Draft

Remedial Action Report

Palmer Barge Line Superfund Site

April 16, 2008

EXHIBIT 1A

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1.0 Introduction

The Palmer Barge Line Superfund Site (Site ID # TXD068104561) is located on the western shore of Sabine Lake, in Jefferson County, Texas. The Site is approximately 4.5 miles east-northeast of the City of Port Arthur and is located on Old Yacht Club Road on the South Industrial Islet. It is bounded to the north by vacant property, to the west by Old Yacht Club Road, to the south by the State Marine Superfund Site, and to the east by Sabine Lake. The Site is located approximately 0.5 miles southwest of the confluence of the Neches River and the Sabine Neches Barge Canal. Figure 1 depicts the Site location.

This Remedial Action Report is provided to document the completion of Remedial Action for the Palmer Barge Line Superfund Site, to fulfill the requirements of the Unilateral Administrative Order issued by the United States Environmental Protection Agency (EPA), effective June 6, 2007. As required by the Statement of Work, this report is organized in accordance with the fact sheet *Remedial Action Report, Documentation for Operable Unit Completion*, Publication 9355.0-39FS, June 1992.

The Remedial Action Report is organized as follows:

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2.0 Operational Unit Background

Based on historical information (URS 2005a), the Palmer Barge Line Site is underlain by fill and sediment that was removed during dredging of the Intercoastal Waterways and the Sabine-Neches ship channel. The Site is generally flat, with surface drainage in an easterly direction towards Sabine Lake.

The Site, along with the adjacent properties to the north and south, were reportedly used as a municipal landfill by the City of Port Arthur for approximately 31 years. Although disposal at the landfill has ceased and the landfill contents are covered with dredged sediments, the contents remain on-site in shallow surface soils within two feet of ground surface in many areas.

In April 1982, Palmer Barge Line purchased approximately 17 acres from the City for the purpose of servicing and maintaining barges and marine vessels. Primary operations at the Palmer Barge Line facility included cleaning, degassing, maintenance, and inspection of barges and other marine equipment. Cleaning operations included the removal of sludge and other residual material by pressure steaming the vessel holds, engines and boilers. Engines were degreased and accumulations of sludge were removed. Degassing activities involved the removal of explosive vapors from vessel holds using nitrogen or boiler exhaust. Maintenance and inspection activities included the replacement and repair of valves, engine repairs, and line leak repairs followed by pressure tests. A flare was located in the central part of the Site and was used to burn excess gases and liquids produced during facility operations. Facility operations resulted in volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCB), and metal contamination in soils in some areas of the Site.

Regulatory and enforcement history of the Site began in December 1996 when the Texas Natural Resource Conservation Commission (TNRCC, now named the Texas Commission on Environmental Quality, or TCEQ), Region 10 Field Office personnel conducted a multi-media investigation for the purpose of determining the compliance status of the facility.

In March 1998, the TCEQ with EPA Region 6 conducted an investigation to identify potential sources and to sample soil and sediment. Sample results indicated the presence of metals, SVOC, and pesticides in on-site soil. Metals and SVOC were detected in offshore sediment adjacent to the Site.

In July 1999 the TCEQ sampled ASTs, roll-off boxes and "slop" tanks to characterize stored materials.

In October 1999, EPA Region 6 conducted an Expanded Site Inspection (ESI) of the Site to determine the presence and nature of constituent occurrence on-site and off-site and to determine migration routes and routes of exposure of site-related constituents. Six areas of concern were identified:

- Wastewater Above-ground Storage Tanks (ASTs);
- Boiler House ASTs;
- Open Slop Tanks;
- Horizontal ASTs in southeast portion of the Site;
- Twelve ASTs in eastern portion of the Site; and
- Flare.

Locations of these areas of concern are shown in Figure 2. Results of the inspection identified the presence of VOCs, SVOCs, pesticides, PCBs, and metals.

On July 27, 2000 the Site was added to the National Priorities List. During August 2000, EPA Region 6 conducted a Removal Action to remove material stored on-site. Activities included waste removal, water treatment, oil/water separation, and sludge stabilization and the removal of all ASTs except for a larger AST on the northern portion of the Site that contained sludge.

