Authorized	2/8/2016
18	[illegible]	7	0	0	Approved	2/8/2016
19	[illegible]	7	0	0	Approved	2/8/2016

[illegible]

ALCOA/LAVACA BAY SUPERFUND SITE
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The Site, which covers approximately 3,500 acres, is located on the south side of State Highway 35, near the City of Point Comfort, Texas, and is adjacent to Lavaca Bay on the west and Cox Creek/Cox Lake on the east. Although all areas of the Site were investigated during the Remedial Investigation, the EPA determined in the 2001 ROD that only certain areas of Lavaca Bay, the Dredge Island and two on land areas (Chlor-Alkali Process Areas and Witco Area) required remediation. The review should take approximately three to six months to complete and the review results will be made available to the public at the following information repository:

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For more information about the Site, contact Gary Baumgarten, U.S. EPA Remedial Project Manager at (214) 665-6749, toll free at 1-800-533-3508 or by email at baumgarten.gary@epa.gov

All media inquiries should be directed to the EPA Press Office at (214) 665-2200

APPENDIX B – INTERVIEWS

SUPERFUND FIVE-YEAR REVIEW INTERVIEW RECORD		
Site Name: Alcoa (Point Comfort) / Lavaca Bay	**EPA ID No.:** TXD 008123168	
Location: Point Comfort, Texas	**Date of Interview:** April 4, 2016	**Interview Method:** email
Contact Made By:		
Name: Gary Baumgarten	**Title:** Project Manager	**Organization:** EPA Region 6
Telephone No: (214) 665-6749 **E-Mail:** baumgarten gary@epa gov	**Street Address:** 1445 Ross Avenue, Suite 1200 **City, State, Zip:** Dallas, Texas 75202	
Individual Interviewed		
Name: Anna Lund	**Title:** Project Manager	**Organization:** TCEQ
Telephone No: (210) 403-4020 **E-Mail:** anna lund@tceq texas gov	**Street Address:** TCEQ - Office of Waste Superfund Section (MC-136) Remediation Division P O Box 13087 **City, State, Zip:** Austin, TX 78711-3087	
Interview Questions		

1. What is your overall impression of the work conducted at the site since March 2006?

Response: All work conducted at the site was in compliance with the Consent Decree, dated February 2005. After the remedy construction completion, the Quarterly and Remedial Action Annual Effectiveness Reports were submitted to the agencies in accordance with the approved schedule. The reports presented an evaluation of the performance of the hydraulic control system at CAPA, natural recovery of sediments in Lavaca bay, trends in fish/shellfish tissue values, and the Operation and Maintenance activities. Additionally, Alcoa voluntarily performed several supplemental sampling events in the Closed Area. The project efforts were effective, proactive and efficient.

2. From your perspective, what effect have remedial operations at the site had on the surrounding community?

Response: The surrounding community is well informed about the site remedial operations through the Community Relations Program. This program is active and has a very positive effect on the community.

3. Are you aware of any ongoing community concerns regarding the site or its operation and maintenance? If so, please provide details.

Response: In June 2014, the Texas Department of State Health Services (DSHS), Health Assessment and Toxicology program (HAT), was in the Lavaca Bay area to conduct educational outreach activities regarding fishing in Lavaca Bay.

In March 2015, Amanda Raby, founder of the group Wiv Luv, met with Alcoa and EPA to discuss the possibility of depositing large bags of oyster mushroom compost in Lavaca Bay marshes surrounding the Federal Superfund site. After the meeting, it was determined that the oyster mushroom compost would not be deposited in the bay.

4. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please describe purpose and results.

Response: As a technical support to the EPA, the TCEQ participated in the documents review process, project status discussion meetings, site inspections, oversight field activities, and in the Citizens Advisory Panel to Alcoa Community meetings.

5. Are you aware of any events, incidents, or activities that have occurred at the site such as dumping, trespassing, vandalism, or anything that required emergency response from local authorities? If so, please give details.

Response: I am not aware of any events, incidents, or activities that have occurred at the site such as dumping, trespassing, vandalism, or anything that required emergency response from local authorities.

6. Have there been any complaints, violations, or other incidents related to the site that required a response by your office? If so, please summarize the events and result.

Response: Our office has not responded to any of the above.

7. Are you aware of any problems or difficulties encountered which impacted the effectiveness of the remedial action, or a change in O&M procedures? If so, please describe changes and impacts.

Response: Alcoa has been very proactive and continues to conduct additional studies to identify mercury hotspots in the closed area of Lavaca Bay. These studies are the result of this closed area not recovering as quickly as they once thought it would at the time of the ROD. Mercury levels in juvenile blue crabs and red drum remain elevated. That's the only concern with the site progress,

but Alcoa knows about this issue, and EPA & TCEQ have discussed this with them recently which prompted additional supplemental studies.
8. Have there been any changes in state or federal environmental standards since 2006 which may call into question the protectiveness or effectiveness of the remedial action? **Response:** To my knowledge, there have been no changes in state or federal environmental standards since 2006 which may call into question the protectiveness or effectiveness of the remedial action.
9. Do you know of opportunities to optimize the operation, maintenance, or sampling efforts at the site since 2006, and have such changes been implemented? **Response:** Alcoa conducted additional studies during the Fall of 2015, which proposed collection of data to build upon the body of information developed during the RI. Two additional studies are planned for April 2016
10. Do you feel well-informed about the site's activities and progress? If not, please indicate how you would like to be informed about site activities – for example by e-mail, regular mail, fact sheets, meetings, etc. **Response:** In general, the TCEQ is well-informed about the site's activities and progress.
11. Do you have any comments, suggestions, or recommendations regarding the site's management or operation? **Response:** There appears to be excellent site management.

