APPENDIX NOT INCLUDED

DRAFT CLEAN WATER ACT SECTION 404(b)(1)EVALUATION

SAN JACINTO RIVER WASTE PITS SUPERFUND SITE

Prepared for

U.S. Environmental Protection Agency

On behalf of

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LIST OF ACRONYMS AND ABBREVIATIONS

2H:1V	2 horizontal to 1 vertical
ACBM	articulated concrete block mat
AOC	Administrative Order on Consent
ARAR	Applicable or Relevant and Appropriate Requirement
BESI	Benchmark Ecological Services, Inc.
BMP	best management practices
BTSP	Battleship Texas State Park
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFS	cubic feet per second
CIAC	Coastal Industrial Authority Canal
CWA	Clean Water Act
CY	cubic yards
E1UB	estuarine, subtidal, unconsolidated bottom
E1UBL	estuarine, subtidal, unconsolidated bottom (permanently flooded)
E2EM	estuarine, intertidal, emergent, vegetation
E2EM1P	estuarine, intertidal, emergent, persistent
EO	Executive Order
HDPE	high density polyethylene
I-10	Interstate Highway 10
IPC	International Paper Company
LEDPA	Least Environmentally Damaging Practicable Alternative
LLDPE	linear low-density polyethylene
LNWR	Lacassine National Wildlife Refuge
MIMC	McGinnes Industrial Maintenance Corporation
MSL	mean sea level
NAVD88	North American Vertical Datum 1988
NPL	National Priorities List
NWI	National Wetlands Inventory
PEM	Palustrine Emergent

PRP	potentially responsible party
RAWP	Remedial Action Work Plan
RD/RA	Remedial Design/Remedial Action
RI/FS	Remedial Investigation and Feasibility Study
ROD	Record of Decision
SITE	San Jacinto River Waste Pits Superfund Site
SSWMA	Sheldon State Wildlife Management Are
TCEQ	Texas Commission on Environmental Quality
TCRA	Time Critical Removal Action
TCRA Site	historic impoundments
TPWD	Texas Parks and Wildlife Department
USEPA	U.S. Environmental Protection Agency
USGS	United States Geological Survey
WQMP	Water Quality Monitoring Plan

1 INTRODUCTION

International Paper Company (IPC) and McGinnes Industrial Maintenance Corporation (MIMC) are implementing a Time Critical Removal Action (TCRA) under an Administrative Order on Consent (AOC) with the United States Environmental Protection Agency (USEPA) - Docket No. 06-12-10, April 2010, at the San Jacinto River Waste Pits Superfund Site (Site). The TCRA is to stabilize a portion of the Site, abating any release of polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans into the waterway from the impoundments until the Site is fully characterized and a remedy is selected (USEPA 2010a). The TCRA primarily involves construction of an armored cap over the portion of the Site where the historic impoundments were located (TCRA Site).

The Site is located on the western bank of the San Jacinto River, immediately north of the Interstate Highway 10 (I-10), in Channelview, Harris County, Texas and on the Highlands United States Geological Survey (USGS) 7.5 minute quadrangle (Figure 1-1 and Figure 1-2). On March 19, 2008, USEPA listed the Site on the National Priorities List (NPL), and USEPA issued a Unilateral Administrative Order (UAO), Docket No. 06-03-10, to IPC and MIMC on November 20, 2009 (USEPA 2009). The 2009 UAO directs IPC and MIMC to conduct a Remedial Investigation and Feasibility Study (RI/FS) for the Site.

In accordance with the AOC, MIMC and IPC submitted the Revised Draft Time Critical Removal Action Alternatives Analysis to USEPA on June 14, 2010 (Anchor QEA 2010b). After reviewing the TCRA Alternative Analysis, USEPA selected a granular cover designed to withstand a storm event with a return period of 100-years (USEPA 2010b). USEPA determined this placement of capping materials remedy was necessary to serve the public by preventing the further release of source material from the TCRA Site and into the San Jacinto River.

Under the approved Final Removal Action Work Plan (RAWP)(Appendix A), USEPA identified Section 404 and 404(b)(1) of the Clean Water Act (CWA) and its implementing regulations (herein Section 404, and Section 404[b][1], respectively) as an Applicable or Relevant and Appropriate Requirement (ARAR) (Anchor QEA 2010a). Section 10 of the Rivers and Harbors Act of 1899 (herein referred to as Section 10) was also identified as an

ARAR. USEPA requested preparation of a potentially jurisdictional waters of the U.S. report and a draft 404(b)(1) report for their consideration. That report would not contain the final compensatory mitigation[1] plan, which would be incorporated in the Final Record of Decision (ROD) for the RI/FS. Compliance can be demonstrated by identification of wetlands during the baseline characterization, efforts to avoid and minimize adverse impacts, and later mitigation of unavoidable impacts to wetlands during the Remedial Design/Remedial Action (RD/RA) phase (USEPA 1994). Compliance with 40 CFR 230.10 is a key component of USEPA's compliance requirements for Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA or Superfund) projects (USEPA 1994).

This document, a preliminary draft for USEPA consideration, summarizes the evaluation of Section 404(b)(1) of the CWA compliance prepared on behalf of IPC and MIMC for the Site. The report also contributes information to aid the agency in demonstrating compliance with the Executive Order (EO) for Protection of Wetlands (EO 11990) which requires minimization of the destruction, loss, or degradation of wetlands and to preserve and enhance natural and beneficial values of wetlands while carrying out an agency's responsibilities (Carter 1977). Compliance with this is considered fundamental to the compliance with 404(b)(1) (USEPA 1994). It also provides information necessary to demonstrate that the proposed removal action technologies and alternative defined in the RAWP are in compliance with the substantive requirements of CWA Section 404(b)(1).

[1] Throughout this report, the term "mitigation" refers to the complete spectrum of mitigatory actions applied in Clean Water Act Section 404 evaluation, including compensation (33 CFR 320.4(r)(1), 40 CFR 230.70-77, and the Joint U.S. Army Corps of Engineers (USACE)/USEPA Memorandum on Mitigation. Mitigation to demonstrate other forms of substantive compliance may also be included by USEPA's discretion. Where included for that purpose, it will be so noted.

