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DRAFT MEMORANDUM – FOR DISCUSSION PURPOSES ONLY

To:	Steve Tzhone, Carlos Sanchez, Charles Faultry, Barbara Nann, USEPA	**Date:**	February 10, 2010
From:	David Keith, Anchor QEA, LLC	**Project:**	090557-01
Cc:	Phil Slowiak, International Paper, Corporation Drew Shafer, March Smith, McGinnes Industrial Maintenance Corporation		
Re:	San Jacinto River Waste Pits Superfund Site Time Critical Removal Action		

INTRODUCTION

This memorandum provides an assessment of how the proposed elements of a Time Critical Removal Action (TCRA) by International Paper Company and McGinnes Industrial Maintenance Corporation (collectively referred to as "Respondents") at the San Jacinto River Waste Pits Superfund Site (Site) support the objectives and criteria of the U.S. Environmental Protection Agency (EPA) for addressing Imminent and Substantial Endangerment (ISE) Factors at the Site. This memorandum provides the following information:

- A brief history and physical description of the Site, and a description of the distribution of dioxins and furans in surface sediments in the Site waste impoundments and surrounding areas based on existing data.
- An evaluation of the Site against the eight factors used by EPA for determining if there is an actual or threatened release of hazardous substances from the facility that may be an imminent and substantial endangerment to the public health and welfare or the environment.
- A description of the proposed TCRA remedy.
- An evaluation of the proposed TCRA remedy to determine if the remedy addresses ISE factors relevant to the Site.

The TCRA would be the first of three associated actions planned for implementation at the Site. The other two actions include:

- A Non-Time Critical Removal Action addressing the long-term Site stabilization.
- A full RI/FS conducted in the area surrounding the Site as identified in the UAO.

HISTORY AND DESCRIPTION OF THE SAN JACINTO SUPERFUND SITE

The Site consists of a set of impoundments approximately 14 acres in size, and built in the 1960s for disposal of paper mill wastes. The impoundments are located on a 20-acre parcel on the western bank of the San Jacinto River, in Harris County, Texas, immediately north of the Interstate Highway 10 (I-10) bridge over the San Jacinto River. The TCRA that is the subject of this memorandum is focused on the original 14 acre impoundment area.

In 1965, the impoundments were built by constructing berms within the estuarine marsh just north of what was then Texas State Highway 73 and is now I-10, west of the main river channel. It is likely that the impoundment berms were constructed by side casting marsh materials from the interior of the impoundments using a mechanical excavator. The waste was then deposited directly within the berms on the interior excavated surface. There were two primary ponds at the Site connected with a drain line to allow flow of excess water (including rain water) from Pond #1 on the western side, to Pond #2 on the eastern side. The western impoundment was the primary pulp waste disposal area and waste was pumped into the impoundments from the barge as a slurry. The eastern impoundment was primarily used for settling out residual solids in the effluent from the western impoundment. There is evidence of a secondary bermed area within Impoundment #2 that may have been associated with the drain line between the two primary impoundments. This water was collected near the barge unloading area, pumped back into the barge and returned to the Champion Paper Mill in Pasadena, Texas, where it passed through settling impoundments.

The materials in the impoundments were reported to have the following characteristics:

- Primarily fibrous – the dried material was reported to resemble a cheaper grade of cardboard.
- Near neutral pH.
- Medium stiff to stiff – vertical walls could be cut in the impoundments while removing the material and the wall would stand.
- Low permeability – after the material set a short time, water would not seep in and rain water would stand over it.
- Organic base – grass could be started on dry material and it was reported to spread rapidly (TSDH 1966).

In a letter dated July 1966, the Texas Water Pollution Control Board stated that it was their understanding that the waste impoundments would not be used again for the disposal of

waste materials, and remaining surface water could be released from the Site as requested by McGinnes Industrial Maintenance Corporation (TWPCB, 1966).

Physical changes at the Site since its construction, including the 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 and destruction of the berms, and exposure of the contents of the impoundments to surface waters.

Based on permit reviews, aerial photo interpretation, recent bathymetric survey results and an evaluation of the distribution of dioxin in surface sediments surrounding the Site, it appears sand mining-related dredging apparently performed by or on behalf of Houston International Terminal, a division of Big Star Barge & Boat Company, occurred in the vicinity of the perimeter berm at the northwest corner of the impoundments in 1997 or 1998. Material dredged during this time was apparently placed onto an adjacent upland area (referred to herein as "the Big Star property") immediately to the west of the dredged area and impoundments. These dredging activities directly compromised the integrity of the berms on the northwestern portion of the Western impoundment, as they were undermined, and resulted in dispersion of the paper mill waste to surrounding sediments in the river and potentially to adjacent upland soils.

In addition to the direct impact to the northwest berm that was undermined by dredging, the dredging activity also contributed to the erosion and disappearance of the perimeter berm and development of an apparent scour channel on the northeastern side of the Site. These deleterious circumstances resulted in inundation of the eastern portion of the Site by the San Jacinto River sometime after 1998. The interpretation provided above is based on aerial photograph review.

CURRENT SITE CONDITIONS

Current land use in areas to the west and south of the Site is residential, commercial and industrial, while areas east and north of the Site are either undeveloped or residential. Residential development on the eastern bank of the river is present within 0.5 mile of the Site. Recreational use of the Site and surrounding area, primarily for fishing, has been observed.

