Final 100% Remedial Design - Southern Impoundment (Amended April 2021)

San Jacinto River Waste Pits Site
Harris County, Texas

International Paper Company

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List of Acronyms

AOC	-	Administrative Settlement Agreement and Order on Consent for Remedial Design
ARAR	-	Applicable or Relevant and Appropriate Requirements
ASTM	-	American Society for Testing and Materials
BHHRA	-	Baseline Human Health Risk Assessment
BMP	-	Best Management Practice
BOD	-	Biological Oxygen Demand
^{137}Cs	-	Cesium-137
CFR	-	Code of Federal Regulations
CFS	-	Cubic Feet per Second
CME	-	Central Mine Equipment
COPC	-	Constituent of Potential Concern
CQA/CQP	-	Construction Quality Assurance/Quality Control Plan
cy	-	Cubic Yard
DQO	-	Data Quality Objective
DWA	-	Depth-Weighted Average
EPA	-	Environmental Protection Agency
ERP	-	Emergency Response Plan
FSP	-	Field Sampling Plan
ft bgs	-	Feet Below Ground Surface
F_y	-	Yield
GAC	-	Granular Activated Carbon
GHD	-	GHD Services Inc.
gpm	-	Gallons per Minute
GPS	-	Global Positioning System
HASP	-	Health and Safety Plan
I-10	-	Interstate Highway 10
IBC	-	Intermediate Bulk Containers
ICIAP	-	Institutional Controls Implementation and Assurance Plan
in^3/ft	-	Cubic Inches Per Foot
ML	-	Minimum Level
MGD	-	Million Gallons per Day
mg/L	-	Milligrams per Liter
NAVD88	-	North American Vertical Datum of 1988
ng/kg	-	Nanograms per Kilogram
NTU	-	Nephelometric Turbidity Units
PCBs	-	Polychlorinated Biphenyls
PC FSP	-	Pre-Construction Field Sampling Plan
PDI	-	Pre-Design Investigation
PDI-1	-	First Phase Pre-Design Investigation
PDI-2	-	Second Phase Pre-Design Investigation
QAPP	-	Quality Assurance Project Plan
RA	-	Remedial Action
RAO	-	Remedial Action Objective
RC	-	Remedial Contractor
RCRA	-	Resource Conservation and Recovery Act

RD	-	Remedial Design
RDWP	-	Remedial Design Work Plan
RI	-	Remedial Investigation
ROD	-	Record of Decision
SM	-	Standard Method
SOW	-	Statement of Work
SPT	-	Standard Penetration Test
SVOC	-	Semi-volatile Organic Compound
SWMP	-	Site-Wide Monitoring Plan
SWPPP	-	Stormwater Pollution Prevention Plan
TAC	-	Texas Administrative Code
TAT	-	Turnaround Time
TCDD	-	2,3,7,8-tetrachlorinated dibenzo-p-dioxin
TCEQ	-	Texas Commission on Environmental Quality
TCLP	-	Toxicity Characteristic Leaching Procedure
TCRA	-	Time Critical Removal Action
$TEQ_{DF,M}$	-	TCDD Toxicity Equivalent for Mammals
TOC	-	Total Organic Carbon
TODP	-	Transportation and Off-Site Disposal Plan
TPH	-	Total Petroleum Hydrocarbons
TSS	-	Total Suspended Solids
TSWP	-	Treatability Study Work Plan
TSWQS	-	Texas Surface Water Quality Standard
TWG	-	Technical Working Group
USACE	-	United States Army Corps of Engineers
UU	-	Unconsolidated Undrained
VOC	-	Volatile Organic Compound
µm	-	Micron

1. Introduction

GHD Services Inc. (GHD), on behalf of International Paper Company, submits to the United States Environmental Protection Agency (EPA) this Final 100% Remedial Design (RD) for the Southern Impoundment (Southern Impoundment 100% RD) of the San Jacinto River Waste Pits Site in Harris County, Texas (Site). This Southern Impoundment 100% RD was prepared pursuant to the requirements of the Administrative Settlement Agreement and Order on Consent for Remedial Design (AOC), Docket No. 06 02 18, with an effective date of April 11, 2018 (EPA, 2018a). The AOC includes a Statement of Work (SOW) under which a Final 100% RD for the Southern Impoundment is to be submitted to the EPA. The *Pre-Final 90% Remedial Design - Southern Impoundment* (Southern Impoundment 90% RD) was submitted on September 24, 2020 (GHD, 2020e). Comments on the Southern Impoundment 90% RD (Comments) were received on November 18, 2020 (EPA, 2020d), and have been addressed in this Southern Impoundment 100% RD. The *Final 100% Remedial Design - Southern Impoundment* (Southern Impoundment 100% RD) was submitted on December 18, 2020 (GHD, 2020g). Comments on the Southern Impoundment 100% RD (Comments) were received on March 15, 2021 (EPA 2021), and have been addressed in this Southern Impoundment 100% Final RD.

1.1 Background

The Site is located in Harris County, Texas, east of the City of Houston, between two unincorporated areas known as Channelview and Highlands. The Northern Impoundment is located immediately north of the Interstate Highway 10 (I-10) bridge over the San Jacinto River. The Southern Impoundment is approximately 20 acres in size and is located on a small peninsula that extends south of I-10. A vicinity map is shown on Figure 1, the Site plan is shown on Figure 2, and the Southern Impoundment is shown on Figure 3.

The Southern Impoundment consists of an impoundment built in the mid-1960s and used in that time period for disposal of solid and liquid pulp and paper mill material. The primary hazardous substances identified within the Southern Impoundment are polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans. Additional background information regarding the Southern Impoundment is contained in the *Remedial Investigation Report* (Integral and Anchor QEA, 2013b).

The remedy selected by the EPA for the Southern Impoundment is described in the *Record of Decision* (ROD) (EPA, 2017) as follows:

> This remedial action (RA) involves excavation and replacement of soil in the Southern Impoundment that is greater than the clean-up level. Soil would be removed within these areas to a depth of 10 feet below grade. Implementation of this RA would require dewatering (groundwater lowering) to allow excavation of impacted soil in relatively dry conditions and may need to be timed to try to avoid high water and periods when storms are most likely. Excavated soil would be further dewatered, as necessary, and potentially treated to eliminate free liquids prior to transporting it for disposal. Effluent from excavation and subsequent dewatering would need to be handled appropriately, potentially including treatment prior to disposal. Excavated soil would be disposed of at an existing permitted landfill, the excavation would be backfilled with imported soil, and vegetation would be re-established. An existing building (an elevated frame

structure) and a concrete slab would need to be demolished and removed prior to excavating the underlying soil. These features would be replaced as necessary.

The Remedial Action Objectives (RAOs) for the Site, as identified in the ROD, include:

RAO 1: Prevent releases of dioxins and furans above clean-up levels from the former waste impoundments to sediments and surface water of the San Jacinto River.

RAO 2: Reduce human exposure to dioxins and furans from ingestion of fish by remediating sediments to appropriate clean-up levels.

RAO 3: Reduce human exposure to dioxins and furans from direct contact with or ingestion of paper mill waste, soil, and sediment by remediating affected media to appropriate clean-up levels.