APPENDIX C - REFERENCE LIST

ALCOA Inc. 1999. "Remedial Investigation Report, Alcoa (Point Comfort)/Lavaca Bay Superfund Site." November.

ALCOA Inc 2000. "Feasibility Study, Alcoa (Point Comfort)/Lavaca Bay Superfund Site."

ALCOA Inc. 2012. "2011 Remedial Action Annual Effectiveness Report, Alcoa (Point Comfort)/Lavaca Bay Superfund Site, Point Comfort, Texas." March 31.

ALCOA Inc. 2013. "2012 Remedial Action Annual Effectiveness Report, Alcoa (Point Comfort)/Lavaca Bay Superfund Site, Point Comfort, Texas." March 31.

ALCOA Inc. 2014 "2013 Remedial Action Annual Effectiveness Report, Alcoa (Point Comfort)/Lavaca Bay Superfund Site, Point Comfort, Texas." March 31.

ALCOA Inc. 2015. "2014 Remedial Action Annual Effectiveness Report, Alcoa (Point Comfort)/Lavaca Bay Superfund Site, Point Comfort, Texas " March 31.

ALCOA Inc. 2016. "2015 Remedial Action Annual Effectiveness Report, Alcoa (Point Comfort)/Lavaca Bay Superfund Site, Point Comfort, Texas." March 31.

U.S. Environmental Protection Agency (EPA), 2001. "Comprehensive Five-Year Review Guidance." EPA 540-R-01-007. June.

EPA. 2001. "Record of Decision for the Alcoa (Point Comfort)/Lavaca Bay Superfund Site." December.

EPA. 2007a. "Explanation of Significant Differences for the Alcoa (Point Comfort)/Lavaca Bay Superfund Site." May