2 PURPOSE AND NEED FOR THE PROPOSED ACTION

The need for the proposed TCRA is based on sediment sampling results, and Site visit observations indicating source materials are in direct contact with the San Jacinto River and in contact or adjacent to potentially jurisdictional waters of the U.S. (Section 7.2). The primary source materials documented at the Site are pulp waste containing polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans, both of which are hazardous substances as defined in CERCLA Section 101(14), 42 U.S.C. 9601(14), and further defined in 40 CFR 302.4. Source materials have been documented entering the San Jacinto River from existing impoundments by both direct observation and chemical analysis, confirming that dioxin and dibenzofuran contaminants are present in the river within and adjacent to the TCRA Site (USEPA 2010a). "Both human and ecological health is threatened by releases of hazardous substances from the [Site]" (USEPA 2010a). There is currently no containment to prevent the migration of source materials from the TCRA Site to the river.

The purpose of this Proposed Action is to stabilize a portion of the Site (the TCRA Site) to abate the further release of polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans into the waterway from the historic impoundments until the Site is fully characterized and a final remedy is selected for the Site (USEPA 2010b). The stabilization will be completed in a manner that is to the maximum extent practicable as established by USEPA. After the TCRA has been completed, USEPA will make a determination of future actions at the Site.

3 DESCRIPTION OF THE PROPOSED ACTION

3.1 Location

The TCRA Site is a portion of the 20 acre (8 hectare) tract located on the western bank of the San Jacinto River, immediately north of the Interstate Highway 10 (I-10) Bridge (Figure 1-1) in Channelview, Harris County, Texas. The TCRA Site itself has no specific street address.

3.2 Description of Discharge/Fill Sites, including Site History

The TCRA Site consists of a set of impoundments approximately 15.7 acres in size, built in the mid-1960s for disposal of paper mill wastes. In 1965, the impoundments were constructed by forming berms within the estuarine marsh, just north of what was then Texas State Highway 73 (now I-10), to the west of the main river channel. The two primary impoundments at the TCRA Site were divided by a central berm running lengthwise (north to south) through the middle, and were connected with a drain line to allow flow of excess water (including rain water) from the impoundment located to the west of the central berm, into the impoundment located to the east of the central berm (Figure 3-1).

In 1965 and 1966, pulp and paper mill wastes (both solid and liquid) were reportedly transported by barge and unloaded at the TCRA Site into the impoundments. The wastes deposited in the impoundments have recently been found to be contaminated with polychlorinated dibenzo-p-dioxins, polychlorinated furans (dioxins and furans), and some metals (TCEQ and USEPA 2006). Physical changes at the Site in the 1970s, 1980s, and 1990s, including regional subsidence of land in the area, due to large-scale groundwater extraction and sand mining within the river and marsh to the west of the impoundments, have resulted in partial submergence of the berms and exposure of the contents of the impoundments to surface waters.

The impoundments are currently occupied by estuarine vegetation to the west of the central berm, and are consistently submerged even at low tide to the east of the central berm. Estuarine riparian vegetation also lines the upland area that runs parallel to I-10. A sandy intertidal zone is present along the shoreline throughout much of the Site. Site photos are provided in Attachment B of Appendix B.

For purposes of the TCRA design, the TCRA Site has been subdivided into the following areas:

- Eastern Cell
- Western Cell
- Northwestern Area

The location of each of these areas is depicted on Figure 3-1. Physical descriptions of each area are described below:

3.2.1 Eastern Cell

The Eastern Cell is characterized by shallow water, with bed elevations ranging from -10 to 0 feet North American Vertical Datum 1988 (NAVD88). On the west side of the Eastern Cell, a central berm extends up to elevations as high as 8 feet NAVD88.

3.2.2 Western Cell

The ground surface of the Western Cell is predominantly above the average water surface elevation in the San Jacinto River. Surface elevations range from approximately 8 feet along the surrounding berms to approximately 2 feet NAVD88 in the center portion of the Western Cell. The ground surface is largely vegetated in the Western Cell; however, impounded wastes have been observed at the ground surface.

3.2.3 Northwestern Area

The northwestern area differs from the Eastern Cell in that the water is deeper. Typical bed elevations range from -20 to -10 feet NAVD88. The northwestern area is part of the Western Cell; the two areas are connected by a relatively steep slope (approximately 2 horizontal to 1 vertical [2H:1V]) from the deep water of the northwestern area up to the high ground in the Western Cell.

3.3 Summary of Alternatives

As described in Section 1, MIMC and IPC entered into the AOC to conduct a TCRA in April 2010 (USEPA 2010a). Pursuant to the requirements of the AOC, a comparative evaluation of

alternatives for the TCRA was submitted to USEPA on June 14, 2010, (Anchor 2010b). Each of the alternatives are located at the TCRA Site. The physical components of the alternatives (as presented in the Alternative Analysis) and the Selected Alternative (Proposed Action) are described in the following subsections. Upon review of the TCRA Alternative Analysis, USEPA selected the action described in section 3.3.2 (USEPA 2010b). This report summarizes the approach utilized to identify the Selected Alternative and provides additional information on the effects of the Selected Alternative.

3.3.1 TCRA Alternative Analysis

3.3.1.1 Alternative 1 – Sheet Pile and Granular Cover

Alternative 1 would entail the following major elements (Figure 3-2):

- Installation of a sheet pile isolation wall around the impoundment alignment around a majority of the Eastern Cell.
- Placement of a granular cover within the contained area.

The sheet pile would have a top elevation of 4 feet NAVD88. Because the wall would be overtopped in the design storm event, granular cover would be placed within the contained perimeter of the sheet pile.

3.3.1.2 Alternative 2 – Sheet Pile, Granular Cover, and Revetment

Alternative 2 would entail the following major elements (Figure 3-3):

- Construction of a sheet pile isolation wall around the Eastern Cell.
- Installation of granular cover within the contained area.
- Dredging of the deep water in the northwestern corner of the TCRA Site.
- Consolidation of dredge material in geotubes staged on the high ground in the Western Cell.
- Protection of the shoreline of the Western Cell with a rock revetment and an aggregate berm.

Granular cover would be used in Alternative 2 in the same fashion as Alternative 1.

Alternative 2 includes dredging of the deeper water area in the northwest corner of the Site. Dredge material would be pumped into geotubes located on the high ground in the Western Cell where it would dewater and consolidate. A dredge cut thickness of 18 inches has been assumed in this alternative, with an overdredge allowance of 6 inches.