On September 30, 2002 EPA Region 6 issued an Administrative Order on Consent to conduct a Remedial Investigation and Feasibility Study (RI/FS) for the Site. URS Corporation, on behalf of the Potentially Responsible Parties (PRP), conducted a Remedial Investigation (RI) at the Site from September 30, 2002 to September 30, 2005 to characterize the nature and extent of constituents present in environmental media at the Site and in adjacent Sabine Lake surface water and sediments. EPA published notice of the completion of the Feasibility Study (FS) and of the proposed plan for Remedial Action on July 27, 2005, and provided opportunity for public comment on the proposed Remedial Action.

On September 30, 2005, EPA Region 6 accepted and certified the Record of Decision (ROD). After analyzing four proposed remedies for the Site presented in the ROD, the EPA, the State of Texas, and the local community decided on Alternative 4 - Excavation/Off-Site Disposal. A Unilateral Administrative Order for Remedial Design and Remedial Action was issued to the Palmer Barge PRP Committee, effective June 6, 2007.

URS Corporation was selected as the supervising contractor to assist in the execution of the Order. URS produced the Final Remedial Design/Remedial Action Work Plan (URS 2007) and

managed the Remedial Action for the Site. The Final Remedial Design/Remedial Action Work Plan was approved by the EPA on August 2, 2007.

The Baseline Human Health Risk Assessment (BHHRA) conducted for the Site in June 2005 indicates that the primary exposure scenarios of interest are the on-site industrial worker's potential exposure to constituents present in surface soil, and the off-site recreational fisherman's potential exposure via consumption of fish from Sabine Lake that may have accumulated site-related constituents from surface water and sediment. Primary sources of information used in the BHHRA are the Expanded Site Inspection Report (ESI) and the Remedial Investigation Report (RI) for Palmer Barge Line Superfund Site (URS 2005a). Constituents of Concern (COC) were identified in the RI. Preliminary Remediation Goals (PRG) for the Constituents of Concern were developed for the soil medium and soil concentrations from both the RI and ESI Investigations.

The EPA, in consultation with the TCEQ chose a 10^{-5} target cleanup level based on exposure to COCs that exceed those levels at surface soils (0 to 2 feet). The target cleanup level for lead is based on the EPA Region 6 medium specific screening level concentration for lead of 800 mg/kg for an industrial/commercial site. The Constituents of Concern and the selected remediation goals for the Human Health Risk Areas are presented in Table 1.

The results of the Screening Level Ecological Risk Assessment (SLERA) (URS 2005b) indicate that the COCs in Sabine Lake surface water and sediment do not pose risks of sufficient magnitude to require Remedial Action. The proposed ecological risk management decision for sediment is to allow degradation to naturally attenuate organic constituents and to implement on-site source control to prevent the potential for future impacts to Sabine Lake.

However, the SLERA indicates that Constituents of Concern identified in on-site surface soil could pose an unacceptable risk to terrestrial biota by the direct contact pathway, and to wildlife by the food/prey ingestion pathway, if receptors were present. Since future long-term industrial use of the Site is uncertain and potential exposure could occur if ecological succession were to proceed naturally, the selected remedy includes soil remediation to address the potential for future on-site ecological risk. Safe soil concentrations were developed for on-site soils that would be protective of ecological receptors. Ecological safe soil concentrations for on-site soils are presented in Table 2.

Within the six areas of concern identified in the RI, four locations exceeded the 10^{-5} target cleanup levels and were considered potential risk to human health. Seven locations exceeding the target cleanup levels for the site surface soils (0-2 feet) were considered potential ecological

risk areas. These Ecological Risk (EA) Areas and Human Health Risk Areas (HR) are shown in Figure 3.

As stated in the ROD, the Remedial Action objectives for the Palmer Barge Superfund Site are to:

- Prevent direct contact, ingestion, and inhalation of surface soils that exceed human health based levels, based on the industrial worker scenario, for the Constituents of Concern;
- Prevent off-site migration of Constituents of Concern to Sabine Lake sediments that exceed human and ecological based levels for the chemicals of concern; and
- Prevent exposure to site soils that may pose a risk to ecological receptors.