APPENDIX D – SITE FIGURES AND TABLES

Figure 1 – Site Map

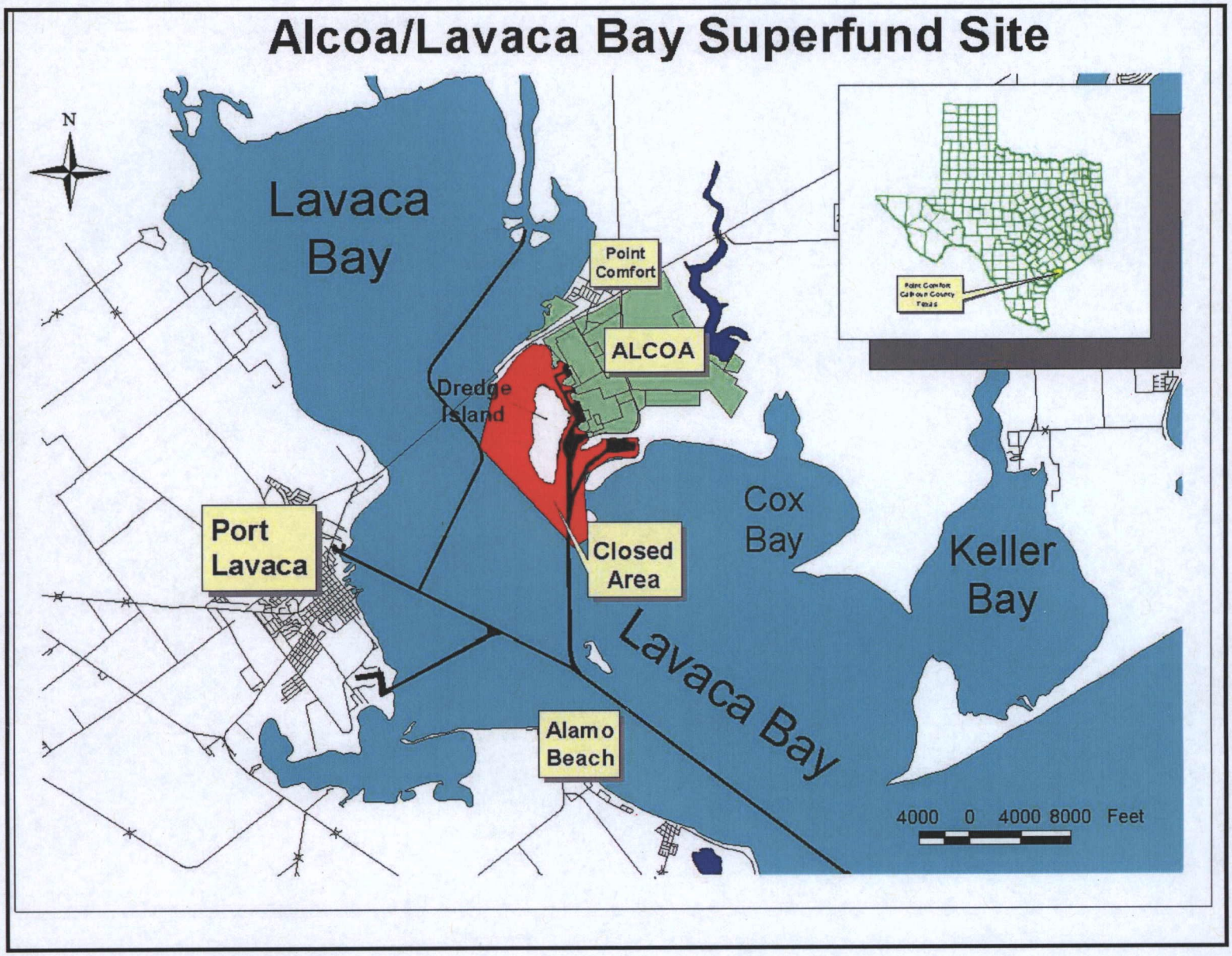

Figure 2 – CAPA Groundwater Potentiometric Surface

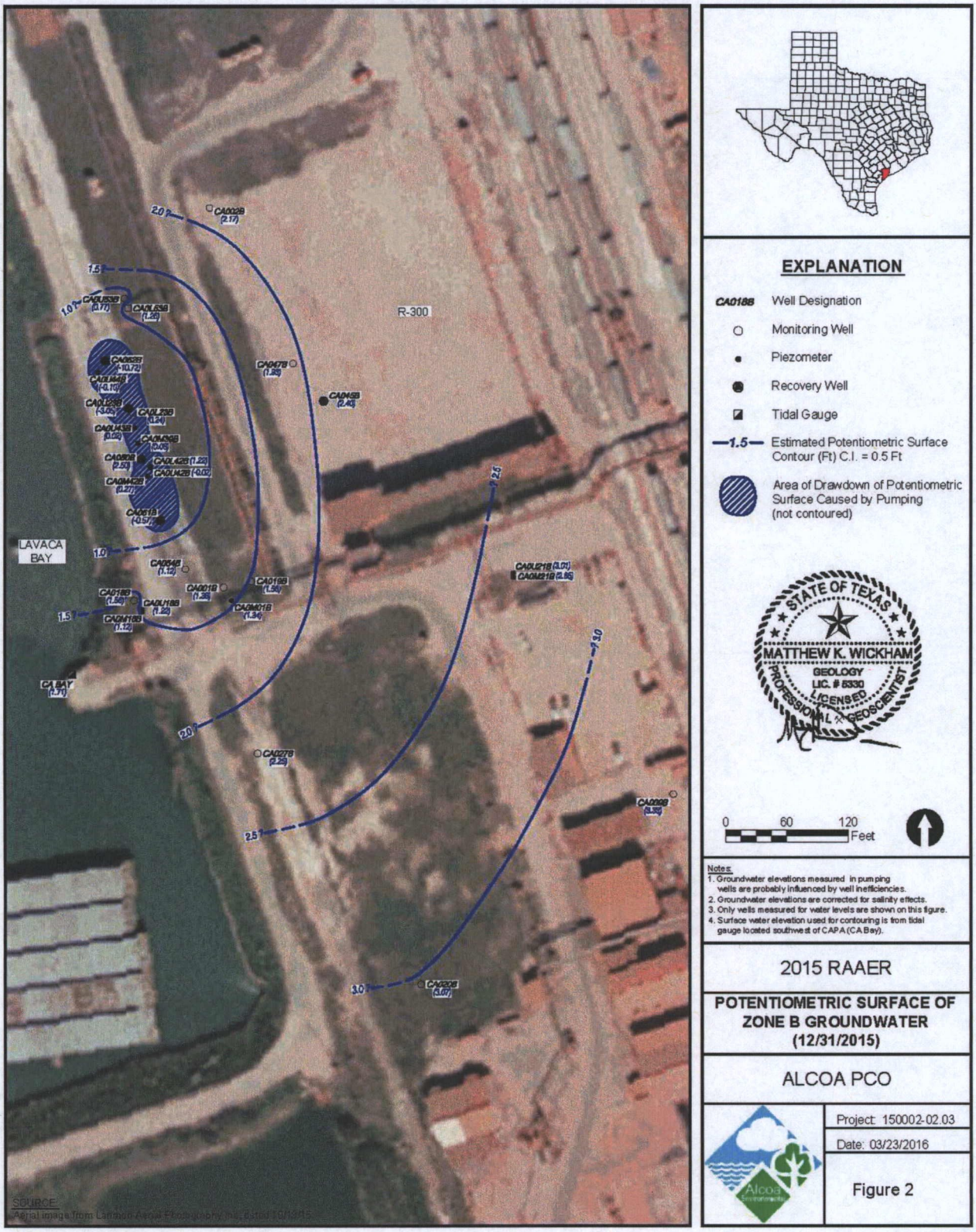

Figure 3

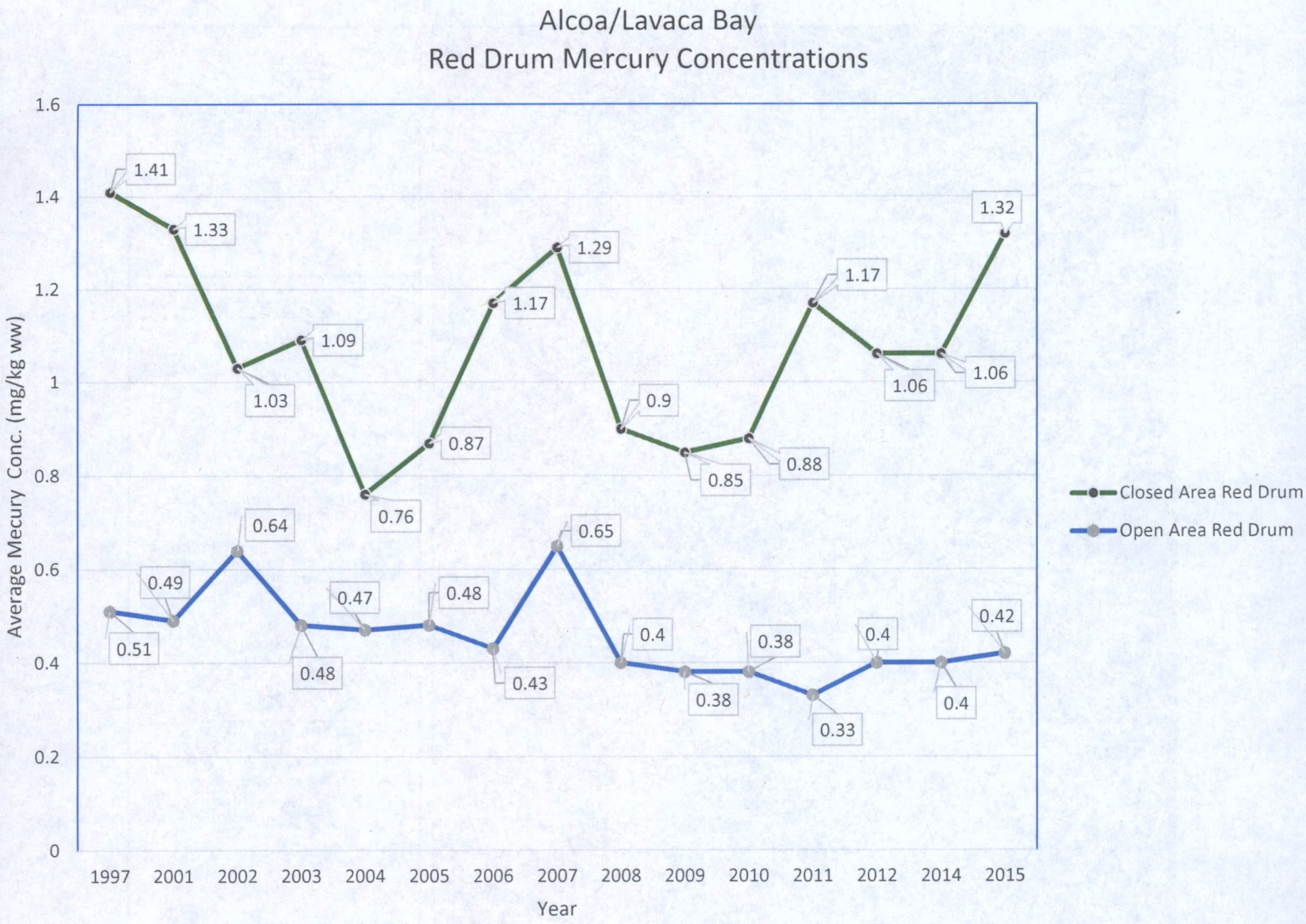
Alcoa/Lavaca Bay
Red Drum Mercury Concentrations
Average Mecury Conc. (mg/kg ww)
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1997
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2014
2015
Year
1.41
1.33
1.03
1.09
0.76
0.87
1.17
1.29
0.9
0.85
0.88
1.17
1.06
1.06
1.32
0.51
0.49
0.64
0.48
0.47
0.48
0.43
0.65
0.4
0.38
0.38
0.33
0.4
0.4
0.42
Closed Area Red Drum
Open Area Red Drum

Table 1

Mercury Removed at CAPA Groundwater Treatment System

	Pounds Mercury Recovered per CAPA Well				
Year	**CAO50B**	**CAO51B**	**CAO52B**	**CAO23B**	**Mercury Removed from all wells (lbs)**
1998	20.67	4.62	0.30	11.81	37.40
1999	10.59	2.51	1.28	7.39	21.77
2000	9.05	2.28	0.83	4.85	17.01
2001	7.45	1.71	0.33	1.85	11.34
2002	4.70	0.90	0.21	2.55	8.36
2003	7.14	0.62	0.20	1.48	9.44
2004	4.66	0.41	0.16	1.38	6.61
2005	7.85	0.68	0.14	1.08	9.75
2006	5.35	0.79	0.15	0.89	7.18
2007	4.33	0.73	0.10	0.49	5.65
2008	10.99	0.97	0.19	0.98	13.13
2009	4.92	0.76	0.13	0.69	6.50
2010	3.31	0.41	0.09	0.72	4.53
2011	3.07	0.15	0.05	0.66	3.92