The north slope of the Western Cell would be protected with a rock revetment. Rock would be appropriately sized to withstand hydrodynamic loads from the design-level event. At the top of the slope in this area, an aggregate berm would be constructed to prevent water from entering the Western Cell during normal tidal cycles. This berm would be constructed to elevation 4 NAVD88.

3.3.1.3 Alternative 3 – Granular Cover and Revetment

Alternative 3 would entail the following major elements (Figure 3-4):

- Construction of a rock cover perimeter around the Eastern Cell.
- Installation of granular cover within the rock perimeter of the Eastern Cell.
- Installation of granular cover over the northwestern corner of the TCRA Site.
- Protection of the shoreline of the Western Cell with a rock revetment and an aggregate berm.

The rock perimeter berm would be at least 2 feet thick. However, in the deep channel along the north side of the Site, additional rock would be placed to provide a hydraulic cutoff of this channel. The additional rock fill would be placed to a top elevation of -2 feet NAVD88, consistent with the majority of the rock perimeter fill.

Granular cover, 6 inches thick (with an overplacement allowance of 6 inches), would be placed within the limits of the rock perimeter, and in the deep water in the northwestern corner of the Site. A rock revetment and aggregate berm would be constructed to protect the slope of the Western Cell, as described in Alternative 2.

3.3.1.4 Alternative 4 – Rock Berm, Granular Cover and Revetment

Alternative 4 would entail the following major elements (Figure 3-5):

- Construction of a rock berm perimeter around the Eastern Cell.
- Installation of granular cover within the rock berm.
- Installation of granular cover over the northwestern corner of the TCRA Site.
- Protection of the shoreline of the Western Cell with a rock revetment and an aggregate berm.

The major elements of Alternative 4 are similar to Alternative 3, with the exception of the perimeter berm around the Eastern Cell. This berm, constructed of rock, would be constructed to elevation 1 foot NAVD88 and would serve to minimize hydrodynamic forces on the cover during normal tides.

3.3.1.5 Alternative 5 – ACBM and Dredge

Alternative 5 would entail the following major elements (Figure 3-6):

- Installation of articulated concrete block mat (ACBM) over the Eastern Cell.
- Dredging of the deep water area in the northwestern corner of the TCRA Site.
- Consolidation of dredge material within geotubes staged on the high ground of the Western Cell.
- Protection of the shoreline of the Western Cell with an aggregate berm at the top of the slope, and either ACBM or rock on the slope.
- Protection of the submerged outer edge of the ACBM with a rock scour apron.

Following completion of dredging in the northwestern area, ACBM would be installed to stabilize sediments in the Eastern Cell. The ACBM would be underlain by a geotextile fabric to facilitate installation and provide another layer of containment for the covered sediments.

3.3.2 USEPA Selected Alternative (Proposed Action)

The USEPA Selected Alternative is based on the major elements described for Alternative 3 in Section 3.3.1.3. The Selected Alternative entails the following major elements (Figures 3-7, 3-8, 3-9):

- Installation of a stabilizing geotextile underlayment over the Eastern Cell.
- Installation of an impervious geomembrane underlayment in the Western Cell.
- Installation of granular cover above the geomembrane in the Western Cell, above the geotextile in the Eastern Cell, and in northwestern area.

3.4 Method of Discharge and Fill

The Selected Alternative for the TCRA will include the following components:

- Clearing and Grubbing
- Geomembrane and Geotextile Installation
- Granular Cover

The anticipated construction methods are described in the following subsection.

3.4.1 Clearing and Grubbing

Vegetation in the Western Cell needs to be cleared and grubbed to facilitate installation of the granular cover. Following mobilization, staging area preparation, and access road construction, the above-ground vegetation will be cut down and larger pieces shredded in a drum grinder or other suitable equipment. Any grubbed and shredded vegetation that has visible contamination or intermixed source material will be tested prior to disposal to determine the appropriate disposal facility. All materials generated during this process will be shipped off-site to an approved disposal facility.

After the initial above-ground clearing has been completed, any remaining stumps larger than 8 inches in diameter will be grubbed on-site. This material will be spread evenly across the footprint of the Western Cell and serve as the base layer upon which the granular cover will be constructed.

3.4.2 Geomembrane and Geotextile Installation

An impervious geomembrane will be installed over the Western Cell to further isolate source materials. The membrane will consist of 40 mil linear low-density polyethylene (LLDPE)

material with fully welded seams. LLDPE was selected due to its higher tolerance for differential settlement compared to high density polyethylene (HDPE). The membrane will be secured at its perimeter in accordance with manufacturer's recommendations. The contractor will protect the surficial geotextile prior to aggregate placement.

The limits of the geomembrane are depicted on Figure 3-7. In order to install the geomembrane, grading will be required. The contractor has an allowance of up to 1,000 cubic yards (cy) of import material[2] to level the Site during installation.

3.4.3 Granular Cover

Granular cover will be placed with a combination of upland-based conventional earthwork equipment, or a water-based crane and barge depending on where the work is occurring.

Prior to placing the granular material using conventional earthwork equipment, a base geomembrane will be rolled out over the footprint of the cover of the Western Cell, and a geotextile will be placed over the footprint of the Eastern Cell (Section 1.4.2).

For land-based placement, granular cover material will be moved into the work area and placed in controlled lifts using front end loaders, dump trucks, bulldozers, and similar equipment. In the Eastern Cell, which is submerged at higher water levels, the contractor may elect to use marsh buggy earthwork equipment. No additional compaction will be used on the granular cover beyond the densification caused by the movement of construction equipment across the cover surface.

For aquatic placement, a material barge will be loaded with the required aggregate and staged adjacent to the work area. A barge-mounted excavator or crane will be used to take aggregate from the material barge and place it in the cover area. The contractor will determine their means and methods to ensure that the design thickness of material is placed and will be required to demonstrate that their placement methods will result in a granular cover of the required thickness. This demonstration will be made in an easily accessible,

[2] Clean fill from an offsite source which will consist of earth materials of non-specific gradation.

visible location (e.g., barge deck) prior to the start of placement, and will be reviewed by the resident engineer before the means and methods are accepted for aquatic placement.

Daily surveys will be performed to ensure that the contractor is meeting the required grades and thickness for cover materials.

3.5 Timing of Fill Activity

The following major construction elements are required to complete the TCRA work. Each item, shown in Table 3-1, is in approximate sequential order. This schedule is subject to change because of weather and other unforeseen circumstances, and will be reviewed and refined by the TCRA contractor and continuously updated throughout the duration of the TCRA work. Total in-water work is expected to take approximately 100 days. The anticipated start date is December 8, 2010.