RAO 4: Reduce exposures of benthic invertebrates, birds, and mammals to paper mill waste derived dioxins and furans by remediating affected media to appropriate clean-up levels.

The risk-based clean-up level for the Southern Impoundment set forth in the ROD is listed below:

- Dioxin in paper mill waste material and soil in the Southern Impoundment - 240 nanograms per kilogram (ng/kg) (Southern Impoundment construction worker).

The exposure of a future construction worker to constituents of potential concern (COPCs) in surface and subsurface soils, as detailed in the *Baseline Human Health Risk Assessment* (BHHRA; Integral and Anchor QEA, 2013a), was considered in selecting a risk-based clean-up standard for the Southern Impoundment. A depth-weighted average (DWA) of the COPCs was used because a hypothetical future construction worker is assumed to be exposed to a mixture consisting of all soils within a 10-foot (ft) soil depth, and not solely to a given soil horizon for the duration of exposure. In communications and discussions with the EPA, the EPA has confirmed that the clean-up level of 240 ng/kg 2,3,7,8-tetrachlorinated dibenzo-*p*-dioxin (TCDD) toxicity equivalents for mammals ($TEQ_{DF,M}$) outlined in the ROD is a DWA concentration based on the concentration applicable to the soil volume in each depth interval over the upper 10 feet of the subsurface, and is not based on the potential risk associated with each individual depth interval.

1.2 Remedial Design Approach

The RD process, as provided for in the AOC, includes the use of a Technical Working Group (TWG) to provide technical expertise in the development and evaluation of the RD plans. The TWG has considered the pre-design investigations (PDIs), treatability, and Southern Impoundment RD elements represented in this document. The TWG consists of representatives from the EPA, Texas Commission on Environmental Quality (TCEQ), United States Army Corps of Engineers (USACE), GHD and other technical subject matter experts, as needed. The TWG has met a total of 12 times since the RD was initiated including on April 30, 2018, May 14 through 15, 2018, May 30, 2018, June 13, 2018, May 3, 2019, December 17, 2019, January 27 through 28, 2020, February 19, 2020, March 25, 2020, July 29, 2020, November 12, 2020, and December 15, 2020.

In addition, GHD and the EPA conduct weekly meetings to discuss the ongoing design progress, key technical items, and decisions associated with these items.

A summary of the deliverables associated with the RD to date for the Southern Impoundment are listed below.

- On September 10, 2018, the *Draft Remedial Design Work Plan* (RDWP, Integral and Anchor QEA, 2018c) was submitted to the EPA and outlined plans for implementing the RD activities identified in the SOW. The EPA provided comments on the Draft RDWP on October 24, 2018. The *Remedial Design Work Plan* (Integral and Anchor QEA, 2018e) was submitted to the EPA on December 24, 2018, and approved by the EPA on November 6, 2020 (EPA, 2020c).
- On June 8, 2018, the *Draft First Phase Pre-Design Investigation Work Plan* (Integral and Anchor QEA, 2018a) was submitted to the EPA. The EPA provided comments and the *First Phase Pre-Design Investigation Work Plan* (Integral and Anchor QEA, 2018b) was submitted to the EPA on August 24, 2018. It was approved by the EPA on September 12, 2018 (EPA, 2018b). An Addendum to the First Phase Pre-Design Investigation Work Plan (Integral and Anchor QEA, 2018d) was submitted on October 18, 2018.
- On December 7, 2018, a letter was submitted to the EPA (GHD, 2018) requesting a 48-day extension to the deadline for submittal of the *Draft Second Phase Pre-Design Investigation Work Plan* to allow time for the results from the First Phase Pre-Design Investigation (PDI-1) to be received and incorporated. This extension request was approved by the EPA on December 18, 2018 (EPA, 2018c), effectively extending the date for all subsequent RD submittals.
- On February 11, 2019, the *Draft Second Phase Pre-Design Investigation Work Plan* (GHD, 2019a) was submitted to the EPA. The EPA provided comments to the work plan on April 18, 2019 (EPA, 2019a). On June 3, 2019, the *Final Second Phase Pre-Design Investigation Work Plan* (GHD, 2019d) was submitted to the EPA and approved by the EPA in written correspondence dated August 8, 2019 (EPA, 2019c).
- On February 11, 2019, the *Draft Treatability Study Work Plan* (TSWP; GHD, 2019b) was submitted to the EPA. The EPA provided comments to the TSWP on April 18, 2019 (EPA, 2019b). On May 20, 2019, the *Final Treatability Study Work Plan,* (GHD, 2019c) was submitted to the EPA and approved in written correspondence dated August 27, 2019 (EPA, 2019d).
- On September 27, 2019, a letter was submitted to the EPA (GHD, 2019e) requesting an extension to the deadlines for the Preliminary 30% RD for the Northern and Southern Impoundments in response to a force majeure event caused by Tropical Storm Imelda, which caused significant flooding at the Site and the surrounding area in September 2019 and delayed the completion of field work related to Second Phase PDI (PDI-2). In a letter dated October 30, 2019 (EPA, 2019f), the EPA approved a 24-day delay due to the force majeure event and an extension to the deadlines for submittal of the Preliminary 30% RD for both the Northern and Southern Impoundments.
- On April 13, 2020, the Southern Impoundment 30% RD (GHD, 2020a) was submitted to the EPA. The EPA provided comments on June 26, 2020 (EPA, 2020b). Those comments were addressed in the Southern Impoundment 90% RD, submitted to the EPA on September 24. 2020 (GHD, 2020e). The EPA provided the Comments in response to the Southern Impoundment 90% RD on November 18. 2020 (EPA, 2020d). Responses to the Comments are summarized in Table 1 and the Comments have been addressed throughout this Southern Impoundment 100% RD.

- On December 18, 2020, the Southern Impoundment 100% RD (GHD, 2020g) was submitted to the EPA. The EPA provided Comments on March 15, 2021 (EPA, 2021). Responses to the Comments are summarized in Table 1 and the Comments have been addressed throughout this Southern Impoundment 100% RD.

1.3 Objective

The objective of this Report is to present a summary of the 100% RD for the Southern Impoundment. This Report includes a summary of the results from PDI-1 and PDI-2 with respect to the Southern Impoundment, and the Treatability Study. This Report also includes a description of the primary design elements for the selected remedy for the Southern Impoundment, including those related to excavation of subsurface material, the design and installation of a bulkhead, and water treatment, and associated design drawings, specifications, and supplemental plans.

1.4 Document Organization and Supporting Deliverables

The remaining sections of this Report are organized as follows:

- Section 2 of this Report includes descriptions of the phased PDIs for the Southern Impoundment that were performed and a summary of the results and conclusions from these events.
- Section 3 of this Report includes a description of treatability studies for the Southern Impoundment and results.
- Section 4 of this Report addresses the Applicable or Relevant and Appropriate Requirements (ARARs) that may be applicable to the Southern Impoundment remedial action (RA) work.
- Section 5 of this Report details the design criteria assumptions that are the basis for and will be used as part of the excavation, bulkhead installation, transportation and disposal, and water treatment process elements of the Southern Impoundment design.
- Section 6 of this Report includes a description of how the RA for the Southern Impoundment can be implemented in a manner that minimizes environmental impacts in accordance with the EPA's *Principles for Greener Clean-Ups.*
- Section 7 of this Report includes a list of drawings developed to date for the Southern Impoundment RD, along with the list of detailed technical specifications (included as Appendix E).
- Section 8 of this Report includes the drafts of all supporting deliverables identified in the SOW or identified as being required: Construction Health and Safety Plan (HASP), Emergency Response Plan (ERP), Pre-Construction Field Sampling Plan (PC FSP), Field Sampling Plan (FSP), Quality Assurance Project Plan (QAPP), Site-Wide Monitoring Plan (SWMP), Construction Quality Assurance/Quality Control Plan (CQA/QCP), Transportation and Off-Site Disposal Plan (TODP), and Institutional Controls Implementation and Assurance Plan (ICIAP).
- Section 9 of this Report includes references to cited reports, correspondence, etc.