2012	4.00	0.24	0.06	0.60	4.89
2013	4.39	0.14	0.05	0.56	5.13
2014	4.07	0.06	0.04	0.83	5.00
2015	4.36	0.14	0.04	0.90	5.44
Cumulative Total	120.90	18.12	4.32	39.71	183.05

Table 2

Summary of Marsh Sediment Mercury Concentration

Marsh ID	2008	2009	2010	2011	2012	2014	2015
Marsh 1	0.097	0.112	0.113	0.131	0.094	0.098	0.098
Marsh 2	0.084	0.073	0.081	0.064	0.062	0.062	0.035
Marsh 3	0.111	0.155	0.148	0.116	0.132	0.093	0.064
Marsh 5	0.375	0.399	0.405	0.286	0.200	0.231	0.124
Marsh 6	0.748	0.422	0.384	0.300	0.219	0.188	0.178
Marsh 7	0.422	0.391	0.219	0.381	0.308	0.139	0.207
Marsh 11	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Marsh 14	1.261	1.109	0.535	0.719	Removed	Removed	Removed
Marsh 15	0.418	0.374	0.440	0.480	0.287	0.034	0.022
Marsh 19	0.155	0.201	0.210	0.353	2.055	0.095	0.068

Notes:

1. Concentrations are milligrams per Kilogram, dry weight
2. Remediation goal is 0.25 mg/Kg mercury
   (highlighted if goal is met
3. N.A. – not analyzed
4. EPA agreed to suspend the sediment and tissue monitoring activities in Lavaca Bay during 2013 as the samples might be biased by the short-term temporary disturbances created by the Marsh 14 dredging project. Therefore the 2013 RAAER does not present any new sediment and tissue monitoring data.