Table 3-1
Construction Elements and Duration

Element	Duration
Mobilization	1 week
Site Preparation and Access Road Construction	
Laydown area preparation	1 week
Access road construction	1 weeks
Clearing and grubbing Site	2 weeks
Site Stabilization	
Geotextile and geomembrane placement	6 weeks
Cap A placement	6 weeks
Cap B placement	10 weeks
Cap C placement	6 weeks
Cap D placement	4 weeks
Cap E placement	1 week
Site Cleanup	2 weeks
Demobilization	1 week
Total Duration[1]	**36 weeks**

1 – Note: "Total Duration" is not equal to the sum of all activities because some overlap of tasks has been assumed. Actual duration will be determined by the contractor during their project planning.

3.6 Sources and General Characteristics of Material

Clean aggregate of varying gradations for the granular cover will be obtained from a permitted commercial source. Both recycled concrete and natural stone materials will be used for granular cover.

The granular cover will be composed of the following 5 armor cap gradations:

- Armor Cap Material A:
  - 80 percent by weight of well graded crushed concrete with the following gradation requirements:
    - 100% passing 6 inches
    - No more than 50% passing 3 inches
    - No more than 4% passing the #200 sieve
  - 20 percent by weight of gravelly sand with the following gradation requirements:
    - 100% passing 3/8-inch sieve
    - 50% to 90% passing the #4 sieve
    - 10% to 40% passing the #10 sieve
    - No more than 4% passing the #200 sieve
- Armor Cap Material B/C. Well graded crushed concrete with the following gradation requirements:
    - 100% passing 12 inches
    - No more than 50% passing 5 inches
    - No more than 4% passing the #200 sieve
- Armor Cap Material. Well graded crushed concrete with the following gradation requirements:
    - 100% passing 12 inches
    - No more than 50% passing 6 inches
    - No more than 4% passing the #200 sieve
- Armor Cap Material C. Well graded crushed natural rock with the following gradation requirements:
    - 100% passing 12 inches
    - No more than 50% passing 6 inches
    - No more than 4% passing the #200 sieve

- Armor Cap Material D. Well graded crushed natural rock with the following gradation requirements:
    - 100% passing 18 inches
    - No more than 50% passing 8 inches
    - No more than 4% passing the #200 sieve
- Armor Cap Material E. Well graded crushed natural rock with the following gradation requirements:
    - 100% passing 24 inches
    - No more than 50% passing 12 inches
    - No more than 4% passing the #200 sieve

3.7 Quantity of Material

Figure 3-10 shows the extent of waters of the U.S. at the Site (as well as potential impacts under the proposed action). The following quantity of material will be placed in waters of the U.S. for the Proposed Action based upon a comparison of potentially jurisdictional waters and anticipated TCRA components. Additional information on potentially jurisdictional waters is provided in Section 7.

Table 3-2
Material Volumes

Material	Thickness	Quantity (cy)
Armor Cap Material A	Minimum 12”	5,660
Armor Cap Material B/C	Minimum 12”	4,610
Armor Cap Material C	Minimum 12”	4,330
Armor Cap Material D	Minimum 18”	9,560
Armor Cap Material D	Minimum 24”	610

Note: The allowance of an additional 1,000 cy of import materials may be used by contractor under the geomembrane.

3.8 Projected Life

As required by the USEPA decision document (USEPA 2010b), the selected alternative has a minimum projected life of five to seven years until the Site is fully characterized and a final

remedy is selected. However, the preferred alternative is designed to withstand storm events with a return period of 100-years.

4 EVALUATION AND CRITERIA

The 404(b)(1) guidelines require evaluation of the aquatic impacts associated with the discharge of dredged or fill material. The purpose of the CWA Section 404(b)(1) as per 40 CFR § 230.1(a) "is to restore and maintain the chemical, physical, and biological integrity of waters of the United States through the control of discharges of dredged or fill material." Specifically, 40 CFR § 230.1(c) states that "dredged or fill material should not be discharged into the aquatic ecosystem, unless it can be demonstrated that such a discharge will not have an unacceptable adverse impact."

Section 230.11 of Subpart B of the Guidelines provides the four conditions that must be satisfied in order to make a finding that a proposed discharge complies with the requirements described in 40 CFR § 230. These four conditions include:

1. No discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge that would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental impacts (see Section 3.4).
2. No discharge of dredged or fill material shall be permitted if it violates any water quality standards, jeopardizes any endangered or threatened species, or disturbs any marine sanctuaries (see Sections 5 and 6).
3. No discharge of dredged or fill material shall be permitted that will result in significant degradation of any waters of the United States, including adverse effects on human health or welfare, effects on municipal water supplies, aquatic organisms, wildlife, or special aquatic sites (see Sections 7 and 8).
4. No discharge of dredged or fill material shall be permitted unless appropriate and practicable steps have been taken that will minimize potential adverse impacts (see Sections 9 and 11).

The potential impacts of the proposed removal action are evaluated based on conditions set forth in 40 CFR § 230.11, and the factual determination and discussion of conditions for compliance are provided in Sections 10 and 13.

5 POTENTIAL IMPACTS ON PHYSICAL AND CHEMICAL CHARACTERISTICS OF THE AQUATIC ECOSYSTEM (SUBPART C)

The following sections describe the conditions on the TCRA Site as well as impacts associated with the Proposed Action.

5.1 Substrate (230.20)

Existing substrate in the Eastern Cell consists of clay with 60 to 90 percent fines (Anchor QEA 2010a). Northwestern area substrate consists of silty, clayey sand with 42 to 66 percent fines (Anchor QEA 2010a). The Western Cell ground surface is predominantly above the surface of the average surface water elevation. Organic content at the TCRA Site ranges from 2 to 12 percent (Anchor QEA 2010a).