This Report also includes the following appendices: Southern Impoundment PDI Supporting Documents (including analytical and geotechnical laboratory reports, data validation reports and photographic logs for the PDI [Appendix A]); Southern Impoundment Treatability Study Supporting Documents (including water and soil analytical laboratory reports [Appendix B]); the Southern

Impoundment Supporting Deliverables (Appendix C), the Design Drawings (Appendix D), and the Technical Specifications (Appendix E).

2. Pre-Design Investigation

Prior to the PDI, subsurface investigations of the Southern Impoundment were completed in March 2011 and May 2012 as part of the remedial investigation (RI) to characterize soil chemistry for dioxins and furans. A summary and results of these investigations are included in the *Remedial Investigation Report* (Integral and Anchor QEA, 2013b) that was submitted to the EPA on May 23, 2013. These investigations were completed prior to the EPA setting the clean-up level for Southern Impoundment soil of 240 ng/kg. As a result, a key goal of the Southern Impoundment PDI was to delineate and refine the areas and volume of Southern Impoundment soil waste material requiring excavation based on the EPA's soil clean-up level.

The PDI for the Southern Impoundment was conducted in two phases, as described below.

2.1 First Phase Pre-Design Investigation (PDI-1)

The purpose of PDI-1 was to address the following data gaps for the Southern Impoundment:

- Characterization of dioxins and furans in the upper 10 feet of soils adjacent to cores collected during the RI in which the DWA $TEQ_{DF,M}$ concentrations were greater than 240 ng/kg in order to delineate areas not previously characterized and volumes of soil that will require removal.
- Geotechnical assessment of subsurface within the excavation area of the Southern Impoundment to support engineering design.
- Characterization of for disposal of material excavated from the Southern Impoundment that will require off-site disposal.

PDI-1 activities in the Southern Impoundment were completed from November 1 through 19, 2018, in accordance with the *First Phase Pre-Design Investigation Work Plan (*Integral and Anchor QEA, 2018b), dated August 24, 2018, and approved by the EPA on September 12, 2018 (EPA, 2018b), and the *Addendum to the First Phase Pre-Design Investigation Work Plan*, dated October 18, 2018 (Integral and Anchor QEA, 2018d).

Southern Impoundment PDI-1 field activities included subsurface sampling for chemistry, waste characterization, and geotechnical analyses at 45 sampling locations (Figure 4). Borings were advanced from the surface to 10 feet below ground surface (ft bgs) for chemistry and waste characterization, and from the surface to the Beaumont clay, approximately 35 ft bgs, for geotechnical sampling and testing.

A photographic log documenting the PDI-1 field event is included as part of Appendix A.

2.1.1.1 PDI-1 Chemistry Sampling

As part of PDI-1 activities, a total of 66 subsurface borings were installed at 45 locations in the Southern Impoundment. Of those samples, 26 were analyzed for dioxins and furans and 40 were archived for future analysis pending the results of the first 26 samples. All borings were installed to a depth of 10 ft bgs.

- Twelve borings were installed in six new locations (two borings co-located at each location) to fill in data gaps from the RI results. A single composite sample was collected from each location for analysis of dioxins and furans. A second co-located boring was collected at each location, archived in two-foot intervals and analyzed only if the composite sample result was greater than 240 ng/kg $TEQ_{DF,M}$.
- A total of 20 composite perimeter step-out borings were installed around five RI boring locations at which the $TEQ_{DF,M}$ was greater than 240 ng/kg $TEQ_{DF,M}$ (four borings per RI boring location, one in each of the four cardinal directions). A total of 20 interval perimeter, step-out, co-located borings were installed in the same locations as the composite borings. Samples were collected in two-foot intervals, archived and analyzed only if the composite sample result was greater than 240 ng/kg $TEQ_{DF,M}$.
- An additional 20 borings were collected from step-outs from the RI boring locations. These step-outs were beyond the bounds of the step-outs described above and were collected and archived in two-foot intervals. These were analyzed only if the original step-out composite sample result was greater than 240 ng/kg $TEQ_{DF,M}$.

Discrete and composite samples were collected via direct push methodology and submitted for analysis consistent with the *First Phase Pre-Design Investigation Work Plan* (Integral and Anchor QEA 2018b). Samples were analyzed by ALS Laboratories in Houston, Texas for dioxins and furans using EPA approved method (1613B). Sample data validation was completed by a third-party validation firm (EcoChem, Inc.).

2.1.1.2 PDI-1 Geotechnical Sampling

A total of five geotechnical borings were installed to a total depth of 35 ft bgs in locations shown on Figure 4. Disturbed samples were collected from standard penetration test (SPT) split-spoon samplers and analyzed for moisture content, plasticity (Atterberg limits), specific gravity, and grain size distribution. Undisturbed samples were collected using Shelby tube samplers and analyzed for moisture content and bulk density testing. Most tests were performed in a laboratory setting, with blow counts being the only geotechnical test conducted in the field. Geotechnical samples were submitted to GeoTesting Express for analysis.

2.1.1.3 PDI-1 Waste Characterization Sampling

In order to support waste disposal planning, composite samples from 0 to 10 ft bgs were collected from five areas that were anticipated to be subject to removal, as depicted on Figure 4. Samples were analyzed for toxicity characteristic leaching procedure (TCLP) parameters and ignitability, corrosivity, reactivity, and toxicity, as outlined in Table 2. Due to the presence of debris not typical of paper mill waste in some previous cores, samples were also analyzed for total petroleum hydrocarbons (TPH) and asbestos.

2.1.2 Summary of PDI-1 Results

2.1.2.1 PDI-1 Chemistry Results

Of the 38 soil subsurface borings analyzed, 23 had DWAs greater than 240 ng/kg $TEQ_{DF,M}$ and 16 had DWAs less than 240 ng/kg $TEQ_{DF,M}$, as seen on Figure 5. The PDI-1 chemistry sample validated analytical data for the Southern Impoundment is shown in Table 3. The laboratory reports and data validation report are included as part of Appendix A.

2.1.2.2 PDI-1 Geotechnical Results

The PDI-1 geotechnical results show interbedded clay, silt, and sand in the areas of the Southern Impoundment in which the geotechnical samples were collected. Soils were shown to have moderate moisture content. Atterberg classification of clay soils indicated that they contained a mix of clays and sands, with an approximately even mix of high plasticity, fat clays and low plasticity, lean clays. Interspersed within these clays were samples with a high sand content. The PDI-1 geotechnical sample results for the Southern Impoundment are included in Appendix A.