The selected remedy defined in the ROD was designed to protect human health and the environment and be protective of ecological receptors by removing materials that exceed risk-based criteria. The selected remedy consists of the following components:

- Excavate the upper two feet of soil that exceed human health and ecological risk based levels at each of the response areas;
- Collect confirmation samples at each of the response areas and analyze for constituents of potential concern;
- Backfill excavated areas with clean soil;
- Dispose excavated soils at an off-site permitted disposal facility;
- Implement Institutional Controls to restrict future land use to industrial purposes only by recording a restrictive covenant in the real property records of Jefferson County, Texas;
- Abandon five existing monitoring wells on-site; and
- Remove sludge from Wastewater Above-ground Storage Tank and dispose sludge at an off-site disposal facility. Decontaminate and recycle tank.

3.0 Construction Activities

As supervising contractor, URS was responsible for managing the logistics associated with the Remedial Action. The following pre-remediation activities were conducted: obtaining property access agreements, preparation of bid documents including technical specifications for the Remedial Action, subcontractor and laboratory selections, and sampling the Human Health and Ecological Risk Areas for the purposes of perimeter delineation, waste characterization and profiling, and acceptance of backfill material. These pre-remediation activities are described briefly in the sections below.

3.1 Property Access Agreements

An agreement allowing access to the property was obtained from property owner Mr. Chester Slay in November 2002 and remained in effect throughout the duration of the Remedial Design and Remedial Action. A copy of the agreement is provided in Appendix A.

3.2 Project Manual (Bid Specifications)

Bid instructions and technical specifications for the remediation work to be performed were detailed in the Project Manual. Project Manual and Bid Specifications were approved by EPA on August 17, 2007 as the Remedial Design Report. The Project Manual was placed in the public repository at the Port Arthur Public Library.

3.3 Subcontractor Selection

Safety statistics, qualifications, and preliminary pricing information were considered from three pre-qualified contractors. USA Environment, LP was selected as Subcontractor to implement the soil removal and replacement, tank cleaning and demolition, and waste disposal. Apollo Environmental Strategies was separately contracted to perform the plugging and abandonment of site groundwater monitoring wells.

3.4 Laboratory Selection

Pricing, proficiency evaluations for prescribed analyses, recent method detection limit studies, and a copy of the laboratory's NELAP certification were obtained from three local laboratories. Based on review of the information provided, Southern Petroleum Laboratories (SPL) was selected as the analytical laboratory to support the Remedial Action.

3.5 Soil Sampling

The Field Sampling Plan outlined the sampling plan and methodologies for soil sample collection for the Site. The presence of landfill debris necessitated the sampling strategy to be based on surface soil (0 to 6 inches below ground surface [bgs]) and shallow surface soil (12 to 18 inches bgs) sampling. As required by the ROD, samples were analyzed for Constituents of Concern. Analytical results were used to determine horizontal limits of impacted soils in each of the response areas. If constituents were found to contain concentrations in excess of the remediation goals (RG), step-out samples were analyzed for those constituents. When step-out samples exceeded the RG, additional step-out samples were collected and analyzed. This process continued until sample results for perimeter samples were below the RG, indicating horizontal delineation had been achieved.

Sample locations using GPS coordinates were recorded and are shown on an aerial image of the Site in Figures 4 and 5. Tables 3-1 through 3-9 summarize confirmation sample results for each Ecological and Human Health Risk Area. Final lab data files containing analytical results for the Ecological and Human Health Risk Areas are included with this report on a compact disk (CD) as Appendix B.

3.6 Waste Characterization Sampling of Soil

In accordance with the Field Sampling Plan, representative composite samples were obtained from Ecological and Human Health Risk Areas and analyzed for waste characterization purposes; results of the analyses are presented in Table 4 and Table 5. Based on analytical results for the soil, the soils were classified as non-hazardous.

Final laboratory data files containing analytical results of soils waste characterization are included with this report as Appendix B.

3.7 Waste Characterization Sampling of Above-ground Storage Tank Sludge

As specified in the Field Sampling Plan, representative composite samples were obtained from the AST. A man lift was used to access the tank from a manhole in the top of tank. The analytical results are summarized in Table 6. The sludge contained hazardous levels of benzene (D018), chromium (D007), 2,4-Dinitrotoluene (D030), and insecticides endrin (D012), lindane (D013), and heptachlor (D031) as defined in 40CFR 261.24.

Final laboratory data files containing analytical results for waste characterization of sludge are included with this report as Appendix B.