Geomembrane installation and armor cap placement as part of the Proposed Action will alter the substrate characteristics of the TCRA Site, but this alteration is expected to be beneficial to the aquatic ecosystem. In the Western Cell where clearing and grubbing is proposed, the physical characteristics of the existing substrate will be replaced with new, clean substrate to stabilize the former impoundments and preventing further release of source material into the river. In the Northwestern and Eastern Cells, a granular cover will be placed over the geotextile and under the armor, respectively, is proposed, the substrate will also be modified and the new, clean layer will prevent contaminated material from entering the river
As of 2008, the San Jacinto River in the vicinity of the Site is currently on the Texas Commission on Environmental Quality (TCEQ) 303d list of impaired water bodies due to dioxins and PCBs in edible tissue (TCEQ 2008). The caps proposed to be placed at the TCRA Site will isolate the underlying source materials, reduce ecological exposure to source materials, and may provide long-term benefits to aquatic resources. The long-term benefits would be associated with the TCRA and/or final remedy.[3]

[3] The use of long-term or permanent benefits in the impact analyses assumes that the TCRA and/or final remedy will achieve these benefits.

5.2 Suspended Particulates/Turbidity (230.21)

No historical turbidity data are available for the Site. The USGS gauge station does not have a gauge present in the San Jacinto River below the Lake Houston dam. However, some localized increases of suspended particulate levels and turbidity above ambient river conditions are expected during discharge of fill material. These effects are considered short-term and minor, as the turbidity will be associated with the clean fill material. To minimize short-term increases in suspended particulates and turbidity, best management practices (BMPs) and the Water Quality Monitoring Plan (WQMP) will be implemented during construction (Appendix F of the RAWP [Appendix A], Anchor QEA 2010a). BMPs to be implemented in accordance with the RAWP include:

- Use of silt curtains and debris booms around the in water work area
- Use of upland erosion controls such as plastic covering in stockpiles
- Use of silt fence around upland areas
- Construction of a stable upland haul route capable of handling construction traffic without creating ruts that would develop into a source of turbid water

Additional BMPs may be employed in the event that further controls are warranted. For example, the contractor may be required to limit their work activities to slack tide periods and/or calmer sea states depending on conditions observed in the field.

Turbidity arising from discharge of fill material is expected to dissipate quickly, and due to the short-term nature of the disturbance and clean state of materials being used for capping, suspended particulates resulting from this activity are not expected to have a permanent or negative impact on the aquatic ecosystem.

5.3 Water Quality (230.22)

Polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans have been detected in surface water at the Site (USEPA 2010a). A 2004 assessment of the water quality of the San Jacinto from U.S. Hwy 90 to downstream of the I-10 Bridge found fish consumption not supported due to dioxins and PCBs in catfish and crab tissue (TCEQ 2004). Water quality conditions are expected to improve through the isolation of existing source materials at the TCRA Site.

Water quality within the vicinity of the Site will be monitored in accordance with appropriate regulations and the WQMP. In addition to the BMP's described in Section 5.2, the following BMPs described in the RAWP will be implemented to minimize short term impacts on water quality:

- Cap lift thickness will be controlled to prevent bearing capacity failure and/or development of a mud wave at the leading edge of the cover. Once the initial lift is in place, subsequent lifts will be supported by the first lift of cap material and will pose minimal risk for causing resuspension through mud wave development.
- Equipment will be inspected daily for drips or leaks. Any equipment with drips or leaks will be taken out of service until repairs are made.
- The contractor will be required to maintain a spill kit on-site. This kit will have suitable materials to contain and collect any petroleum products that might spill from construction equipment.
- The contractor will be required to fuel all equipment in a designated area that can be easily accessed and contained in the event of a spill during fueling.
- Turbidity will be monitored during TCRA construction (Appendix B).

Long-term negative water quality impacts are not expected as a result of activity associated with the Proposed Action. The Proposed Action will result in long-term benefits to aquatic resources.

5.4 Current Patterns and Water Circulation (230.23)

Flow rates in the San Jacinto River in the vicinity of the Site are partially controlled by the Lake Houston dam, which is located about 28 miles upstream of the waste impoundments. The average flow in the river is 2,200 cubic feet per second (cfs). Daily average low flows in the river can decrease to as low as 100 cfs. Floods in the river primarily occur during tropical storms (e.g., hurricanes) or intense thunderstorms. Extreme flood events (return intervals of 25 years or more) have flow rates of 200,000 cfs or greater. The October 1994 flood had a peak discharge of 360,000 cfs, which is an event with a return period of greater than 100 years. The estimated flow volume during an event with a return period of 100 year is 372,000 cfs (Unpublished Data 2010). River stage height during the October 1994 flood had

a maximum value of 27 feet above mean sea level (MSL) (Appendix I of the RAWP [Appendix A], Anchor QEA, 2010a).

The Proposed Action will result in negligible changes in the water surface elevation and insignificant changes to flood plain storage or overall bathymetry of the main channel during the 100-year high flow event. Water level model results indicate the Proposed Action would change the river stage height by 0.02 feet during a 100-year high-flow event (Unpublished Data 2010). Based upon Anchor QEA's hydrologic analyses of this storm event and understanding of the system, minor fluctuations during higher frequency, low flow conditions are also expected. Therefore, the Proposed Action will not permanently alter nor substantively affect current patterns or water circulation at the TCRA or in the San Jacinto River during or after the construction.

5.5 Normal Water Fluctuations (230.24)

The river in the vicinity of the waste impoundments is affected by diurnal tides, with a typical tidal range of 1 to 2 feet. Tidal range varies over a 14-day cycle, with neap and spring tide conditions corresponding to minimum and maximum tidal ranges, respectively. Tropical storms and wind storms from the north can have significant effects on water levels at the Site. Tropical storms can cause storm surges with water levels that are significantly higher than typical tidal elevations. Storms with strong winds from the north can cause water to be transported out of the Galveston Bay system, which can result in water levels that are much lower than low tide elevations (Appendix I of the RAWP [Appendix A], Anchor QEA, 2010a).

The Proposed Action will not result in significant changes to flood plain storage or overall bathymetry of the channel. Water level model results indicate the Proposed Action would change the river stage height by 0.02 feet during a 100-year or 1 percent probability high-flow event (Unpublished Data 2010). Following the analyses, a short technical memorandum will be prepared and submitted to USEPA.

Based upon Anchor QEA's hydrologic analyses of this storm event and understanding of the system, minor fluctuations during higher frequency, low flow conditions are also expected.

The Proposed Action is not anticipated to permanently alter nor substantively affect normal water fluctuations at the TCRA or in the San Jacinto River during or after the construction.

5.6 Salinity Gradients (230.25)

Salinity in the vicinity of the waste impoundments generally ranges between 10 and 20 parts per thousand during low to moderate flow conditions in the river (Henderson 2010).