Table 3

Summary of Mercury Concentration in Red Drum and Juvenile Blue Crab

	Closed Area	**Adjacent Open Area**
Red Drum Sampling Event	Mean Mercury Concentration (mg/Kg ww)	Mean Mercury Concentration (mg/Kg ww)
4th Quarter 1997	1.41	0.51
2001 Annual	1.33	0.49
2002 Annual	1.03	0.64
2003 Annual	1.09	0.48
2004 Annual	0.76	0.47
2005 Annual	0.87	0.48
2006 Annual	1.17	0.43
2007 Annual	1.29	0.65
2008 Annual	0.90	0.40
2009 Annual	0.85	0.38
2010 Annual	0.88	0.38
2011 Annual	1.17	0.33
2012 Annual	1.06	0.40
2014 Annual	1.06	0.40
2015 Annual	1.32	0.42
Juvenile Blue Crab Sampling Event	Mean Mercury Concentration (mg/Kg ww)	Mean Mercury Concentration (mg/Kg ww)
4th Quarter 1997	0.59	0.19
2001 Annual	0.48	0.22
2002 Annual	0.26	0.11
2003 Annual	0.25	0.07
2004 Annual	0.14	0.07
2005 Annual	0.22	0.05
2006 Annual	0.21	0.08
2007 Annual	0.18	0.08
2008 Annual	0.16	0.06
2009 Annual	0.22	0.09
2010 Annual	0.23	0.09
2011 Annual	0.17	0.06
2012 Annual	0.14	0.06
2014 Annual	0.18	0.07
2015 Annual	0.10	0.04

EPA agreed to suspend the sediment and tissue monitoring activities in Lavaca Bay during 2013 as the samples might be biased by the short-term temporary disturbances created by the Marsh 14 Dredging Project. Therefore the 2013 RAAER does not present any new sediment and tissue monitoring data

APPENDIX E – SITE INSPECTION PHOTOS AND CHECKLIST

Figure 1 - CAPA Water Treatment System

Figure 2 - Warning sign at former CAPA Facility

Figure 3 - Mainland Shoreline No. 3 (looking south)

Figure 4 - Southwest area of Dredge Island

Figure 5 - Confined Disposal Facility Inner Dike Area

Figure 6 - North Decant Structure

Figure 7 - Fish Closure Sign along Highway 35

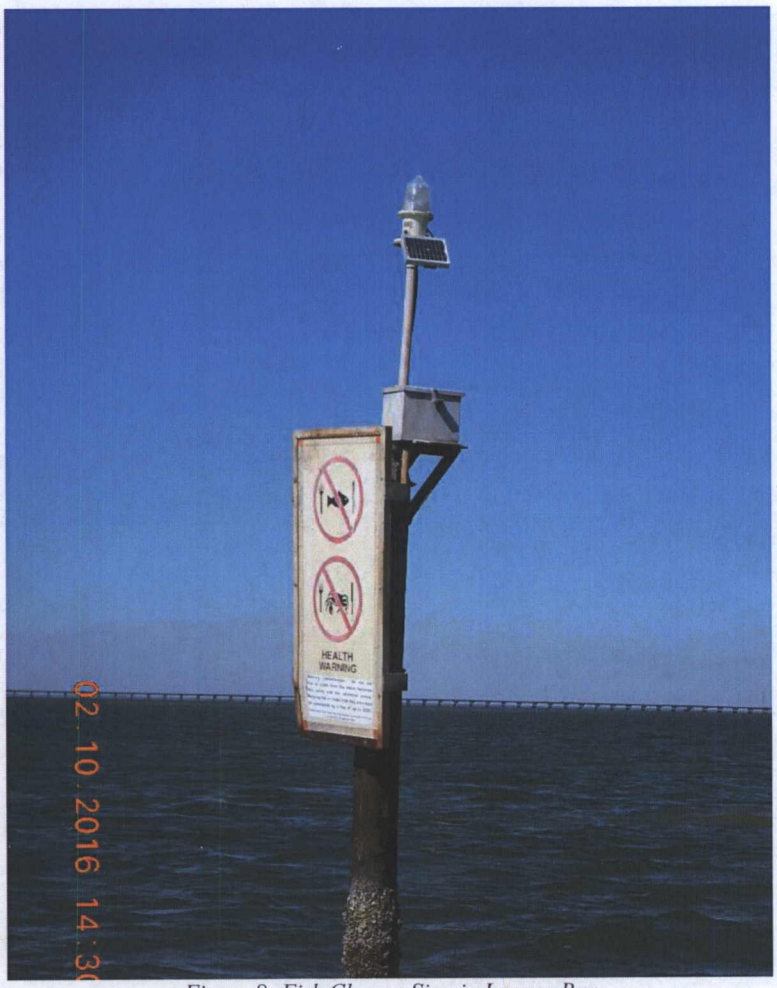

Figure 8- Fish Closure Sign in Lavaca Bay

Site Inspection Checklist

I. SITE INFORMATION

Site name: Alcoa (Point Comfort) / Lavaca Bay	**Date of inspection:** February 10, 2016
Location: Point Comfort, TX	**EPA ID:** TXD 008123168
Agency, office, or company leading the five-year review: EPA Region 6	**Weather/temperature:** Clear; approximately 70° F