2.1.2.3 PDI-1 Waste Characterization Results

Based upon the results summarized in Table 2, material to be excavated for off-site disposal from the Southern Impoundment did not exhibit any of the four characteristics of hazardous waste (ignitability, corrosivity, reactivity, or toxicity), as defined in Title 40 of the Code of Federal Regulations (CFR) Part 261, Subpart C. Analytical results for asbestos were non-detect, indicating that the material analyzed would not require any special handling.

Analytical results for TPH for boring SJSB012-N1-Composite were elevated, bordering on the limit between Class 1 versus Class 2 under the regulations governing classification of non-hazardous industrial solid waste in Texas (30 Texas Administrative Code [TAC] §335.505, 335.506, and 335.508) and suggesting that additional evaluation should be conducted during the Southern Impoundment RA to classify non-hazardous waste (as Class 1 versus Class 2).

Additional waste characterization testing for the Southern Impoundment was performed as part of the Southern Impoundment Treatability Study, as discussed in Section 3.

2.2 Second Phase Pre-Design Investigation (PDI-2)

The purpose of PDI-2 was to address the following data gaps for the Southern Impoundment:

- Refinement of the horizontal and vertical extent of subsurface material from the Southern Impoundment soil with a DWA $TEQ_{DF,M}$ greater than 240 ng/kg to a depth of 10 ft bgs
- Geotechnical data to inform the design and construction of a bulkhead along the shoreline for a portion of the excavation
- Topographic and above-ground utility survey data to support design elements related to access, staging, and excavation

2.2.1 PDI-2 Investigation Activities

PDI-2 field work on the Southern Impoundment took place from September 3 through December 11, 2019, in accordance with the *Final Second Phase Pre-Design Investigation Work Plan (*GHD, 2019d), dated June 3, 2019, and approved by the EPA on August 8, 2019 (EPA, 2019c). On September 17, 2019, Tropical Storm Imelda caused significant flooding at the Site, shutting down all work until October 7, 2019. This event resulted in a force majeure event, approved by the EPA in correspondence dated October 30, 2019 (EPA, 2019f), that delayed the completion of PDI-2 field work.

Southern Impoundment PDI-2 field activities included installation of 21 chemistry sample boring locations, two geotechnical boring locations, and three treatability testing boring locations (chemistry and geotechnical borings shown on Figure 6; treatability sample locations shown on Figure 7). The treatability testing and results are further discussed in Section 3. Borings were advanced from the surface to 10 ft bgs for chemistry borings, and from the surface to approximately 75 ft bgs for geotechnical sampling and testing.

A photographic log documenting the PDI-2 field event is included in Appendix A.

2.2.1.1 PDI-2 Chemistry Sampling

As part of PDI-2 activities, 21 chemistry borings were installed using direct push methodology to a depth of 10 ft bgs with discrete samples collected for every 2-ft interval. Each 2-ft interval sample was analyzed by Eurofins TestAmerica Laboratory in Sacramento, California for dioxins and furans using EPA approved Method (1613B) and percent moisture using Standard Method (SM) 2540G. Sample data validation was completed by GHD. The DWA for each location was calculated mathematically using the results of the five discrete interval samples for that boring to determine if the DWA for that location was greater than or less than the clean-up level (240 ng/kg $TEQ_{DF,M}$).

Eleven of the borings were non-contingent borings and samples from these locations were analyzed immediately upon arrival at the laboratory. Samples from the other 10 borings were contingent samples (denoted as C1, C2, or C3) that were archived by the laboratory, and were only analyzed if the adjacent non-contingent boring of the same number had a DWA greater than 240 ng/kg $TEQ_{DF,M.}$

Analytical results from boring SJSB065 showed dioxin and furan concentrations greater than 240 ng/kg $TEQ_{DF,M}$ DWA. To fully delineate the southwestern corner of the Southern Impoundment, a step-out boring (SJSB065-C1) was added along the shoreline, as shown on Figure 6. On October 11, 2019, a Work Plan Refinement Notice (GHD, 2019f) was submitted to the EPA identifying the need to add a chemistry boring (SJSB065-C1) to the approved scope of work. The additional work was approved by the EPA on October 22, 2019 (EPA, 2019e).

On November 8, 2019, a Third Work Plan Refinement Notice (GHD, 2019g) was submitted to the EPA identifying the need to add three additional chemistry borings to the approved scope of work. The additional work was approved by the EPA on November 14, 2019 (EPA, 2019g). Analytical results from borings SJSB060-C1 and SJSB061-C1 showed dioxin and furan concentrations greater than 240 ng/kg $TEQ_{DF,M}$ DWA. To fully delineate that corner of the Southern Impoundment, three additional step-out borings were added, including SJSB060-C2 and SJSB060-C3 which were installed in the right-of-way on the east side of Market Street and SJSB061-C2 which was installed in the southeastern corner of the Glendale Boat Works property, as shown on Figure 6.

2.2.1.2 PDI-2 Geotechnical Sampling

Upon review of the geotechnical data obtained during PDI-1, geotechnical data was not identified as a data gap in the *Final Second Phase Pre-Design Investigation Work Plan* (GHD, 2019d). As such, no geotechnical borings were originally planned for purposes of PDI-2. Analytical results showed dioxin and furan concentrations greater than 240 ng/kg $TEQ_{DF,M}$ DWA in step-out soil boring SJSB065-C1, along the shoreline adjacent to the water in the southwest corner of the Southern Impoundment. As such, it was determined that it would be necessary to install a bulkhead along the shoreline in that corner to allow for excavation and backfill to be conducted under dry conditions. Two geotechnical soil borings were added to the approved scope of work in order to collect geotechnical data to inform the design of the bulkhead. The two geotechnical borings were identified in the Third Work Plan Refinement Notice (GHD, 2019f). The locations of these borings (SJGB028 and SJGB029) are shown on Figure 6.

Geotechnical borings were installed using a Central Mine Equipment (CME) mud-rotary drilling rig. Samples were collected and analyzed for moisture content (per American Society for Testing and Materials [ASTM] D2216); grain size (per ASTM D6913 and ASTM D7928); plasticity (Atterberg limits; per ASTM D4318); torvane shear (per ASTM D2537); and unconsolidated undrained (UU) triaxial shear strength (per ASTM D2850) to a depth of 75 ft bgs. Geotechnical samples were sent to Tolunay-Wong Engineers, Inc. in Houston, Texas, for analysis.

2.2.2 Summary of PDI-2 Results

2.2.2.1 PDI-2 Chemistry Results

Of the 21 chemistry sample borings installed during the PDI-2, 20 were analyzed. Contingent boring, SJSB063-C1 was collected but was not analyzed due to the non-contingent boring of the same number (SJSB063) demonstrating DWAs below 240 ng/kg $TEQ_{DF,M}$. Of those 20, eight had DWAs greater than 240 ng/kg $TEQ_{DF,M}$ and 12 had DWAs below 240 ng/kg $TEQ_{DF,M}$, as seen on Figure 8. Analytical analysis and data handling for PDI-2 followed the procedures identified in the QAPP that was submitted in *Final Second Phase Pre-Design Investigation Work Plan* (GHD, 2019d) to ensure that data quality objectives (DQOs) were achieved. This included a systematic process, which included data validation that is designed to ensure that the data collected are of the appropriate type and quality for its intended application. The validated analytical data is shown in Table 4 and provides quality assurance that the data collected are usable. The laboratory reports and data validation report are included as part of Appendix A.