During floods, salinity values approach freshwater conditions (Anchor QEA 2010a). The Proposed Action will not significantly affect the channel bathymetry of the San Jacinto River; therefore, no change to the salinity gradient is expected during or after construction at the TCRA.

6 POTENTIAL IMPACTS ON BIOLOGICAL CHARACTERISTICS OF THE AQUATIC ECOSYSTEM (SUBPART D)

6.1 Threatened, Endangered, and Candidate Species (230.30)

A presence and absence survey for threatened, endangered, and candidate species was conducted at the Site by Benchmark Ecological Services, Inc. (BESI) and a summary report is under development (Appendix C). Preliminary results indicate that no critical habitat for threatened and endangered species is present (Olday 2010). Once the report received, both Section 6.1 and 6.2 will be completed.

6.2 Fish, Crustaceans, Mollusks, and other Aquatic Organisms in the Food Web (230.31)

Baseline chemical characteristics of sediments at the Site indicate that concentrations of dibenzo-p-dioxins and polychlorinated dibenzofurans are present. The presence of these contaminants in sediment at the Site may affect aquatic receptors and aquatic dependant wildlife. Under present conditions, the food chain may be adversely impacted due to the presence of these chemicals (USEPA 2010a). Capping activities are designed to isolate the source materials from exposure to aquatic receptors, reducing the availability of the source material to the food chain (Anchor QEA 2010a).

Fill materials for capping will be placed on 13.21 acres of aquatic habitat. This may disrupt existing benthic invertebrate communities and fish access to the TCRA Site during implementation of the project, but this is anticipated to be a minor loss to the aquatic food web in the vicinity of the Site. Cap material will provide a clean substrate that will be quickly colonized by benthic invertebrates and access to the TCRA Site for fish will be reopened. The TCRA will reduce exposure and will provide a significant overall improvement over existing conditions for aquatic organisms and the aquatic food web.

6.3 Impacts on Other Wildlife (230.32)

Bird and wildlife use and access may be disrupted during construction; however, as a former industrial site, present use of the TCRA Site by terrestrial wildlife is limited. Impacts associated with the TCRA will be short-term and localized to the TCRA Site. In the Western

Cell, vegetative cover and habitat will be removed as part of the Proposed Action. Overall, however, the Proposed Action will abate the release of contaminants to the waterway, which will improve long term habitat conditions for birds and wildlife that rely on the aquatic habitat at the Site (USEPA 2010b). Migratory birds may use the area for rest over, but the Site is not suitable for nesting (Olday 2010).

7 POTENTIAL IMPACTS TO SPECIAL AQUATIC SITES (SUBPART E)

7.1 Sanctuaries and refuges (230.40)

No impacts to sanctuaries and refuges are expected as a result of the Proposed Action. There are no wildlife sanctuaries or refuges in the tidal portion of the San Jacinto River (TPWD 2010a).

7.2 Wetlands (230.41)

National Wetlands Inventory (NWI) indicates estuarine, subtidal, unconsolidated bottom (E1UBL) and estuarine, intertidal, emergent, persistent, irregularly flooded (E2EM1P) wetlands on the Site (USFWS, 2010). A Wetland Delineation was performed at the TCRA Site in November of 2010 to provide more precise delineation of the wetlands and other waters of the U.S. present on the TCRA Site (Appendix D). The following four NWI wetland types were identified on the Site (Figure 7-1):

- Estuarine Intertidal Emergent Vegetation (E2EM)
- Estuarine Subtidal Unconsolidated Bottom (E1UB)
- Palustrine Emergent (PEM)
- Palustrine Unconsolidated Bottom (PUB)

Within the TCRA Site, E2EM wetlands were identified in the intertidal areas, and E1UB wetlands were identified in the subtidal areas of the San Jacinto River itself. Representative plant species of the E2EM wetlands include *Spartina patens, Syphyotrichum divaricatum, Iva annua and Distichlis spicata* (Benchmark 2010).

All subtidal portions of the San Jacinto River within the Site were delineated as E1UB. Therefore, in determining the area of wetlands impacted by the Proposed Action, E1UB subtidal wetlands are assumed to exist in all subtidal portions of the San Jacinto River. Using this assumption, results of the delineation indicate a total of 13.21 acres of waters of the U.S. (including 2.47 acres of E2EM and 10.74 acres of E1UB) will be impacted by the Proposed Action (Figure 7-2). Clearing, grubbing and capping will alter the substrate and temporarily disrupt the wetland habitat. However, the Proposed Action will reduce exposure of aquatic organisms and the aquatic food web to contaminants, providing significant overall

improvement. Additional information on the impacts associated with this and the other alternatives is provided in Section 9.4.2.

7.3 Mudflats (230.42)

40 CFR Part 230.42 defines coastal mudflats as areas "exposed at extremely low tides and inundated at high tides". These coastal areas formed mostly of mud support a variety of wildlife and particularly migratory birds. Areas at the TCRA Site with a substrate surface elevation between Mean Tide (+0.83 feet NGVD) and Mean Low Lower Water (0.05 feet NGVD) were identified as potential mudflats. A potential mudflat of 0.78 acres is exposed at low tide in the vicinity of the Eastern Cell and Northwestern Area (Figure 7-3). Under the Proposed Action, a cap would be placed over those areas. The cap would cover those areas with 12 to 24 inches of armored cap material and temporarily disrupt the mudflat habitat. However, the Proposed Action will provide significant overall improvement by reducing contaminants exposure to aquatic organisms and the aquatic food web.

7.4 Vegetated Shallows (230.43)

A submerged vegetation survey has not been completed at the Site. Under the Proposed Action, granular cover would be placed in the areas shown on Figure 3-7. Any vegetated shallows present would be temporarily lost. However, reductions in contaminants would outweigh temporary effects and result in a net beneficial improvement.

7.5 Riffle and Pool Complexes (230.44)

At the Site, the San Jacinto River at the Site is very wide and influenced heavily by tidal cycles. As such, impacts to riffle and pool complexes are not applicable to the Proposed Action, and it will not affect riffle and pool complexes.

8 POTENTIAL EFFECTS ON HUMAN USE CHARACTERISTICS (SUBPART F)

The 404(b)(1) guidelines require evaluation of the potential effects on human use characteristics associated with the discharge of dredged or fill material.

8.1 Municipal and Private Water Supplies (230.50)

There are no municipal or private water supplies intakes located within the Site. Two water supplies were found that are located in close proximity to the project location (Figure 8-1). No water supply wells are located within close proximity to the Site; no adverse effect on private, groundwater supplies is anticipated (TCEQ 2010).