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls (Witco, CAPA, Bay)
- ☒ Institutional controls
- ☒ Groundwater pump and treatment (CAPA)
- ☐ Surface water collection and treatment
- ☒ Other

Witco Area - DNAPL Collection System

Lavaca Bay – Monitoring and natural recovery of sediment

CAPA – capping of building R-300 area

Witco Area - capping

Dredge Island – stabilization/fortification

- ☐ Monitored natural attenuation
- ☒ Groundwater containment (chlor-alkali process area)
- ☐ Vertical barrier walls

Attachments: ☒ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** _____ _____ _____
   Name Title Date

   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____

2. **O&M staff** _____ _____ _____
   Name Title Date

   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

   Agency Texas Commission on Environmental Quality
   Contact Anna Lund Project Manager _____ 210-403-4020
   Name Title Date Phone no.

   Problems; suggestions; ☐ Report attached Interview form included as attachment to the Five-Year Review Report

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.

Problems; suggestions; ☐ Report attached _____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.

Problems; suggestions; ☐ Report attached _____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.

Problems; suggestions; ☐ Report attached _____

4. **Other interviews** (optional) ☐ Report attached. Interview form included as attachment to the Five-Year Review Report

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

☒ O&M manual	☒ Readily available	☒ Up to date ☐ N/A
☒ As-built drawings	☒ Readily available	☒ Up to date ☐ N/A
☒ Maintenance logs	☒ Readily available	☒ Up to date ☐ N/A

Remarks _____

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A

☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☐ N/A

Remarks _____

3. **O&M and OSHA Training Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks _____

4. **Permits and Service Agreements**

☐ Air discharge permit ☐ Readily available ☐ Up to date ☒ N/A

	☐ Effluent discharge	☒ Readily available	☒ Up to date ☐ N/A
	☐ Waste disposal, POTW	☐ Readily available	☐ Up to date ☒ N/A
	☐ Other permits_____	☐ Readily available	☐ Up to date ☒ N/A
	Remarks_____		
5.	**Gas Generation Records**	☐ Readily available	☐ Up to date ☑ N/A
	Remarks_____		
6.	**Settlement Monument Records**	☐ Readily available	☐ Up to date ☑ N/A
	Remarks_____		
8.	**Leachate Extraction Records**	☐ Readily available	☐ Up to date ☑ N/A
	Remarks_____		
9.	**Discharge Compliance Records**		
	☐ Air	☐ Readily available	☐ Up to date ☑ N/A
	☑ Water (effluent)	☐ Readily available	☐ Up to date ☐ N/A
	Remarks_____		
10.	**Daily Access/Security Logs**	☐ Readily available	☐ Up to date ☐ N/A
	Remarks_____		

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for State
☒ PRP in-house ☒ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other_____

2. **O&M Cost Records**

☒ Readily available ☒ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate_____ ☐ Breakdown attached

Estimated O&M Costs from the ROD and Action Memo are as follows:

CAPA Groundwater	$110,000 per year
Fish/Shellfish Monitoring	$140,000 to $200,000 per year
Sediment Monitoring	$100,000 per year
Witco Area	$ 44,000 per year

Dredge Island $ 50,000 per year

Total annual cost by year for review period if available

Average Actual O&M Cost received from Alcoa

Fish Tissue & Sediment Monitoring	~ $165,000 per year
CAPA Groundwater	~ $ 90,000 per year
Witco Area	~ $ 20,000 - $25,000 per year
Dredge Island	~ $ 25,000 - $75,000 per year

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☐ Gates secured ☒ N/A

Remarks_____

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A
Remarks: Appropriate signs have been placed at CAPA and Witco to notify that permission is required to work in these areas

C. Institutional Controls (ICs) Prior to receiving a Certificate of Completion of the Remedial Action, Alcoa shall submit to EPA and the TCEQ for approval deed record documents that implement the institutional controls specified in the ROD for the soils in the Chlor-Akali Process Area and the Former Witco Area. The deed records shall:

- identify the location of caps, barriers, and containment systems constructed as part of the Remedial Action to notify future purchasers or users of the property that excavation in these areas may cause a release of hazardous substances to the environment.

- restrict the construction of any buildings, wells, pipes, roads, ditches, fences, channels, cables, or any other structures - fixtures or otherwise - by any person in a manner not consistent with the ROD.

Alcoa issues updated memoranda to plant staff and contractors to note that construction activities were conducted at the Witco and CAPA areas as part of the Superfund cleanup activities. Plant personnel and contractors are reminded that they should not drive in the capped areas and that if they do drive in those areas they face severe discipline up to and including dismissal.

The fish closure order originally established by the Texas Department of Health (now the Texas Department of State Health Services [TDSHS]) in 1988 and updated in January 2000 remains in place to control the consumption of finfish and shellfish from the "Closed Area". Based on input from TDSHS and the City of Point Comfort, Alcoa installed new fish closure warning signs in areas where people fish from the shoreline in the closure area. The new signs were installed in November 2014 and present information about the fish closure in three languages (English, Spanish and Vietnamese).