2.2.2.2 PDI-2 Geotechnical Results

Two geotechnical borings (SJGB028 and SJGB029) were completed during PDI-2 to support the design of the bulkhead along the shoreline of the river. The near surface soils encountered at these two locations are mostly alternating layers of silt, sand, and clay up to -10 feet NAVD88. A layer of very loose to loose granular deposits were encountered between -10 feet and -40 feet NAVD88. Below this interval is a fat clay that grades into a sandy clay deposit that extends to the termination depth of the borings at approximately -69 feet NAVD88. The clay interval appears to be part of the Beaumont Formation, which is commonly found in the near surface of the eastern bank of the San Jacinto River. The geotechnical results and a summary report from Tolunay-Wong Engineers, Inc. are included as part of Appendix A.

2.2.2.3 PDI-2 Topographic and Utility Survey

To support design elements related to access, staging, and excavation, a topographic survey was conducted on the Southern Impoundment from July 29 through August 2, 2019. The survey was conducted by a surveyor (Morrison Surveying, Inc.) licensed in the state of Texas. Field data was collected using conventional surveying equipment, including a Trimble R10 global positioning system (GPS), and Trimble S6 robotic total station with supporting accessories. Surveying was completed on a 50-ft grid over the Southern Impoundment boundaries. Above-ground utilities were also noted during survey activities. Survey data was utilized to develop a topographical digital elevation map of the Southern Impoundment. This surface and all identified above-ground utilities from this survey have been incorporated into the design drawings.

2.3 Conclusions and Recommendations

PDI-1 results showed dioxins and furans concentrations greater than 240 ng/kg $TEQ_{DF,M}$ DWA at 23 boring locations and the PDI-2 results showed concentrations greater than 240 ng/kg $TEQ_{DF,M}$ DWA at eight boring locations. The data from PDI-1 and PDI-2 were combined with the data from the RI to generate Thiessen polygons to determine the approximate vertical and horizontal extent of the dioxins and furans concentrations in the subsurface greater than 240 ng/kg $TEQ_{DF,M.}$ These Thiessen polygons are shown on Figure 9. The analytical laboratory reports from the PD-1 and PDI-2 sampling events can be found in Appendix A. The results for the discrete sample intervals and mathematically calculated DWAs for the RI, PDI-1, and PDI-2 events are summarized in Table 5.

Based on the results from the RI and PDI events, there are four main areas in which excavation is proposed, as shown on Figure 9. The Thiessen polygons developed from these results are the basis for the excavation area and volume in this Southern Impoundment 100% RD.

The geotechnical results from the PDI-2 were utilized to inform the design of the sheet pile bulkhead in the vicinity of the southwest corner of the Southern Impoundment. A summary of the geotechnical analysis is presented in Section 5 and the geotechnical report is included in Appendix A.

3. Treatability Study and Waste Characterization

3.1 Treatability Study and Waste Characterization Overview

Pursuant to the ROD, excavated Southern Impoundment soil may need to be solidified to eliminate free liquids prior to transport for off-site disposal and contact water generated in the excavation through seepage and/or stormwater accumulation that may need to be treated prior to discharge.

As part of the PDI-2 field activities, borehole water samples and subsurface samples were collected from the Southern Impoundment to utilize for treatability testing, as specified in the TSWP (GHD, 2019c) submitted to the EPA on May 20, 2019, and approved on August 27, 2019 (EPA, 2019d).

In addition, a robust field pilot test which involved on-site clarification and filtration was performed as part of the treatability studies on contact water generated from the Northern Impoundment. Laboratory particle size analysis was also performed on the Northern Impoundment samples to evaluate the effectiveness of filtration micron size at removing dioxins and furans. Results of those

Northern Impoundment treatability studies that provide the basis for the water treatment element of the Southern Impoundment RD are provided below. Detailed results of the Northern Impoundment treatability studies on contact water were provided as part of the Preliminary 30% Remedial Design for the Northern Impoundment, submitted to the EPA on May 28, 2020, (GHD, 2020b). To ensure the testing completed on the Northern Impoundment contact water is applicable to the Southern Impoundment, a representative borehole water sample was collected from the Southern Impoundment and analyzed to obtain characterization data to be used in comparing that sample to samples from the Northern Impoundment used in the pilot test and laboratory treatability study.

To supplement previous waste characterization results, three composite samples were collected from locations in the Southern Impoundment with concentrations of dioxin and furans greater than 240 ng/kg $TEQ_{DF,M}$ DWA. These samples were also evaluated for the need for solidification prior to disposal.

3.2 Treatability Study Objectives

As outlined in the TSWP, the objectives related to the Southern Impoundment Treatability Study included:

- Evaluate the re-use of contact water on-site for in-situ solidification of the Southern Impoundment waste material
- Evaluate optimum solidification mix designs to solidify the waste material for transportation and disposal
- Evaluate optimum solidification mix designs to meet requirements for Texas Class 1 and/or Class 2 non-hazardous industrial waste disposal, in accordance with 30 TAC 335.505-506 and 335.508
- Characterize the borehole water quality to evaluate whether it could be incorporated into the solidification mix design

The TSWP did not include treatability testing for the Southern Impoundment contact water. It was later determined that treatability testing for the Southern Impoundment should be performed, based on a determination that the estimated volume of contact water could not be fully used in solidification of excavated soils. Characteristics of the borehole water collected in the Southern Impoundment were correlated to the characteristics of the samples collected in the Northern Impoundment. The purpose of the comparison was to determine if water quality characteristics and sample results of treatability evaluations performed on Northern Impoundment water samples could be applied to water that may be encountered during the RA at the Southern Impoundment.

3.3 Waste Characterization

3.3.1 Waste Characterization Activities

In order to support waste disposal planning and supplement results obtained during PDI-1, during the Southern Impoundment PDI-2 activities, four 5-gallon buckets of material were collected from each of three treatability sample locations, as shown on Figure 7. This material was collected between October 9 and 12, 2019. Sample locations were selected based upon data collected during the RI and PDI-1 indicating that those locations had dioxin and furan concentrations greater than

240 ng/kg $TEQ_{DF,M}$ DWA. Samples were collected and composited from borings installed using direct push methodology. Samples were containerized, sealed, and delivered via courier to the GHD Treatability Laboratory in Niagara Falls, New York, on October 17, 2019.

Samples were analyzed for the following parameters evaluate whether they exhibit any characteristics of hazardous waste under Resource Conservation and Recovery Act (RCRA) and to determine whether they would meet 30 TAC 335 Subchapter R for Class 1 or Class 2 non-hazardous landfill disposal requirements:

- TCLP Dioxins and Furans - EPA 1613B
- TCLP Volatile Organic Compounds (VOCs) - EPA 8260C
- TCLP Semivolatile Organic Compounds (SVOCs) - EPA 8270D
- TCLP Organochlorine Pesticides - EPA 8081B
- TCLP Polychlorinated Biphenyls (PCBs) - EPA 8082A
- TCLP Herbicides - EPA 8151A
- TCLP Glycols - EPA 8015D Direct Injection
- TCLP Metals - EPA 6010C
- TCLP Mercury - EPA 7470A
- TCLP Methomyl - EPA 8321A
- Total Cyanide - EPA 9014
- Sulfide - EPA 9034
- Ignitability - EPA 1020B
- pH - EPA 9045D
- Paint Filter - EPA 9095B

3.3.2 Waste Characterization Results

Baseline characterization results for the Southern Impoundment treatability samples were consistent with results obtained during PDI-1, indicating that the material is a non-hazardous waste under RCRA. The basis for that classification is discussed in the sections below.