Operated by Coastal Water Authority, the Lynchburg Reservoir is located 0.8 miles south or downstream of the project (Morris Pumps 2010). It accepts off-channel water from the Trinity Reservoir to provide water to the city of Houston (Berry 2010). BMPs for containment while the project is under construction and improved water quality upon project completion will prevent adverse effects for the river (Appendix A, Sections 1.2 and 4.2.3).

The Coastal Industrial Authority Canal (CIAC) is also located approximately 1.65 miles upstream from the project location (Figure 8-1) (Baytown Area Water Authority 2010). The CIAC treats surface water pumped from the San Jacinto River and other surface water sources to serve the city of Baytown and several Harris County districts. Due to the location of the CIAC intake, the project will not have an adverse effect on this water supply.

A third water supply, Lake Houston, is the closest large municipal water supplier (City of Houston 2010). It is located 25 miles upstream of the project location and the project will have no adverse affect on the water quality of the lake.

8.2 Recreational and Commercial Fisheries (230.51)

Internet and GIS database searches were conducted to find recreational and commercial fisheries in close proximity to the Site (TPWD 2010b, National Biological Information Infrastructure 2009). Lake Houston, which is located 25 miles upstream of the Site, is a popular place for recreational fishing. Recreational fishing adjacent to the project area is

limited because of the industrial nature of the surrounding area, poor water quality and proximity to I-10. However, some fishing has been observed. Also, a fishing advisory has been issued for the area (Section 5.3). The Lake Houston is upstream of the project and the project is anticipated to increase water quality; therefore, the project will not have an adverse effect on recreational fishing.

There are no known commercial fisheries in close proximity to the project location. There are a number of fisheries located 9 miles downstream of the project (Figure 8-2). BMPs and monitoring of turbidity will prevent water pollution and accidental and imminent releases of potential contaminants. Therefore, the project is intended to have a beneficial effect on known commercial fisheries.

8.3 Water-Related Recreation (230.52)

Water recreation in the immediate project area is limited because of the poor water quality (Section 5.3), industrial nature of the surrounding area and proximity to Interstate 10 (TPWD 2010a). The nearest water recreation site is Lake Houston, located 25 miles upstream of the project. As a result of the Proposed Action, water quality will improve upon project completion and no water recreation facilities are located in close proximity to the Site, adverse effects on water-related recreation are not expected.

8.4 Aesthetics (230.53)

Due to the location and the nature of the proposed project, no adverse effect to aesthetics is anticipated. This review is based upon Site visits, surveillance, and aerial photography provided by Google Earth, 2010. The Site is located adjacent to I-10 (Attachment B, Photograph 2 of the Section 401 Water Quality Compliance Summary [Appendix B]) with surrounding industrial areas. There are 4 parks within a 3-mile radius of the project location. Due to the location of fill (approximately existing ground levels), the distance, and vegetation within the park viewshed, Site construction will not be visible from these parks. The closest private residence is 0.13 miles from the project location, and several residences are located west of the Site and northeast across the River. The area between the project and the residences is vegetated with trees and bushes which block the Site view from the residences. Furthermore, the prevention of accidental or incidental releases by the TCRA should further

improve Site aesthetics. The Federal Highway Administration has sponsored a National Scenic Byway Program. There are no listings for scenic highways or byways near the project location (Americas Byways 2010).

8.5 Parks, Natural and Historic Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves (230.54)

The San Jacinto Battleship Texas State Park (BTSP) is located 2.5 miles south of the project area (Figure 8-3). This park hosts a famous battleship and is a popular tourist attraction. The BTSP is not immediately adjacent to the project Site and the project will prevent the accidental or imminent release of potential contaminants; therefore, there will be a beneficial effect on the park or the tourist attraction. Similarly, the neighborhood parks would also benefit.

The Sheldon State Wildlife Management Area (SSWMA) was created in 1952 as a waterfowl sanctuary and public fishing site (TPWD 2010a). This area lies 13.5 miles northwest of the project area; therefore, no adverse effects due to construction are expected on the SSWMA (Figure 8-4). Implementation of the TCRA will have a beneficial effect on local ecology as it would prevent accidental and imminent releases of hazardous materials.

The closest National Seashore is the Padre Island National Seashore (ESRI Data and Maps 2008, National Park Service 2010). Located 206 miles southwest of the project along the gulf coast of Texas, it is the longest stretch of Barrier Island in the world (Figure 8-4). The project will have no adverse effect on the national seashore.

The Lacassine National Wildlife Refuge (LNWR) is located 123 miles northeast of the project location (Figure 8-4) (USFWS 2010 a, b). The LNWR is 35,000 acres in size and is a breeding and nesting ground for birds and other wildlife. Due to the distance from the project, adverse effects due to temporary constructions features will not effect on the LNWR (Figure 8-4).

8.6 Other Factors in the Public Interest

8.6.1 Historic and Cultural Resources

A detailed cultural resource report was conducted in consultation with the State Historic Preservation Officer to evaluate the potential for historic and cultural resources to be effected by the project (Appendix E). There are no historic or cultural resources recorded in the project area. The extent of the proposed ground disturbance for the project does not exceed previous disturbance; therefore, the project is not anticipated to have any adverse effect on historic or cultural resources.

8.6.2 Activities Affecting Coastal Zones

The project area lies on the boundary of the Texas Coastal Zone (Figure 8-5). The Texas Coastal Zone is defined in the Bureau of Economic Geology's Environmental Geologic Atlas series as the area of land "from the inner Continental Shelf to about 40 miles inland" which includes "all estuaries and tidally influenced streams and bounding wetlands". (University of Texas 2010) Activities associated with the project will be consistent with the Texas Coastal Zone Management Plan (Appendix F).

8.6.3 Navigation

Within the state of Texas, the principal navigable waterways in Texas include the Gulf coastal bays, the Gulf Intracoastal Waterway, the Trinity River from the Gulf of Mexico to Fort Worth, and the ship channels serving Gulf ports (Texas Department of Transportation 2004). Most rivers and streams entering the Gulf of Mexico are technically navigable for a specified distance inland from their mouth (Texas General Land Office 2010). Navigability of rivers in the USACE Galveston District is determined on a case-by-case basis (USACE 1999). Downstream of the I-10 Bridge, the main channel of the river extends for about 2 miles until the confluence with the Houston Ship Channel. The main channel is navigable with depths ranging from 15 to 30 feet. Shallower areas exist along the eastern shore of the main channel, with depths of 6 feet or less. The old river channel branches off from the main channel about 0.5 miles downstream of the I-10 Bridge. Water depths in the old river channel are typically 6 feet or less.