3.8 Backfill Material Sampling

Candidate borrow material was sampled and analyzed; analytical results are presented in Table 7. Samples were analyzed for metals, pesticides, PCBs, SVOCs, VOCs to ensure that the imported soil did not contain hazardous constituents, and for geotechnical parameters for soils classification.

Final lab data files containing analytical results of the borrow material are included in this report as Appendix B.

3.9 Summary Description of Activities Undertaken to Construct and Implement the Remedial Action

On September 4, 2007 a pre-construction meeting was attended by the USA field staff, EPA representative, URS project manager, URS on-site representative, and property owner, Mr. Durrett. Upon conclusion of the meeting, field mobilization activities commenced. A temporary field office was established, silt fences were installed along the down gradient perimeter of response areas, and a truck scale pad was constructed. Areas requiring excavation were surveyed and staked. In consideration of safety, high grass and cane along the roadside entrance were cleared to enhance visibility. Miscellaneous materials at the Site including equipment, pipe, valves, scrap and other debris were cleared from the work areas.

3.10 Soils Excavation

Excavation of the Ecological and Human Health Risk areas began on September 7, 2007 and was completed on September 26, 2007. Once delineation boundaries were determined by the perimeter delineation sampling, excavation of the area commenced. Soil excavation depths were limited to as shallow as one foot in some areas due to encountering underlying landfill materials.

Three-point composite samples were collected from the bottom of each human health risk area HR-1 through HR-4 and analyzed to provide information regarding soil concentrations at the base of the excavated areas to support the Institutional Controls documentation. Underlying landfill material was encountered during excavation of each of these areas and consequently, soil concentrations left in place were representative of underlying landfill materials. Concentrations in excess of Remediation Goals were indicated in the exposed landfill materials in HR-2 and HR-3 (Figure 6). Sample results for bottom confirmation samples are presented in Table 8.

Final lab data files containing analytical results for bottom confirmation samples for HR-1 through HR-4 are included in this report on CD in electronic format as Appendix B.

A total of 181 tons of soils were excavated and disposed of at the Waste Management Newton County Landfill, located in Deweyville, Texas. The waste profile application is included in Appendix C. Copies of manifests are provided in Appendix D.

After the excavation of each response area, clayey backfill material was imported to re-establish the original grade. Kerr Enterprises located in Nederland, Texas provided backfill material.

3.11 Above-ground Storage Tank Sludge and Tank Removal

The sludge-containing wastewater AST was a 10,000-barrel steel tank. Because of concerns with potential volatile vapors within the tank, access was accomplished by hydro-cutting a large opening in the side of the AST, above the sludge level. Tank contents were predominantly styrene tars in a semi-solid state and proved extremely difficult to manage. Removal was ultimately accomplished through a combination of vacuum removal and bulk removal using an excavator bucket. Tank sludge was placed in vacuum boxes and roll-top boxes and staged on-site until the transportation, storage, and disposal facilities (TSDFs) could process the waste. Following removal of the sludge, the tank bottom and sidewalls were cleaned using a high pressure wash. Cleaning residuals were placed in vacuum boxes for subsequent disposal.

Three in-state and two out-of-state TSDFs accepted waste from the AST. Waste profiles for each TSDF are found in Appendix C. Manifests and TCEQ Waste Code Request Forms and Waste Shipment Summary Forms can be found in Appendix D and E respectively.

Initially, attempts were made to skim oil from the AST for recycling by fuel blending. The Clean Harbors Deer Park, Texas facility accepted 47,160 pounds and Rineco located in Haskell, Arkansas accepted 31,180 pounds of skimmed oil. In accordance with the Unilateral Administrative Order, an out-of-state notification letter was sent to Arkansas' Department of Environmental Quality prior to shipment; a copy of this letter is found in Appendix F.

Disposal of the remaining material within the AST was accomplished by incineration. The Clean Harbors Deer Park, Texas facility was initially selected for incineration of the tank sludge. However, the facility limited the rate of waste shipment so that boxes of the sludge were staged on-site pending shipment authorization from the facility. To expedite disposal to the extent practicable, a waste profile was also established at Veolia Environmental Services located in Port

Arthur, Texas. Upon conclusion of the project, Clean Harbors incinerated 538,215 pounds of sludge and Veolia Environmental incinerated 316,671 pounds of sludge.