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented
☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced
☐ Yes ☒ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) _____
Frequency _____
Responsible party/agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.

Reporting is up-to-date
☐ Yes ☐ No ☐ N/A

Reports are verified by the lead agency
☐ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met
☐ Yes ☐ No ☐ N/A

Violations have been reported
☐ Yes ☐ No ☐ N/A

Other problems or suggestions: ☐ Report attached

_____
_____
_____
_____

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks _____
_____

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident

Remarks _____
_____

2. **Land use changes on site** ☐ N/A

Remarks No land use changes identified

3. **Land use changes off site** ☒ N/A
Remarks

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A
Remarks

B. Other Site Conditions

VII. LANDFILL COVERS ☒ Applicable ☐ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☒ Settlement not evident
Areal extent Depth
Remarks

2. **Cracks** ☐ Location shown on site map ☒ Cracking not evident
Lengths Widths Depths
Remarks

3. **Erosion** ☐ Location shown on site map ☒ Erosion not evident
Areal extent Depth
Remarks

4. **Holes** ☐ Location shown on site map ☒ Holes not evident
Areal extent Depth
Remarks

5. **Vegetative Cover** ☐ Grass ☒ Cover properly established ☐ No signs of stress
☐ Trees/Shrubs (indicate size and locations on a diagram)
Remarks

6. **Alternative Cover (armored rock, concrete, etc.)** ☒ N/A
Remarks

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
Areal extent Height
Remarks none identified

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident
☐ Wet areas ☐ Location shown on site map Areal extent

☐ Ponding ☐ Location shown on site map Areal extent_____
☐ Seeps ☐ Location shown on site map Areal extent_____
☐ Soft subgrade ☐ Location shown on site map Areal extent_____
Remarks none identified

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☒ No evidence of slope instability
Areal extent_____
Remarks_____

B. Benches ☐ Applicable ☒ N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay
Remarks_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay
Remarks_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay
Remarks_____

C. Letdown Channels ☐ Applicable ☒ N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement
Areal extent_____ Depth_____
Remarks_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type_____ Areal extent_____
Remarks_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent_____ Depth_____
Remarks_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____

5. **Obstructions** Type_____ ☐ No obstructions
☐ Location shown on site map Areal extent_____
Size_____
Remarks_____

6. **Excessive Vegetative Growth** Type_____

☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent_____
Remarks_____

D. Cover Penetrations ☐ Applicable ☒ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance
☐ N/A
Remarks_____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____

3. **Monitoring Wells** (within surface area of landfill)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____

4. **Leachate Extraction Wells**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A
Remarks_____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**
☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
☐ Good condition ☐ Needs Maintenance
Remarks_____

2. **Gas Collection Wells, Manifolds and Piping**
☐ Good condition ☐ Needs Maintenance
Remarks_____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
☐ Good condition ☐ Needs Maintenance ☐ N/A
Remarks_____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
Remarks_____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
Remarks

G. Detention/Sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent Depth ☐ N/A
☐ Siltation not evident
Remarks

2. **Erosion** Areal extent Depth
☐ Erosion not evident
Remarks

3. **Outlet Works** ☐ Functioning ☐ N/A
Remarks

4. **Dam** ☐ Functioning ☐ N/A
Remarks

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
Horizontal displacement Vertical displacement
Rotational displacement
Remarks

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident
Remarks

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident
Areal extent Depth
Remarks

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
☐ Vegetation does not impede flow
Areal extent Type
Remarks

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent Depth
Remarks

4. **Discharge Structure** ☐ Functioning ☐ N/A
Remarks

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Performance Monitoring** Type of monitoring_____
   ☐ Performance not monitored
   Frequency_____ ☐ Evidence of breaching
   Head differential_____
   Remarks_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☒ Applicable ☐ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
   ☒ Good condition ☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A
   Remarks_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   ☒ Good condition ☐ Needs Maintenance
   Remarks_____

3. **Spare Parts and Equipment**
   ☒ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
   Remarks_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____

3. **Spare Parts and Equipment**
   ☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
   Remarks_____

C. Treatment System ☒ Applicable ☐ N/A

1. **Treatment Train** (Check components that apply)
   ☒ Metals removal ☐ Oil/water separation ☐ Bioremediation
   ☒ Air stripping ☒ Carbon adsorbers
   ☐ Filters_____

☐ Additive (*e.g.*, chelation agent, flocculent)_____
☐ Others_____
☒ Good condition ☐ Needs Maintenance
☒ Sampling ports properly marked and functional
☐ Sampling/maintenance log displayed and up to date
☒ Equipment properly identified
☒ Quantity of groundwater treated annually ~ 3 million gallons
☐ Quantity of surface water treated annually_____
Remarks_____

2. **Electrical Enclosures and Panels** (properly rated and functional)
☐ N/A ☒ Good condition ☐ Needs Maintenance
Remarks_____

3. **Tanks, Vaults, Storage Vessels**
☐ N/A ☒ Good condition ☐ Proper secondary containment ☐ Needs Maintenance
Remarks_____

4. **Discharge Structure and Appurtenances**
☐ N/A ☒ Good condition ☐ Needs Maintenance
Remarks_____

5. **Treatment Building(s)**
☐ N/A ☒ Good condition (esp. roof and doorways) ☐ Needs repair
☐ Chemicals and equipment properly stored
Remarks_____

6. **Monitoring Wells** (pump and treatment remedy)
☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition
☒ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks_____

D. Monitoring Data

1. **Monitoring Data**
☒ Is routinely submitted on time ☒ Is of acceptable quality

2. **Monitoring data suggests:**
☒ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks_____

X. OTHER REMEDIES

In addition to the hydraulic containment system at CAPA, and caps at the Witco Area and CAPA, the following remedial actions have been implemented or are being implemented.