Figure 1 shows current topographic and bathymetric survey information for the Site. Examination of this figure and field observations indicate the southern, central, and western berms of the waste impoundments have maintained much of their original integrity. However, due to the historic sand mining operations along the northwestern portion of the Site, the berm from approximately station 3+50 to 7+00 on Figure 1 was undermined and is no longer present.

Figure 2 depicts cross sections A-A' and B-B' referred to on Figure 1. Section A-A' is taken through the western berm and shows the definite shape of the original berm that remains stable at a +6 foot (NAVD 88 datum). In addition a shallow buttress located at the base of the berm is present, which provides resistance against instability.

Section B-B' is taken through the location of the historic northwestern berm and is also shown on Figure 2. As can be seen, the undermining has caused the berm to fail and flow to a more stable angle of repose. The slope appears stable now, but the definite shape of the original berm (as seen is A-A') is gone. In fact, as a result of the dredging, areas of the original waste impoundment that were at or above sea level along this shoreline are now at -16 feet (NAVD 88 datum). Important features of the impoundment that were evaluated in the development of the TCRA design elements include the following:

- The remaining portions of the western and central berms are stable and above mean high water levels.
- The western impoundment is currently occupied by late successional stage estuarine riparian vegetation that provides a stable interim cover.
- The northwestern shoreline that was undermined by dredging has exposed pulp waste sludge in the intertidal shoreline that is especially susceptible to erosion by wave action on vertical faces.
- The eastern impoundment is a shallow sloping embayment with recently deposited silt and sand from the river along the shoreline (Figure 3).

EXISTING SEDIMENT CHEMISTRY DATA

The preliminary Site boundary identified in the 2009 UAO is in an area from which sediments have previously been sampled for several studies, including the following:

- The SSI report (TCEQ and USEPA 2006)
- Sampling for the I-10 dolphin project (Weston 2006)

- The Houston Ship Channel dioxin TMDL study (University of Houston and Parsons 2006)
- Samples collected by TCEQ in August, 2009 as part of TMDL Program
- The Houston Ship Channel toxicity study (ENSR and EHA 1995).

Surface sediment samples have been collected from 46 locations, and sediment cores have been collected from 5 locations within the preliminary Site boundary. In some cases, a location was sampled more than once, so more than 46 individual surface sediment samples are represented in the database. Eight of the surface sediment sample locations are within the impoundments or in their immediate vicinity near the I-10 bridge. The highest spatial density of samples within the preliminary Site boundary is in and adjacent to the impoundments and adjacent to the I-10 bridge. Sediment samples collected within the Site upstream of the impoundments are approximately 1,000 ft (305 m) apart. Twenty-five samples were collected within the Site and Study Area under or downstream of the I-10 bridge, but 16 of these are not within the Site boundary, and 15 are closely spaced around the Sneed Shipbuilding facility.

A map of concentrations of dioxins/furans in the study area (Figure 4) shows all of the concentrations exceeding 1000 parts per trillion (ppt) Toxicity Equivalent (TEQ) are within the previously bermed impoundments at the Site. Concentrations of dioxins and furans drop quickly near and outside of the former berm alignment.

A closer examination of the distribution of dioxins and furans in soils and sediments in the impoundments shown in Figure 5, shows the highest concentrations of dioxin and furan in the eastern impoundment area sediments lie within the shallow secondary bermed area that was likely associated with the underdrain between the western and eastern impoundments, and used for the primary water polishing area when the impoundments were in operation. Dioxin concentrations immediately south of the secondary berm area are 1,210 ppt and 1,390 ppt TEQ, and the sediment sample immediately east of the secondary berm feature, but still within the original impoundment perimeter is 83 ppt TEQ (Figure 5.

IMMINENT AND SUBSTANTIAL ENDANGERMENT FACTORS NCP 300.415(B)(2)

TCRAs are implemented at CERCLA sites to remove the actual or threatened release of hazardous substances from a facility that may be an imminent and substantial endangerment to the public health or welfare or the environment. There are eight Imminent and

Substantial Endangerment Factors considered by EPA in determining the need for a TCRA, including the following:

1. Actual or potential exposure to nearby populations, animals, or the food chain from hazardous substances or pollutants, or contaminants
2. Actual or potential contamination of drinking water supplies or sensitive ecosystems
3. Hazardous substances or pollutants or contaminant or drums, barrels, tanks, or other bulk storage containers, that may pose a threat or release
4. High levels of hazardous substances or pollutants or contaminants in soils in largely at or near the surface, that may migrate
5. Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released
6. Threat of fire or explosion
7. Unavailability of other appropriate federal or state response mechanisms to respond to the release
8. Other situations or factors that may pose threats to public health and welfare or the environment.

For the Site, issues associated with factors 1, 2, 4, and 5 are relevant in determining whether Respondents' proposed TCRA will adequately address the alleged imminent and substantial endangerment at the Site.

These sampling results discussed above, indicate that Site stabilization actions should focus on the exposed northwestern shoreline of the impoundments that was undermined by dredging activities, and in areas of the eastern impoundment where dioxin and furan concentrations are at hazardous levels.

PROPOSED TIME CRITICAL REMOVAL ACTION ELEMENTS

The proposed TCRA is focused on restricting public access into the Site to prevent potential exposure of dioxin and furan contaminated soils to people that may trespass onto the Site, and on stabilizing the intertidal shoreline areas of the impoundments to prevent actual or threatened releases of potentially hazardous levels of dioxins and furans associated with pulp wastes to the surrounding environment. The public access restrictions will involve placement of security fences and signs to prevent trespassing onto the property. The proposed fencing alignment for the waste impoundment area is shown on Figure 6. This

alignment will prevent access of unauthorized persons into the entire area containing the waste impoundments.