The heating coil and some internal supports, weighing 10,160 pounds were microencapsulated and disposed of at the Waste Management facility in Carlyss, Louisiana. In accordance with the Unilateral Administrative Order, an out-of-state notification letter was sent to Louisiana's Department of Environmental Quality prior to shipment; a copy of this letter can be found in Appendix F.

Sabine River Work in Orange, Texas was selected for disposal of PPE. Fifteen drums weighing 710 pounds total were incinerated at the Sabine River Works facility. Sabine also received and incinerated 21,715 pounds of heel (difficult to remove solids) that were removed from one roll-off bin during cleaning.

The AST was demolished and downsized to approximately seven feet above bottom to facilitate removal of the remaining contents. Hydro-blasting and vacuum removal was used to clean the sides and bottom of the tank. Tank wash fluids were containerized with tank contents. As summarized in Table 9, 918,651 pounds of material was ultimately removed from the tank and disposed.

To maintain the spirit of the Unilateral Administrative Order prescribing that the downsized tank be left on site for recycling by the site owner, the steel scrap was loaded into containers for shipment and recycled at CFF Recycling USA in Houston, Texas. Nine loads totaling 101,760 pounds were recycled; value received for the scrap steel was returned by the Contractor to the property owner, Mr. Slay. The record of reimbursement is provided in Appendix G.

3.12 Monitoring Well Plugging and Abandonment

In September 2003, five shallow groundwater monitoring wells were installed on the Site as shown in Figure 7. The monitoring wells were 2-inch diameter PVC with ten-foot screen internals. The monitoring wells were set with flush mount completions.

As required by the Record of Decision, the five permanent monitoring wells were plugged and abandoned. A licensed water well drilling subcontractor, Apollo Environmental Strategies of Beaumont, Texas plugged the wells. Appendix H contains plugging and abandonment reports filed with the Texas Water Development Board.

4.0 Chronology of Events

The following table summarizes the chronology of Remedial Action activities:

Date	Milestone
11/2002	Property Access Agreement signed.
9/20/05	Date of Authorization of Record of Decision.
5/07/07 (Effective 6/06/07)	Unilateral Administrative Order for Remedial Design/Remedial Action was issued to PRP Committee.
6/25/07	Received Authorization to Proceed from EPA.
8/01/07	Submitted Final Remedial Design/Remedial Action Work Plan to EPA.
8/02/07	Received EPA approval of RD/RA Work Plan and associated plans.
8/07/07	Mr. Durrett, new property owner of area HR-4 and adjacent property owner Mr. Bailey grant full access to property.
8/08/07	Pre-remediation soil sampling activity begins for horizontal delineation, waste classification, and waste characterization.
8/15/07	Submitted Project Manual/Plans and Specifications for approval.
8/17/07	Received EPA approval for Project Manual/Plans and Specifications as final, with additional approval of the document as the Remedial Design Report.
9/05/07	Subcontractor mobilization commences; silt fences installed, scale pad construction begins.
9/11/07	Began removal of tank contents.
9/12/07	Work stoppage due to inclement weather (Hurricane Humberto).
9/13/07	Subcontractor repairs silt fence damaged by heavy winds. Work stoppage continues due to Hurricane Humberto
9/14/07	Work resumes following Hurricane Humberto.

Date	Milestone
9/20/07	Monitoring well plugging and abandonment completed.
9/28/07	Backfilling and grading of excavated Human Health and Ecological Risk Areas completed. Tank contents removal and tank cleaning completed. Pre-final inspection conducted by EPA, TCEQ, and Supervising Contractor.
10/02/07	Demobilization begins; travel trailer, weigh scales, weigh scale concrete pad, and silt fences removed.
10/03/07	Shipping of AST scrap metal is completed.
10/29/07	Request 30 day extension of 90-day accumulation period for hazardous waste from EPA.
11/16/07	Heating coil and internal supports transported to Waste Management, Carlyss, Louisiana.
12/19/07	Last shipment of hazardous AST sludge off-site.
1/17/08	Final Inspection conducted by EPA, property owner Mr. Slay, PRP Project Coordinator, and Supervising Contractor.
3/14/08	Last load of hazardous sludge material incinerated.