On July 30, 2020, stored Southern Impoundment waste characterization samples (from PDI-2) were analyzed by the TestAmerica laboratory in Houston, Texas for reactive sulfide using EPA Method 9034. Reactive sulfide was not detected above the laboratory method detection limit in any of the samples. These results and the results of the Total Sulfide analysis conducted during the Treatability Study are shown in Table 6. Analytical laboratory reports are included in Appendix B.

3.3.3 Waste Characterization Conclusions

The EPA's guidance regarding the management of remediation waste states that "contaminated environmental media, of itself, is not hazardous waste and, generally, is not subject to regulation under RCRA." (*Management of Remediation Waste under RCRA*, USEPA, 1998). The material to be excavated during the Southern Impoundment RA for disposal off-site is the environmental media to be evaluated, and it is subject to regulation under RCRA as hazardous waste only if one of the following two conditions exists:

1. The media is impacted with a listed hazardous waste at concentrations that are above the health based risk levels; or

2. Any constituent in the media exhibits one of the characteristics of hazardous waste.

GHD submitted a waste characterization evaluation for the Southern Impoundment to the EPA on November 5, 2020 (Waste Characterization Letter; GHD, 2020f). The purpose of the evaluation was to describe how pulp and paper mill waste, proposed to be excavated as part of the Southern Impoundment RA, has been characterized and classified in accordance with the RCRA regulations as non-hazardous waste. EPA subsequently concurred with the conclusions contained in the Waste Characterization Letter in the Comments and in a letter to GHD dated November 19, 2020 (EPA, 2020e).

As part of this evaluation, the following sections of Title 40 of the CFR Part 261 - *Identification and Listing of Hazardous Waste*, were evaluated:

- Subpart A - Definition of Solid Waste, Hazardous Waste & Exclusions (261.1-.9)
- Subpart B - Criteria for Identifying the Characteristics and Listing of Hazardous Wastes (261.10-.11)
- Subpart C - Characteristics of Hazardous Waste (261.20-.24)
- Subpart D - Lists of Hazardous Wastes (261.30-.33)

3.3.3.1 Listed Waste Evaluation

The listed waste evaluation involved determining whether the material contains a “listed” hazardous waste at concentrations above regulatory thresholds. The categories of listed hazardous wastes, using the codes assigned to each category, are:

- “F” codes = Non-Specific Sources
- “K” codes = Specific Sources
- “P” codes = Commercial Chemical Products (acutely hazardous)
- “U” codes = Commercial Chemical Products (non-acutely hazardous)

According to EPA guidance, information about the source of the waste is to be used in making the determination. Information about the waste material was summarized in the Waste Characterization Letter. The evaluation concluded that the material did not meet any of the listed descriptions.

3.3.3.2 Characteristic Waste Evaluation

Under RCRA, a solid waste is a hazardous waste if it exhibits any of the following characteristics:

- Ignitability (D001)
- Corrosivity (D002)

- Reactivity (D003)
- Toxicity (D004 - D043)

The evaluation involved a review of available waste characterization data from PDI-1 and PDI-2 and information from the RI about the material deposited in the Southern Impoundment. It concluded that the excavated material at the point of generation (when it is excavated) would not exhibit the characteristics of a RCRA hazardous waste (i.e., ignitability, corrosivity, reactivity, or toxicity).

In its letter to GHD dated November 19, 2020, the EPA stated that "based upon information provided in the November 5, 2020 evaluation, EPA agrees with GHD's determination that the initially generated waste would not be a listed hazardous waste meeting the current definitions of an F, K, P or U waste. From review of the analytical testing results, the samples are all non-hazardous" (EPA, 2020e). Additional sampling may be required to further characterize excavated material to confirm that it meets the definition of a non-hazardous waste and to determine whether it meets the definition of Class 1 or Class 2 non-hazardous waste under the regulations governing classification of non-hazardous industrial solid waste in Texas. Additional waste characterization sampling will be conducted during the pre-construction sampling event to be conducted utilizing the guidance provided in Chapter Nine "Sampling Plan" of the *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (EPA, 1986) and in *RCRA Waste Sampling Draft Technical Guidance* (EPA, 2002), as described in the PC FSP (Appendix C, Attachment 3). If hazardous waste, as defined in 40 CFR part 261, is identified, it will be managed and disposed of in accordance with RCRA regulations. The results of this additional sampling can be used to further refine the classification of material for off-site disposal.

3.3.4 Soil Treatability

As outlined in the TSWP, solidification reagent testing was planned to be performed on any samples of waste material that failed any of the TCLP or paint filter analyses. Samples from the Southern Impoundment all passed paint filter and did not leach any materials in excess of Subtitle D or Texas Class 2 waste, per 30 TAC 335 Subchapter R. Therefore, reagent testing was not completed during the treatability study.

During the Southern Impoundment RA, there may be instances in which excavated material to be disposed of off-site may be encountered that does not pass the paint filter test for landfill acceptance. In that instance, solidification methods may be utilized to facilitate drying of such materials, such as solidification by amendment addition, in coordination with the disposal facility (e.g., fly ash, lime, or absorbent polymer).

3.4 Water Treatability Testing

The EPA has made the determination regarding the ARAR for compliance with the Texas Surface Water Quality Standard (TSWQS) based on the substantive requirements of the state's regulation for surface water discharge. As detailed in e-mail correspondence dated February 18, 2020 (EPA, 2020a), "EPA has determined that compliance with the TSWQS ARAR will be attained as follows:

- The state surface water quality standard for Dioxins/Furans is 7.97 x 10^{-8} µg/L [0.0797 picograms per liter {pg/L}] (as TCDD equivalents).

- Compliance with the TSWQS will be determined using the minimum level of the EPA approved Method (1613B), cited in 40 CFR Part 136 (Guidelines Establishing Test Procedures for the Analysis of Pollutants), in sampling of surface water discharges during the Site remedial action.
- If an effluent sample analyzed for dioxin is below the minimum level using the EPA approved method, the sample result would be identified as non-detect and the discharge would be determined to be in compliance with the ARAR.

The Minimum Level (ML) for each analyte is defined as the level at which the entire analytical system must give a recognizable signal and acceptable calibration point. It is equivalent to the concentration of the lowest calibration standard, assuming that all method-specified sample weights, volumes, and clean-up procedures have been employed.

This approach is consistent with the state's guidance and other permits issued by the TCEQ."

Extensive treatability testing was performed both on-site at the Northern Impoundment as part of a pilot test and in the GHD Treatability Laboratory using contact water generated from the Northern Impoundment to evaluate water treatment options. The contact water generated in the Northern Impoundment represents a "worst case" of what could be expected during the RA and was expected to be very similar in chemical composition to the contact water from the Southern Impoundment. To ensure that the results obtained from the Northern Impoundment treatability testing could be applied to borehole water collected at the Southern Impoundment, a borehole water sample was obtained from the Southern Impoundment for baseline characterization.