The two primary areas of potential hazardous substance release or exposure to the environment include:

- The northwestern shoreline – this area lies primarily along the undermined border of the western impoundment where the bulk of the pulp waste was disposed, and has vertical faces of pulp waste that are potentially exposed.
- The eastern area of the impoundments – this area is a gently sloping shoreline with recent river sedimentation over residual pulp waste. It has high concentrations of dioxin that are apparently associated with solids settling out during water polishing near the underdrain between the western and eastern impoundments.

A conceptual design of the northwestern shoreline stabilization is provided as Figure 7. The design involves laying a woven geotextile fabric on top of the waste at the shoreline for strength and containment, and building a water control berm using processed concrete to an elevation of +3 feet in the project datum to protect the interior of the impoundment and polish any water that may flow out of that area (e.g. rainwater, etc.). The North American Vertical Datum of 1988 will be used as the project datum in the remainder of this report and the design documents. The processed concrete berm will also provide an anchor system for articulated concrete block mat (ACBM) that would provide a structural cover and extend over areas of the shoreline to the northwest to cover potentially exposed sludge that could be transported off site. The ACBM would be carried down the slope to an elevation of -4 feet to assure adequate coverage of any potential exposed sludge material. The ACBM is also a very strong erosion resistant cover that can provide the structural support needed for this uneven shoreline. A plan view of the area that would be covered by ACBM is provided in Figure 8: it would extend from approximately Station 3+40 to Station 8+.

The ACBM would transition into a clean sand cover on the eastern impoundment. High flows in the San Jacinto River can inundate the eastern portions of the Site and potentially resuspend and transport waste materials from the impoundments. The sand cover will help eliminate this potential resuspension of the waste material from the impoundments. The sand cover will consist of a layer of either coarse sand-sized stone or recycled concrete rubble. The gradation of the material will be such to resist resuspension of the underlying

material. An engineering evaluation will be performed to evaluate the appropriate material size for the cover layer to assure the cover will remain stable. The evaluation will include:

1. Determining the range of flows in the San Jacinto River and magnitude of various return-interval flows (i.e. a 2-year event, a 5-year event, and so forth)
2. Selecting an appropriate return-interval flow event for the short-term protection
3. Computing the forces (shear stresses) due to high flows on the eastern portion of the Site
4. Determining the appropriate particle size to resist the forces for the selected flow event that would prevent the release of any potentially contaminated waste underneath the cover.

As shown in Figure 8 the clean granular cover would extend from an elevation of approximately +2 feet to -2 feet and cover areas from the central berm out to the edge of the gently sloping bench of the eastern impoundment. The area east of the -2 foot contour becomes steeper and appears to have been channelized to some extent by diversion of river water over that area when it was opened by the dredging operations (Figure 8). All shoreline and intertidal areas of the eastern impoundments that have concentrations of dioxins and furan exceeding 1000 ppt TEQ would be covered by the sand cover in the proposed configuration based on available data.

ABILITY OF THE PROPOSED TCRA REMEDY TO ADDRESS RELEVANT ISE FACTORS

The primary exposure and release mechanism to the ecosystem from the Site is through erosion, re-suspension, and transport of pulp waste from intertidal and sub-tidal areas of the impoundments where concentrations of dioxins and furans occur at levels that may present an imminent and substantial endangerment to human health and the environment.
The following provides an analysis of how each of the eight previously discussed factors is addressed with the proposed TCRA actions:

1. Actual or potential exposure to nearby populations, animals, or the food chain from hazardous substances or pollutants, or contaminants
    a. The primary direct exposure to people is from recreational use of the Site by trespassers, and this exposure pathway will be controlled by restricting access into the Site. The primary exposure and release mechanism to the ecosystem from the Site is through erosion, re-suspension, and transport of pulp waste from intertidal and sub-tidal areas of the impoundments where concentrations of dioxins and furans occur at hazardous levels. These exposure and release

mechanisms will be addressed through the proposed shoreline stabilization and granular cover. The ACBM recommended for the shoreline stabilization is commonly used in a variety of applications to provide structural stability and to prevent shoreline erosion. Those applications have successfully involved stabilization and sequestration of contaminated sediments as well as other more typical projects associated with roads, bridges, and river bank stabilization. Granular clean covers are a recommended remedial technology in EPA Sediment Management Guidance. These types of caps and covers are an effective means of eliminating potential contaminant migration issues, and also prevent exposure of contaminants to potential ecological and human receptors at the surface.