5.0 Performance Standards and Construction Quality Control

As described in the Construction Quality Assurance Plan (Appendix J of the RD/RA Work Plan), key personnel were instrumental in overseeing the Remedial Action to completion in accordance to RD/RA Work Plan. Contact information for these persons is found in **Section X. Operable Unit Contact Information** of this report. As listed in the Construction Quality Assurance Plan, the following information was recorded during the Remedial Action and can be found in appendices as noted:

Record	Appendix
Field Book - description of daily activities and sketches of work areas as appropriate	I
Daily Entrance Log- document site workers and visitors	J
Daily Safety Briefings	I, K
Analytical testing results of borrow material qualification, soil and sludge waste characterization and confirmation sampling	L
Waste shipment records - copies of manifests	D
Photographs of construction activity	M
Survey documentation	N
Monitoring well plugging and abandonment reports	H

In addition to the CQAP, the Quality Assurance Project Plan (Appendix F of the RD/RA Work Plan), was developed for controlling and guiding appropriate aspects of the sampling, analysis, data validation, and data interpretation activities for the Site. The QAPP contains policies, project organization, functional activities, and Quality Assurance/Quality Control (QA/QC) measures and requirements intended to achieve the project data quality objectives (DQO) for activities associated with the Remedial Design/Remedial Action Work Plan for the Site.

A data review was conducted for the Remedial Action sampling event conducted August 2007 through September 2007 at the Palmer Barge Superfund Site. The URS Quality Assurance Officer reviewed ten data packages from Southern Petroleum Laboratories for the analysis of soil

and waste samples. The purpose of these laboratory analyses was to provide confirmation data for the Remedial Action and waste characterization data for disposal of soil and sludge from the Site. Analytical data were evaluated for conformance to the requirements of the QAPP and *Test Methods for Evaluating Solid Waste Physical/Chemical Methods* (SW-846). Data were reviewed in accordance to quality objectives and criteria for laboratory measurements and calibrations as defined in the QAPP. Results of the review are discussed in the Data Usability Summary (DUS) found in Appendix N. The completeness requirement as defined in the QAPP 90 percent for soil samples. Data reviewed in the Data Usability indicate that no data were rejected; therefore the QAPP completeness requirements were met.

6.0 Final Inspection and Certifications

Safety was of paramount importance throughout the project. As specified in the site-specific Health and Safety Plan, a Safety Compliance Agreement was entered between URS Corporation and all subcontractors. A copy of this agreement, along with other safety related records is found in Appendix K. A Site Safety Officer was selected and was responsible for conducting site inspections prior to the start of each shift. USA Environment, LP successfully incorporated the site-specific Health and Safety Plan requirements. The Remedial Action was completed without safety incident.

The Selected Remedy for the Palmer Barge Site includes the implementation of Institutional Controls to restrict future land use to industrial purposes only. As stated in the May 7, 2007 Unilateral Administrative Order for Remedial Design and Remedial Action, the institutional control shall be a restricted covenant by the property owner, to the benefit of the State of Texas and the United States Government, recorded in the real property records of Jefferson County, Texas. Example restricted covenant language and a drawing depicting those human health risk areas where the base of excavations encountered landfill materials and soil concentrations were left in place in excess of Remediation Goals as defined in the September 2005 Superfund Record of Decision are found in Appendix O. Prior to filing with Jefferson County, the owner will provide the certified legal property descriptions and plat maps to be included in Exhibits A and B of the restricted covenant. The drawing provided in Appendix O is intended to be included as part of Exhibit B. Proof of filing the restricted covenant will be incorporated into the Project Files when provided by the owner.

In accordance with Section XV, Paragraph 56 of the Unilateral Administrative Order, monthly progress reports were submitted to the EPA during the Remedial Design and Remedial Action. Monthly reports are provided in Appendix P.

7.0 Operation and Maintenance Activities

The excavated areas were backfilled with imported clayey fill and shaped to match the general site drainage. The area of the former AST was shaped to drain eastward. The general site was regraded where rutted by construction activity.

Due to the limited acceptance rate of the disposal facilities, containerized sludge was staged on-site and was transported incrementally to the hazardous waste facilities. Weekly inspections of the staged storage containers were made to verify integrity of the containers. A 30-day extension for the accumulation period was requested to accommodate the potential delays in acceptance of waste shipments. A copy of this request is provided in Appendix Q. The final loads were transported off-site on December 19, 2007. Incineration of the last load was completed on March 14, 2008.