As described in the TSWP, two water management approaches were to be evaluated as part of the treatability study; traditional treatment through clarification and filtration, and thermal evaporation. Based upon the results of treatability testing and the EPA's determination regarding the applicable surface water discharge ARAR (see Section 5.4.1.4), traditional treatment through clarification and filtration was identified for use in the Southern Impoundment 30% RD and thermal evaporation was not considered as a water management approach, so any further discussion of its initial evaluation is not included in this Report.

3.4.1 Water Sample Acquisition

3.4.1.1 Southern Impoundment Borehole Water

As described in the TSWP, GHD planned to collect contact water from approximately three subsurface boring locations in the Southern Impoundment to establish baseline characterization conditions. Consistent with previous investigations, seepage water was rarely encountered in open boreholes. Only one borehole generated a sufficient volume of water to conduct limited baseline characterization. On October 24, 2019, GHD was able to collect 1.5 gallons of borehole seepage water from boring SJSB059 using a bailer. The location of the water sample is shown on Figure 7. The sample was containerized in a 5-gallon bucket, sealed, and delivered via courier to the GHD Treatability Laboratory in Niagara Falls, New York.

3.4.1.2 Northern Impoundment Excavation Seepage and Contact Water

In order to generate the large volume of water required for the thermal evaporation pilot test, 20,000 gallons of representative contact water were generated from the Northern Impoundment. In order to produce this volume, waste material in the western portion of the Northern Impoundment was excavated from a 20-ft by 20-ft by 10-ft cell. The excavated material was stored in roll-off containers. The excavation remained open overnight, and water that seeped into the excavation was collected. In addition, to obtain adequate volume of contact water, approximately 20,000 gallons of potable water was then transferred into the excavation and mixed using an excavator bucket to generate a worst case suspended solids mixture that may be encountered in stormwater during the RA. This simulated contact water was then pumped to two storage tanks and the contents of the two tanks were homogenized and subsequently sampled.

3.4.2 Water Treatability Activities

3.4.2.1 Southern Impoundment Borehole Water Baseline Analysis

In order to establish baseline characterization conditions for contact water in the Southern Impoundment, the sample collected from boring SJSB059 was analyzed for the following characterization parameters:

- Dioxins and Furans - EPA 1613B
- VOCs - EPA 8260C
- SVOCs - EPA 8270D
- PCBs - EPA 8082A
- Total and Dissolved Metals - EPA 6010C
- Total and Dissolved Mercury - EPA 7470A
- Ammonia Nitrogen - EPA 350.1
- Chemical Oxygen Demand (COD) - EPA 410.4
- pH - EPA 9040C
- Total Dissolved Solids (TDS) - SM2540C
- Total Organic Carbon (TOC) - SM5310C

Full characterization, including parameters such as total suspended solids and dissolved dioxins, could not be completed due to the limited sample volume. Based on results of a similar analysis of the Northern Impoundment contact water, the characteristics of Northern Impoundment contact water were determined to be similar to what would be encountered in the Southern Impoundment. The Northern Impoundment data have been used to supplement the more limited data from in the Southern Impoundment. Additional Southern Impoundment water characterization will be performed as part of a pre-construction field sampling event (described in the PC FSP, included as Appendix C, Attachment 3).

3.4.2.2 Northern Impoundment Pilot Treatability Testing

As mentioned in Section 3.4.1.2, contact water was generated in the Northern Impoundment by placing potable water in an open excavation in the Western Cell. This simulated contact water was then processed through an on-site treatment system which included polymer addition with inline mixing followed by clarification, sand filtration, and bag filtration. Water samples were collected and analyzed at different steps in the process, as depicted in a process flow diagram, included as Figure 10. The following samples were collected and analyzed:

- Excavation Seepage Water
- Homogenized Contact Water (Tank 1)
- Homogenized Contact Water (Tank 2)
- Clarified Effluent
- Filtered Effluent

All samples were analyzed for the following characterization parameters:

- Dioxins and Furans - EPA 1613B
- VOCs - EPA 8260C
- SVOCs - EPA 8270D
- PCBs - EPA 8082A
- Total and Dissolved Metals - EPA 6010C
- Total and Dissolved Mercury - EPA 7470A
- Alkalinity - SM 2320B
- Ammonia Nitrogen - EPA 350.1
- Anions (bromide, chloride, fluoride, nitrate, nitrite, sulfate) - EPA 300.0
- Biochemical Oxygen Demand (BOD) - SM 5210B
- COD - EPA 410.4
- Cyanide - EPA-SW846-9012B
- Ferrous iron - SM 3500
- Hydrogen sulfide - SM 4500
- pH - EPA 9040C
- Phosphorus - EPA-SW846-6010D/3050B/7471B
- Sulfide - EPA-SW846-9034
- TDS - Standard Methods SM2540C
- TOC - Standard Methods SM5310C
- Total Suspended Solids (TSS) - SM 2540D

3.4.2.3 Laboratory Particle Size Analysis by Filtration

To further evaluate filtration requirements, testing was performed in the GHD Treatability Laboratory on samples of the contact water from the Northern Impoundment. This serial filtration test was performed in order to determine the size distribution of the particles present in the contact water and any relationship between particle size and the concentration of dioxins and furans in the sample.

The test was performed on a 7-liter sample of homogenized contact water. The entire 7-liter sample was then filtered through a pre-weighed 100 micron (µm) filter paper. A 1-liter sample of the filtrate was then collected for analysis of dioxins and furans. This process was then repeated using the remaining filtrate water and pre-weighed 10, 1, 0.45, and 0.1 µm filter papers with collection of a filtrate sample after each filtration.

After the filtration test was complete, each filter paper was dried and then weighed to determine the amount of particulate captured on the filter and the filtrate samples were analyzed for dioxins and furans.

3.4.3 Water Treatability Results and Conclusions

3.4.3.1 Effluent Limitation Assessment

A water quality-based effluent limitations assessment was completed to ensure that the effluent from the Southern Impoundment maintains instream criteria for dissolved oxygen and other parameters such as bacteria, phosphorus, nitrogen, turbidity, dissolved solids, temperature, and toxic pollutants. This assessment provides an indication that the water quality standards for the receiving water body are met. These numeric water quality criteria are values expressed as levels, or constituent concentrations, or numbers deemed necessary to protect the receiving water. Water from the Southern Impoundment will discharge to the Segment 1005 of San Jacinto River, which is classified as a tidal river. Accordingly, the TCEQ model, TEXTOX MENU #5 for bay or wide tidal rivers was utilized to determine the water quality-based effluent limitations for COPCs for the Southern Impoundment based on the receiving water body. These estimated discharge criteria are included in Table 7. For dioxins and furans, results were compared to the ML, as discussed in Section 3.4.

3.4.3.2 Southern Impoundment Borehole Water Results

Analytical results for the sample obtained from the borehole on the Southern Impoundment are summarized in Table 7. The available results were compared to the Northern Impoundment excavation contact water collected during the pilot test. These results are also included in Table 7. Analytical laboratory reports are included as part of Appendix B.