2. Actual or potential contamination of drinking water supplies or sensitive ecosystems
    a. Dioxins and furans are very hydrophobic and insoluble, it is unlikely that there is a threat to any potential drinking water supplies; however, sensitive ecosystems may be present and potential release and/or exposure pathways to these systems will be controlled by the shoreline stabilization and granular cover as discussed above.
3. Hazardous substances or pollutants or contaminant or drums, barrels, tanks, or other bulk storage containers, that may pose a threat or release
    a. There is no history of, or observed evidence of drums, barrels, tanks or other bulk storage containers at the Site that may pose a threat or release.
4. High levels of hazardous substances or pollutants or contaminants in soils in largely at or near the surface, that may migrate
    a. Areas of the impoundments that have high levels of dioxins and furans will be stabilized using the shoreline stabilization measures and granular cover to prevent any off-site migration as discussed above.
5. Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released
    a. Areas of the impoundments that would be affected by tides, winds, waves, and currents that may result from extreme weather conditions and cause a potential release, or migration of dioxin and furan contaminated materials will be stabilized using the shoreline stabilization measures and granular cover to prevent any off-site migration. These engineering controls will be designed to withstand weather-induced conditions that may occur at the Site. In addition, both the ACBM shoreline stabilization and cover areas will be

monitored on a routine basis to assure they are functioning properly. Any potential maintenance issues will be addressed expeditiously to assure that the potential threat of release, or exposure of dioxin-contaminated materials is prevented during the design and implementation of the longer-term Site stabilization process. The longer-term Site stabilization will involve rebuilding the original berm system to the extent that is practical and converting the Site into a Confined Disposal Facility (CDF) under a Non-Time Critical Removal Action.

6. Threat of fire or explosion
    a. There is no known threat of fire or explosion associated with the Site.
7. Unavailability of other appropriate federal or state response mechanisms to respond to the release
    a. The Site is being appropriately addressed under CERCLA.
8. Other situations or factors that may pose threats to public health and welfare or the environment.
    a. There are no other known situations or factors that may pose threats to public health and welfare, or the environment that are not being addressed by the proposed institutional and engineering controls.

The proposed TCRA engineering controls will prevent any potential releases of materials from the Site that may present an imminent and substantial endangerment to the public health or the environment, and will immediately improve the environmental conditions at the Site by removing near surface contaminated sediment and soil exposure pathways in intertidal and sub-tidal zones.

The TCRA would be the first of three associated actions planned for implementation at the Site and it is being designed to specifically address ISE issues. Other actions will involve long-term Site stabilization by reconstruction of a stable berm system and conversion of the Site into a CDF. The CDF will contain the area addressed by the TCRA and provide for the consolidation and disposal of contaminated sediments associated with waste impoundment releases into the San Jacinto River. The CDF design will require a more thorough engineering evaluation and design process, and would be constructed under a Non-Time Critical Removal Action. In addition, an RI/FS will be conducted in the area surrounding the waste impoundments as identified in UAO (USEPA Region 6, CERCLA Docket No. 06-

03-10 UAO for RIFS) , and additional actions will be taken to address these areas as necessary to protect human health and the environment.

REFERENCES

ENSR and EHA. 1995. *Houston Ship Channel Toxicity Study*. Prepared for the City of Houston, Houston, TX. ENSR Consulting and Engineering, Houston, TX and Espey, Huston and Associates, Austin, TX.

TCEQ and USEPA. 2006. *Screening Site Assessment Report San Jacinto River Waste Pits, Channelview, Harris County, Texas*. TXN000606611. Texas Commission on Environmental Quality and U.S. Environmental Protection Agency.

Texas State Department of Health (TSDH) 1966. Letter from Stanley W. Thompson, P.E. Regional Engineer to D.F. Smallhorst, P.E., Director Division of Water Pollution Control. Re: Investigation of Industrial Waste Disposal - Champion Paper, Inc. Dated May 6, 1966.

Texas Water Pollution Control Board (TWPCB) 1996. Letter from Hugh C. Yantis, Assistant Executive Secretary to Mr. V. C. McGinnes, McGinnes Industrial Maintenance Corporation, Dated July 29, 1966.

University of Houston and Parsons. 2006. *Total maximum daily loads for dioxins in the Houston Ship Channel*. Contract No. 582-6-70860, Work Order No. 582-6-70860-02. Quarterly report No. 3. Prepared in cooperation with the Texas Commission on Environmental Quality and the U.S. Environmental Protection Agency. University of Houston and Parsons Water & Infrastructure. Available at: http://www.tceq.state.tx.us/assets/public/implementation/water/tmdl/26hscdioxin/26-all-data-compiled-q3-fy06.pdf.

Weston. 2006. *Draft Field Activities Report for Sediment Sampling. San Jacinto River Bridge Dolphin Project IH-10 at the San Jacinto River.* Prepared for the Texas Department of Transportation, Environmental Affairs Division, Austin, TX. Weston Solutions, Inc., Houston, Texas.