The lateral extent of the TCRA Site has been defined by USEPA. Water access to the area will be temporarily limited during construction using buoys and warning signs approved by USEPA and the U.S. Coast Guard. In addition, public access is currently limited by fencing on the land side of the impoundments as required by USEPA, to prevent exposure to humans from the contents of the waste pits. In regards to obstructions to navigation, the respondents and USEPA have minimized the adverse effects on navigable waters by selecting a TCRA that minimizes changes in bed elevation in navigable waters and avoids obstructions which would affect the main channel. No other remaining structures would be constructed or affect navigable waters.

9 ANALYSIS OF PRACTICAL ALTERNATIVES PURSUANT TO SITE CRITERIA (230.11)

9.1 Site Availability

Pursuant to 404(b)(1) Guideline, all practicable alternatives must be available to meet the project purpose. The Guidelines state "an area not presently owned by the applicant, which could be reasonably obtained, utilized, expanded, or managed in order to fulfill the basic purpose of the proposed activity may be considered." USEPA has determined that an alternative would be available if it is owned or could be reasonably obtained, used, expanded, or managed by the potentially responsible party (PRP). In this case, IPC and MIMC would be considered the "applicants" pursuant to the Guidelines. Therefore, each of the alternatives, including the Proposed Action, is available.

9.2 Cost Effectiveness

Pursuant to the Guidelines, a determination of practicability must consider if fill or disposal can be accomplished at a reasonable cost. This effort and its alternatives would involve fill. Under CERCLA, USEPA also must consider whether or not an action or remedy provides effectiveness proportional to costs. To determine cost effectiveness, the costs of the alternatives and its protectiveness in comparison to other alternatives were considered, in light of the project purpose. In that analysis, Alternative 3 was considered the most cost-effective alternative at roughly 51 to 88 percent of the costs of other alternatives, while providing equivalent or superior effectiveness and implementability (Anchor QEA 2010b).

9.3 Feasibility

9.3.1 Technical Feasibility

For all of the alternatives, construction is technically and logistically possible using "existing technology." Each of the alternatives was evaluated by the USEPA for their effectiveness (Anchor QEA 2010b). The evaluation included the alternatives effectiveness at isolating target sediments, withstanding extreme weather events, and preventing benthic and human contact. Each of the alternatives was equally effective for these criteria. Alternatives 2 and 5 include dredge and consolidation and therefore have an inherent risk for sediment resuspension and a moderately higher risk for sediment resuspension and residuals

generation (USEPA 2005; USACE 2008a). The USEPA ultimately selected Alternative 3 and later refined it to best meet the project purpose and need (which is the Proposed Action). Factors in the decision are described in (Appendix B of RAWP [Appendix A]).

9.3.2 Administrative Feasibility

Administrative feasibility refers to the requirements associated with coordinating with other offices and agencies, including statutory limits, waivers, and requirements for off-site actions. Factors in the decision are summarized in (Appendix B of RAWP [Appendix A]).

9.4 Aquatic Impacts from Fill

9.4.1 Summary of Baseline Conditions

A combination of estuarine, subtidal, and unconsolidated bottom (E1UBL) and Estuarine, intertidal, emergent, persistent, irregularly flooded wetlands (E2EM1P) were obtained on the TCRA Site which is within the 100-year floodplain (BESI 2010). Some upland scrub shrub and herbaceous habitat were also noted. A more detailed summary of aquatic resources (particularly waters of the U.S.) for the Site is provided (Appendix D).

9.4.2 Potential Aquatic Impacts from Fill

The alternatives were also evaluated based upon the potential for impacts to human health and the environment. The TCRA Alternatives Analyses suggested that Alternatives 1 and 2 pose a higher risk of construction-related environmental impacts, due to resuspension of contaminated sediments, and a higher risk to worker health and safety than Alternatives 3, 4, and 5 (Anchor QEA 2010b). As mentioned earlier, the Proposed Action represents a minor modification of Alternative 3. The anticipated impacts to waters of the U.S. for each of the alternatives are summarized in Table 9-1 (Figures are provided in Appendix G).

Table 9-1

Summary of Potential Impacts to Waters of the U.S. and Mudflats for the Alternatives

Alternatives	Impacted Area (acres)			
	Mudflats	Wetland E1UB	Wetland E2EM	Total US Waters[1]
Alternative 1	0.64	11.29	2.45	13.74
Alternative 2	0.64	12.78	2.45	15.23
Alternative 3	0.64	11.30	2.45	13.75
Alternative 4	0.64	11.30	2.45	13.75
Alternative 5	0.64	11.30	2.45	13.75
Proposed Action	0.78	10.74	2.47	13.21

Notes:

1) Total US waters = E1UB + E2EM. Mudflats are included within E2EM wetlands

Alternative 3 was further assessed in terms of effects on: substrate (Section 5.1); suspended particulates/turbidity (Section 5.2); general water quality (Section 5.3 and the RAWP Appendix B [Appendix A]); current patterns and water circulation (Section 5.4); normal water fluctuations (Section 5.5); and salinity gradient (Section 5.6). Research and analyses indicates that adverse effects on these characteristics of the San Jacinto River will be temporary and/or permanently negligible due to a combination of construction methods and BMP's. Therefore, this analysis suggests that the Proposed Action is the Least Environmentally Damaging Practicable Alternative (LEDPA) based upon impacts to waters of the U.S. Impacts to mudflats are slightly higher for the Proposed Action than some of the other alternatives.

9.5 Conservation and Recovery

In general, Conservation and Recovery typically involves an assessment of the effects to determine if a Proposed Action would jeopardize to listed species (endangered or threatened under the Endangered Species Act) and, if necessary, to assess the ability of a project's remediation or removal to support the conservation and recovery of that species. A presence and absence study indicates no critical habitat is present on the Site (Olday 2010).

9.6 Limit Number of Sites

The TCRA Site is limited to the area of potential source material that requires stabilization and there are no other applicable sites. No other Site would allow prevention of the release of source materials.

RESERVED FOR USEPA

10 FACTUAL DETERMINATIONS AND FINDINGS

11 REFERENCES

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FIGURES