8.0 Summary of Project Costs

The Summary of Estimated Remedy Costs provided in the Record of Decision, September 2005 for Alternative 4 – Excavation/Off-Site Disposal is summarized below:

Description	Cost
Estimated Capital Cost	$351,975
Estimated Annual O&M Cost	$500
Estimated Present Worth (7%)	$428,180

The actual capital cost for implementing the Remedial Action was significantly higher than estimated. The primary factors for the increased capital cost are as follow:

- Tank contents were estimated to be non-hazardous waste during the Feasibility Study, whereas characterization of tank contents found the sludge to be hazardous waste requiring disposal by incineration, therefore disposal costs on a unit basis were significantly higher than estimated;
- Volume of tank contents estimated by previous sounding as reported in the Feasibility Study were 233 cubic yards; actual sludge volume was estimated to be 520 cubic yards once the tank was opened for cleaning, therefore transportation, staging and disposal costs were significantly higher than estimated;
- The tank contents proved to be very difficult to manage due to their physical properties, neither vacuum removal nor bulk removal were particularly effective. Therefore the time to remove contents from the tank was greater than estimated and the unit cost of removal was higher than estimated; and
- Incineration facilities greatly limited the rate of acceptance of hazardous waste shipments; therefore containerized waste was staged for lengthy periods, resulting in higher costs for renting storage containers.

The estimated capital costs for the Remedial Action are $1,250,000, as summarized in the following table:

Summary of Capital Costs Palmer Barge Line Remedial Action	
Activity	**Estimated Cost**
Supervising Contractor Costs for Remedial Action Work Plan, Tank Contents Sampling, Remedial Design, Contractor Bid Documents, Contractor Selection	$81,000
Subcontractor Costs, Including Non-Hazardous Soil Excavation, Transportation and Disposal, Backfill, Sludge Removal, Containerization, Staging, Transportation, Container Cleaning and Return, Tank Demolition, Scrap Transportation, and Analytical	$563,000
Hazardous Waste Disposal Costs	$460,000
Supervising Contractor and Subcontractor Costs for Delineation and Characterization Sampling, Monitoring Well Plugging and Abandonment, Construction Oversight, and Report Preparation	$140,000
Total	$1,250,000

9.0 Observations and Lessons Learned

The Palmer Barge Line Superfund Site Remedial Action was implemented over a comparatively short period of time due to the desire of the EPA to complete the Remedial Action prior to September 30, 2007. Through the cooperation of the PRPs, the EPA, the TCEQ and the landowner, the Remedial Action was completed by September 28, 2007, in spite of the increased volume and the hazardous classification of the tank sludge. This was accomplished because of effective communication throughout the project, the willingness of the PRPs, the EPA and the TCEQ to immediately review and provide comments to the various work plans and documents necessary to fulfill the requirements of the UAO, and the skill and cooperation of the Subcontractor selected to implement the Remedial Action. The collaborative nature of the parties involved in the implementation was key to the success of the project.

However, the project estimate provided in the Feasibility Study and the ROD significantly underestimated the cost of implementation for Remedial Action. As previously discussed, this is attributable to underestimating of the tank sludge volume and the assumption that tank contents were classified as non-hazardous. While the Remedial Investigation and Feasibility Study focused on Human Health and Ecological Risk Assessment of environmental media that would potentially remain on-site, future similar Remedial Actions should include more thorough investigation of the nature and volume of waste to be removed.

Because the tank sludge required incineration, the rate at which hazardous waste could be shipped to the disposal facilities was limited based upon their ongoing operations. If more advance notice could be given to prospective facilities regarding the nature and volume of materials to be incinerated, the facilities would be better able to pre-schedule the materials and may be able to increase the rate at which they accept hazardous waste, which could potentially have reduced costs for box staging.

The UAO was written with the provision that the downsized tank be left on-site for the landowner to salvage. Ultimately it was agreed with the EPA that it would be acceptable to ship the downsized tank to a scrap dealer and provide the salvage value to the landowner. In this way, potential concerns with leaving a large volume of scrap material on-site were alleviated.

10.0 Operable Unit Contact Information

Contact information for key persons involved in the Palmer Barge Superfund Site Remedial Design and Remedial Action oversight, planning, and execution are listed below.

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11.0 References

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