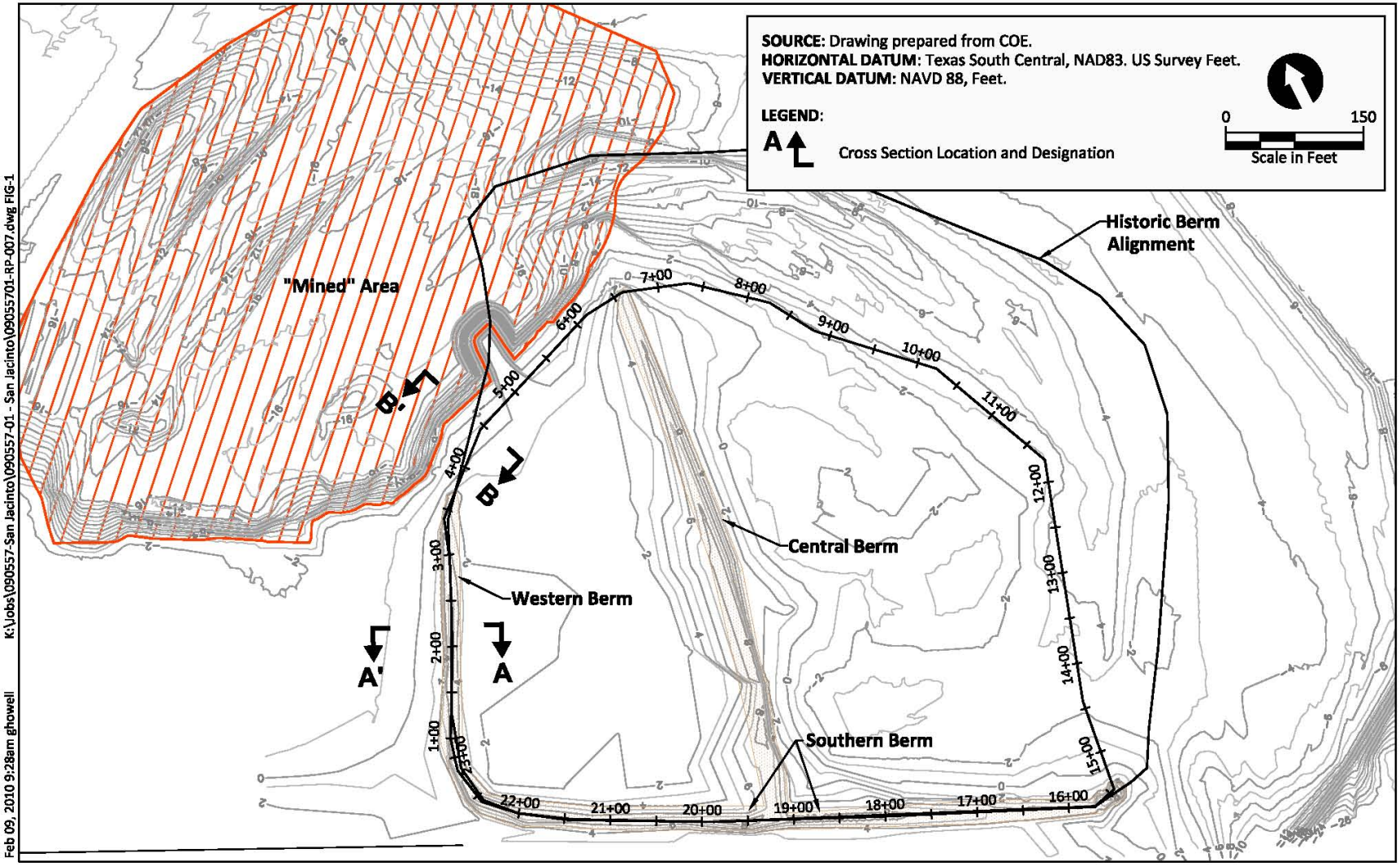

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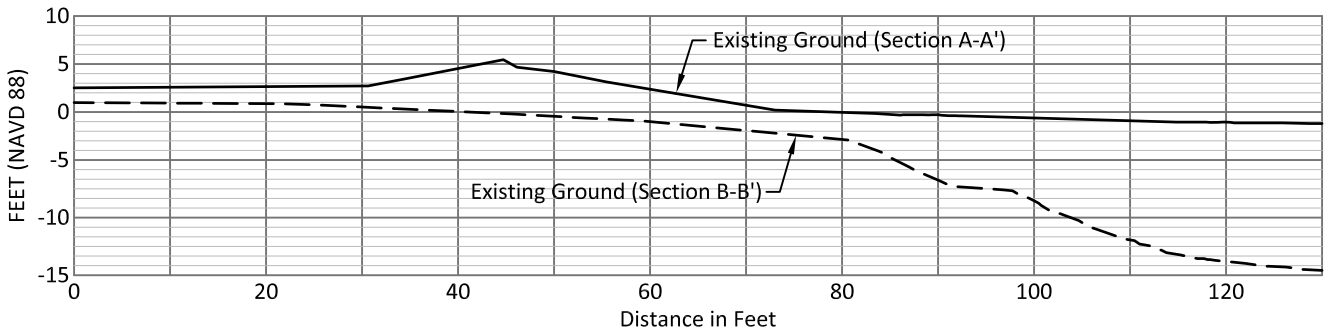
Figure 1
Plan View
Western Berm Stability
San Jacinto Waste Pits



Cross Sections A-A' and B-B'

Feb 09, 2010 9:38am ghowell K:\Jobs\090557-San Jacinto\090557-01 - San Jacinto\09055701-RP-012.dwg SECTION

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Figure 2
Cross Sections A-A' and B-B'
Western Berm Stability
San Jacinto Waste Pits

Figure 3

Examples of eastern pit shoreline areas. Note the gentle sloping shoreline and evidence of recently deposited sediments from the river. Top photograph is looking north and bottom photograph is looking south .