Dredge Island: Alcoa conducts O&M on Dredge Island following completion of the non-time critical removal action in 2001. Inspections at Dredge Island are conducted quarterly and indicate that the island is in good shape and the performance objectives are met. Vegetation on armor storm has been removed and plans are in place to continue implementation of weed control program. The north decant structure shows corrosion of structural steel. Based on site observations, Alcoa has recommended and implemented restrictions on access to the structure. A safety inspection of the structure needs to be completed by a qualified structural engineer.

Fish/Shellfish and Sediment Monitoring: Alcoa conducts annual sampling of Lavaca Bay sediment in marsh and open water areas. Fish tissue and shellfish samples area also conducted annually to monitor the level of mercury. All data collected is presented in the annual remedial action report submitted to EPA and TCEQ.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The remedial action objectives (RAOs) for Lavaca Bay are: (1) eliminate or reduce to the maximum extent practical mercury loading from on-going unpermitted sources to Lavaca Bay; (2) reduce to an appropriate level mercury in surface sediments in sensitive habitats; and (3) reduce to an appropriate level mercury in surface sediments in open-water that represent a pathway by which mercury may be introduced into the food chain. These objectives are designed to allow the reduction of mercury levels in fish tissue such that the overall risk throughout Lavaca Bay will approach that which would be present but for the historic Point Comfort Operations. The ultimate result of remedial actions in Lavaca Bay will be the reduction of mercury in upper trophic level fish/shellfish to levels that would be protective of human consumption and not pose an unacceptable ecological risk.

The RAOs for mercury in sediment have two quantitative target cleanup goals, depending on the location of the sediment. The target cleanup goals are:

- For sediments in fringe marsh-type habitat, eliminate the exposure pathway that is presented by sediments that on average exceed 0.25 ppm mercury.
- For sediments in open-water habitat, eliminate the exposure pathway that is presented by sediments that on average exceed 0.5 ppm mercury.

The RAO for CAPA soils is to reduce the future exposure potential of site workers (e.g.,construction worker, general industrial worker, and maintenance worker) to mercury in soils in the Building R-300 vicinity. The RAO for soils in the Witco Area is to reduce the future exposure potential of site workers (e.g., construction worker, general industrial worker, and maintenance worker) to PAHs in surficial soils at the Stormwater Sump and Separator Area and Former Tank Farm Area.

The completed and ongoing remedial activities and natural recovery have resulted in downward trends in open water sediment and marsh sediment mercury concentrations in parts of the Closed Area. All of the marshes have achieved the remediation goal and the sediment remediation goal for open water sediment has been achieved.

The mercury concentrations of red drum collected in the Closed Area remain statistically elevated relative to red drum collected in the Adjacent Open Area. The red drum concentrations measured in 2015 are higher than those measured in 2011-14. The cause for the increase in fish tissue concentration in the Closed Area is unknown, and the five-year review includes recommended studies to evaluate causes for the upward trend in fish tissue concentrations.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

Inspections at Dredge Island are conducted quarterly and indicate that the island is in good shape and the performance objectives are met. Items that need to be addressed on Dredge Island include: 1) possible damage to the northeast decant structure below the mud line; 2) corrosion of metal portions of the decant structures.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

Concentrations of mercury in red drum from the Closed Area continue to be elevated when compared to the Adjacent Open Area. Using results from ongoing studies and future studies, the conceptual site model (CSM) should be updated and refined. The updated CSM along with the results of the studies should be used to develop a remedial action plan that once implemented, would reduce mercury levels in red drum.

D. Opportunities for Optimization

A remedial action plan needs to be developed to identify appropriate actions that should be taken to reduce mercury levels in red drum in the Closed Area. To develop the remedial action plan, work plans have been developed or will be developed to perform a series of focused investigations to answer the following questions:

- With total mercury levels in the Causeway marsh sediments approaching levels in the Open Area of Lavaca Bay, why has there not been a commensurate reduction in the mercury levels in red drum and juvenile blue crab in the vicinity of these marshes? The findings from studies related to this issue can be used to evaluate the existence of site-specific conditions in the marshes where enhanced methylation and uptake can occur even in the presence of low total mercury concentration in surficial sediments.
- Could red drum be accumulating a significant portion of their mercury burden through an uptake pathway not being monitored? The finding from studies related to this issue can be used to evaluate whether alternative mercury uptake pathways need to be considered in evaluating options to address elevated mercury levels in red drum and which prey items are most useful in tracking progress towards red drum recovery.
- Are there ongoing sources of the inorganic mercury on sediments transported into areas where conditions are favorable for enhanced methylation and uptake into the food web such as the Causeway marshes? The findings from studies related to this issue can be used to determine whether additional source controls may be necessary to address movement of inorganic mercury into areas where it can be readily methylated and enter the food chain.
- Are the fundamental findings from the mercury reconnaissance study conducted in 1996 still valid in terms of the depth of methylation and the locations in the bay system where high rates of mercury methylation and uptake are believed to occur? The findings from studies related to this issue can be used to assess whether revisions to the conceptual site model for mercury methylation are necessary and what locations should be considered as focus areas for evaluation of possible additional actions.