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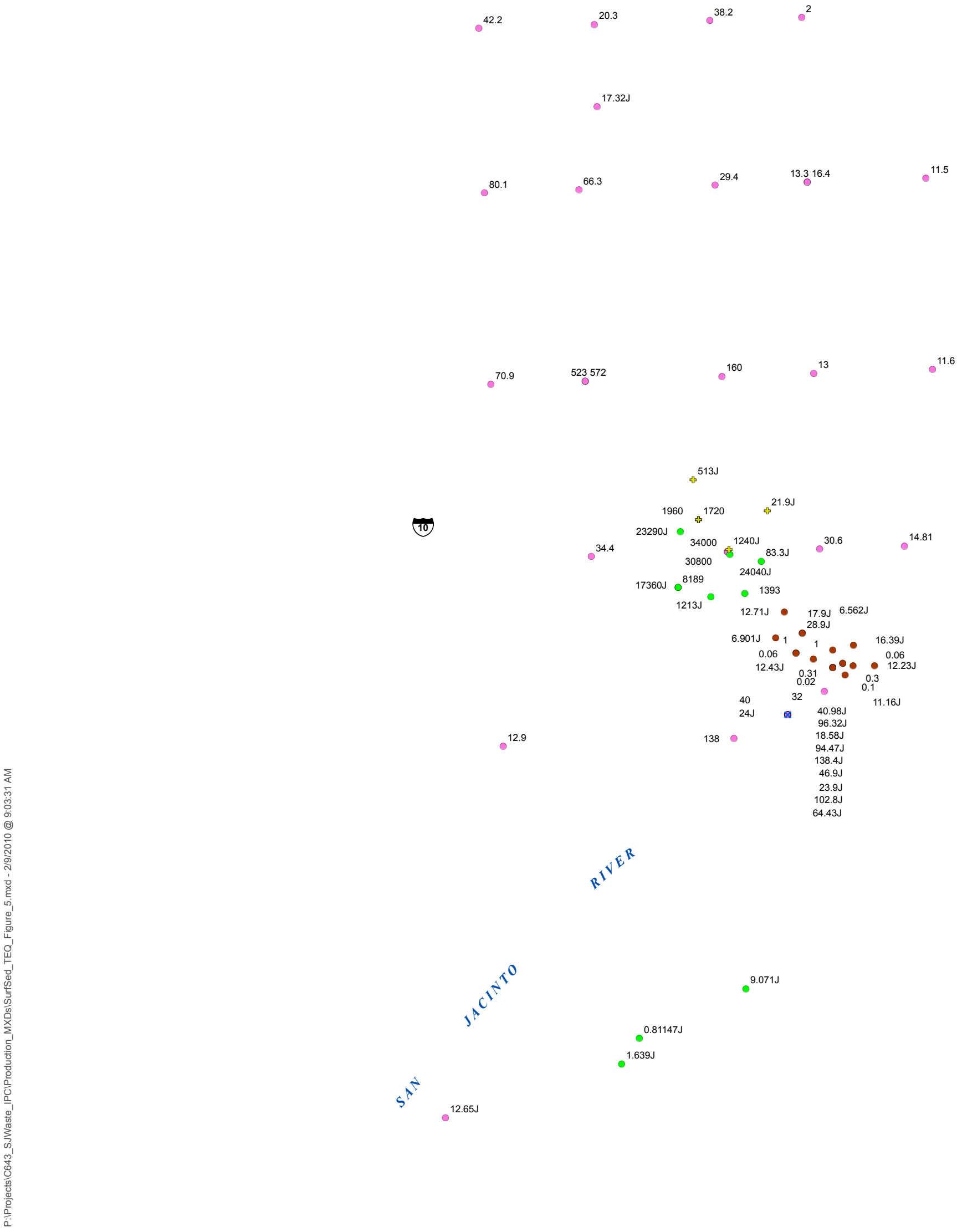

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Scale in Feet

Preliminary Site Boundary
Parcel Boundary
Original Perimeter of Impoundments

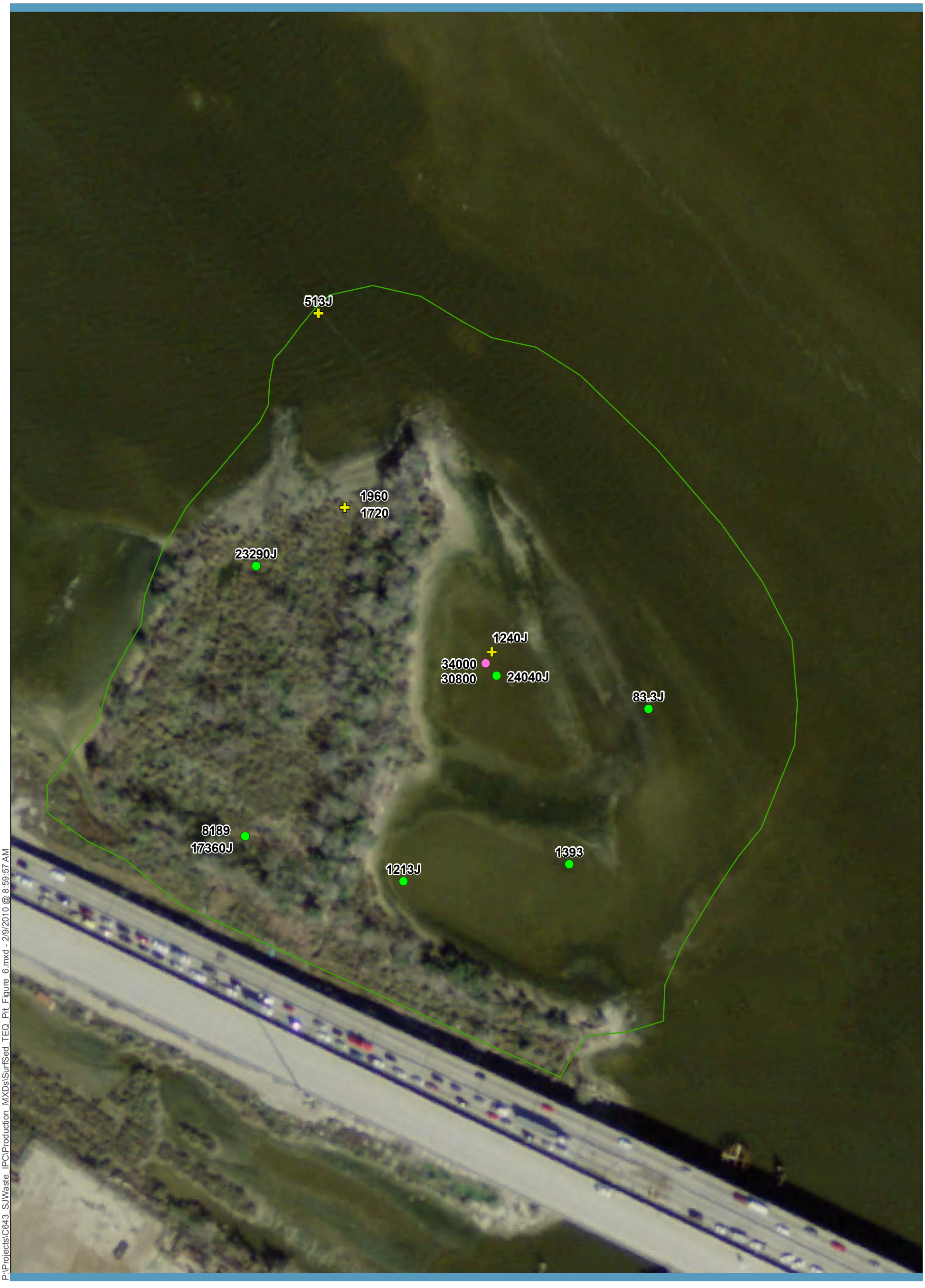
2,3,7,8-TCDD Equivalents (TEQs) in Surface Sediments*

- ENSR and EHA (1995)
- TCEQ and USEPA (2006)
- University of Houston and Parsons (2006)
- Weston (2006)
- URS (2010)

FEATURE SOURCES:
Parcel Boundaries: Harris County Appraisal District
Hydrology: Harris County Flood Control District

* J = Estimated

Figure 4
Sediment TEQs
(pg/g dw, ND=1/2DL, WHO 05)
within the Preliminary Site Boundary
SJRWP Superfund/MIMC and IPC



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ANCHOR QEA integral consulting inc.

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Scale in Feet

Preliminary Site Boundary
Original Perimeter of Impoundments

2,3,7,8-TCDD Equivalents (TEQs) in Surface Sediments*

TCEQ and USEPA (2006)
University of Houston and Parsons (2006)
URS (2010)

FEATURE SOURCES:
Aerial Imagery: 0.5-meter January 2009 DOQQs - Texas Strategic Mapping Program (StratMap),

* J = Estimated
(pg/g dw, ND=1/2DL, WHO 05)

Figure 5
Sediment TEQs (WHO 2005, ng/kg dw)
Within the Original Impoundments
SJRWP Superfund/MIMC and IPC

K:\Jobs\090557-San Jacinto\090557-01 - San Jacinto\60% plans\09055701-PL-008 (EPA).dwg FIG 7

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SOURCE: GOOGLE EARTH, 2009

NOTES:
1. ACCESS GATE 1 SHALL BE SIZED FOR VEHICLE ACCESS, MIN. 24' WIDE.
2. FENCE SHALL EXTEND UNDER I-10.

LEGEND:

PROPOSED FENCE

PROPOSED CONSTRUCTION ACCESS ROAD(SEE SHEET G-2)

PROPOSED LAYDOWN AREA

0 200
Scale in Feet

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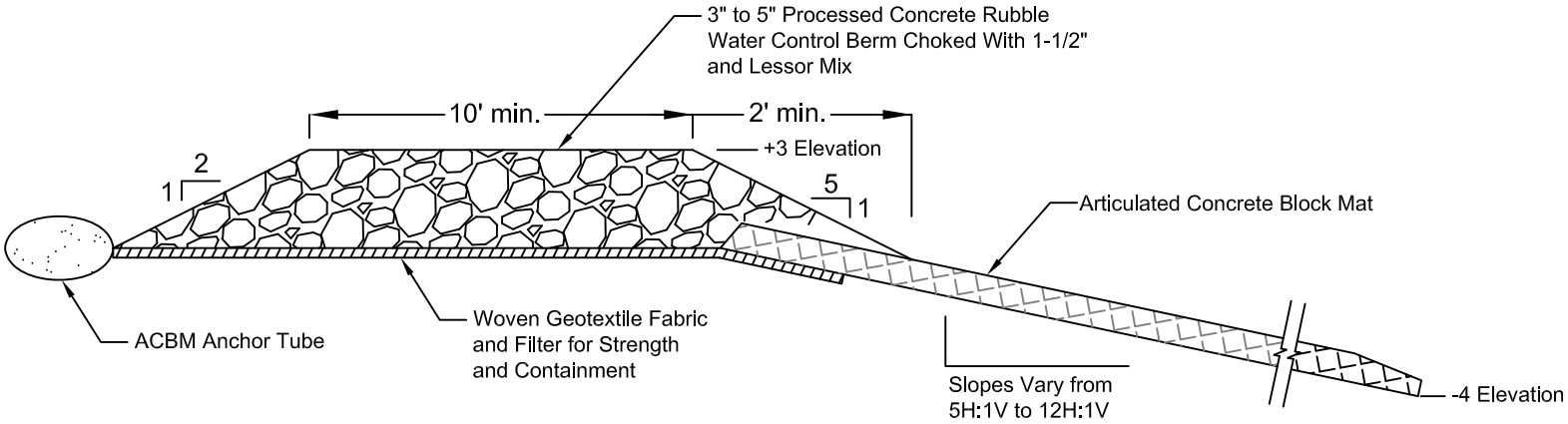
Figure 6
Proposed Fence Alignment
San Jacinto Waste Pits



Note: Overlap Completed Berm a Minimum of 2' onto the Finished ACBM.

HORIZONTAL DATUM: Texas South Central, NAD83. US Survey Feet.
VERTICAL DATUM: NAVD 88.

0 4
Scale in Feet

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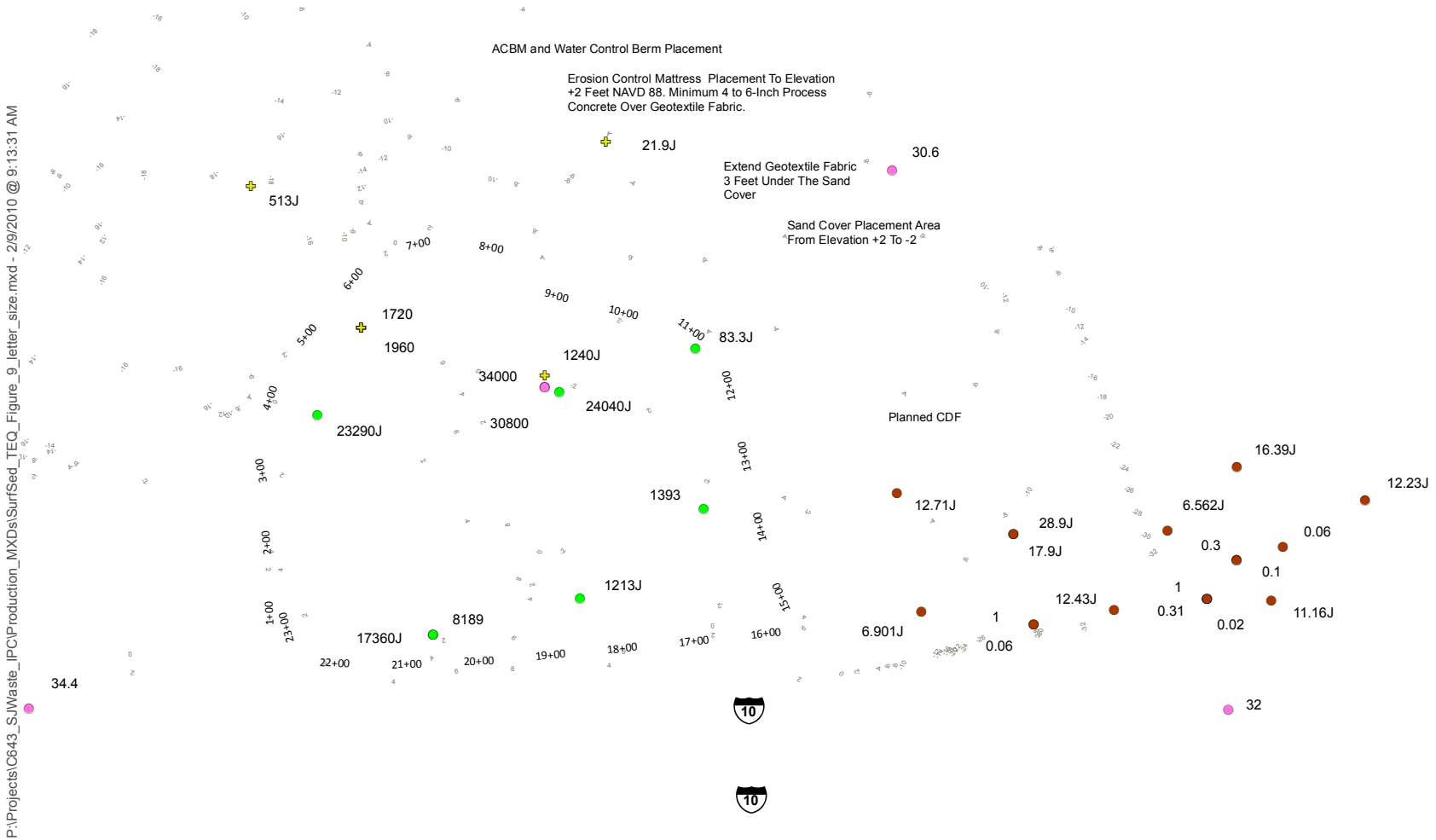
Figure 7
San Jacinto Island
Typical Section for Northwestern Shoreline Stabilization



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integral consulting inc.

Original Perimeter of Impoundments

Virgil C. McGinnes Trustee Parcel

2,3,7,8-TCDD Equivalents (TEQs) in Surface Sediments*

- TCEQ and USEPA (2006)
- University of Houston and Parsons (2006)
- Weston (2006)
- URS (2010)

0 200

Scale in Feet

FEATURE SOURCES:
Drawing Prepared from COE
Horizontal Datum: Texas South Central, NAD83, US Survey Feet
Vertical Datum: NAVD 88

* J = Estimated
(pg/g dw, ND=1/2DL, WHO 05)

Figure 8
Conceptual ACBM, Water Control Berm and Sand Cover
SJRWP Superfund/MIMC and IPC