Evaluation of the results from the two samples analyzed indicates that the COPCs present in the Southern Impoundment borehole water are similar to the Northern Impoundment excavation contact water. COPCs present in both the Southern Impoundment and Northern Impoundment contact water include dioxins, metals, ammonia, and suspended solids. Neither contains PCBs, SVOCs or VOCs. Concentrations of metals and dioxins and furans are primarily associated with the level of solids in the water. The treatment system is designed to remove suspended solids from the contact water, which will, in turn, reduce the associated particulate metals and dioxins concentrations. The average TSS concentration in the Northern Impoundment simulated contact water sample was approximately 4,000 milligrams per liter (mg/L). This concentration is greater than what is anticipated to be encountered in the Southern Impoundment via seepage or stormwater and was conservatively used as the basis for the Southern Impoundment 100% RD.

3.4.3.3 Northern Impoundment Pilot Treatability Results

Results of the water samples from each step of the on-site pilot treatability testing are summarized in Table 7 and were compared to the estimated discharge criteria, as described in Section 3.4.3.1. The contact water initially exhibited high levels of dioxins and furans, TSS, and some metals (including copper, lead, and zinc). Following clarification, the metals in the clarified effluent sample were below estimated discharge limits. Results for all analytical parameters, including dioxins and furans, were below the estimated discharge criteria for the filtered effluent sample. Figure 10 depicts the step-wise decrease in dioxins, metals, and TSS levels at each step in the treatment process. This treatment process was used as the basis for the Southern Impoundment 100% RD with additional unit processes, as discussed in Section 5.4.

Turbidity was monitored using an in-line continuous monitor at both the clarifier effluent and the filtered effluent prior to granular activated carbon (GAC) treatment. Turbidity results are presented in Figure 11. Clarifier turbidity was typically at 10 nephelometric turbidity units (NTU) or less, while filtered effluent turbidity was typically at one NTU or less. The clarifier effluent TSS concentration was 10 milligrams per liter (mg/L), while the filtered/clarified effluent TSS was 2 mg/L. Therefore, turbidity levels can be used as an indication of the TSS concentration. One dioxin congener was greater than the ML in the clarified effluent, but below the ML in the filtered effluent. For the RA, TSS and turbidity levels can be used as an indication of the dioxin level based on these pilot testing results, as well as the bench-scale filtration results.

At one point during the filtration pilot test, a turbidity spike occurred as a result of the loss of polymer feed. Once this issue was observed, the polymer feed was changed from automatic to manual, and turbidity dropped to the prespike levels. This result supports the benefit of using polymer to settle out solids, as well as the ability to monitor performance using turbidity as an indicator.

Transportation and disposal at a centralized wastewater treatment facility was considered as a treatment option, but a facility that would accept and treat the contact water was not identified.

3.4.3.4 Laboratory Particle Size Analysis by Filtration Results

Overall, greater than 90 percent of the particulates were greater than 10 µm in size. Concentrations of dioxins and furans in excess of the MLs were observed in the filtered water that had passed through the 100 µm and 10 µm filters, however after filtration with a 1 µm filter, concentrations of all dioxins and furans were below their MLs. These results are summarized in Table 8 and on Figure 12. Analytical laboratory reports are included as part of Appendix B.

These results, along with the results summarized in Section 3.4.3.2, have informed the basis of design of the wastewater treatment system for the Southern Impoundment 100% RD.

4. Applicable or Relevant and Appropriate Requirements (ARARs)

Compliance with ARARs does not include formal submission of permit applications to the agencies to provide permits or approvals. Instead, information sufficient to demonstrate compliance at the site will be presented to the EPA and coordinated with other agencies.

The EPA recognizes the following three types of ARARs:

- ***Chemical-Specific ARARs:*** Chemical-specific ARARs include health- or risk-based numeric limits or methods that establish the acceptable amount or concentration of a chemical that may be found in or discharged to the environment.
- ***Location-Specific ARARs:*** Location-specific ARARs include limits on allowable concentrations or on activities associated with hazardous substances solely because they occur in special locations.
- ***Action-Specific ARARs:*** Action-specific ARARs include technology- or activity-based requirements or limitations on actions involving the management of hazardous waste.

The applicable regulatory requirements along with project-specific comments that explain how these regulations apply to the project, and how the RD and RA will comply with the regulations are summarized in Table 9. Table 9 addresses each of the ARARs identified in the ROD and certain additional ARARs applicable to the Southern Impoundment RD.

5. Remedial Design

This section outlines the main RD components associated with the Southern Impoundment including the following:

- **Excavation Limits and Procedures**. This section includes discussion of the planned excavation activities to be conducted during the RA. The discussion includes site preparation activities, including coordination with landowners; the methodology for excavation activities, including sequencing, limits, and volumes of material for excavation; and specifics of excavation implementation, including vehicle decontamination, protection of structures and utilities, backfill placement, and site restoration.
- **Pre-Construction Confirmation Sampling**. This section includes discussion of the planned pre-construction confirmation sampling event that will be conducted prior to excavation activities. Data from this investigation will be used to define the vertical and horizontal extents of impacted material (the bottom and sidewall of the excavations), will provide refined delineation of the volume of overburden available for reuse, and will provide additional waste characterization data.
- **Structural Design of the Bulkhead**. This section includes discussion of the basis of design and structural evaluation of the bulkhead that will be installed along 210 linear feet in the southwest corner of the Southern Impoundment to enable excavation of impacted material up to the shoreline.
- **Transportation and Disposal**. This section includes discussion of the characterization, transportation, and off-site disposal of impacted material excavated during the RA.
- **Water Management**. This section includes discussion of the methodology for treatment and discharge of impacted contact water that may accumulate in open excavations during the RA work.

5.1 Excavation Limits and Procedures

5.1.1 Landowner Coordination

Prior to commencement of the RA, access agreements will need to be executed to implement the RA on the Musgrove Towing Service, Inc. (Musgrove) property, the adjoining Kirby Inland Marine (Kirby) property and the parcel on which Market Street, the private road that borders the east side of the Southern Impoundment, is located. In connection with the Musgrove property, the existing elevated building would be removed during the excavation activities. Logistical coordination with all property owners and businesses regarding the use of Market Street will be necessary. Sequencing of the excavation work and other scheduling steps will be taken to minimize adverse impacts on adjacent businesses to the greatest extent practicable.

5.1.2 Preparation for Excavation Work

Prior to initiating any excavation work in the Southern Impoundment, environmental controls (e.g., silt fencing, surface water diversions, and air monitoring) will be implemented by the remedial contractor (RC). These environmental controls, or best management practices (BMPs) may include silt fence or construction fencing around all excavations to properly delineate the active work areas and to minimize the potential for soil erosion of the areas directly adjacent to the excavations. These controls also may include surface water diversions (e.g., soil berms and/or other type of structures) constructed along the edge of excavations to minimize entry of surface water into the excavations. For excavations near Market Street, straw bale or rock check dams may be required to prevent erosion within the roadside ditch itself. A detailed plan for such BMPs will be included as part of a construction Stormwater Pollution Prevention Plan (SWPPP), to be developed by the RC for the Southern Impoundment RA. More information about potential BMPs and stormwater management procedures is included in the SWMP (Appendix C, Attachment 6).

Prior to commencing excavation, a complete topographic survey of each excavation area will be conducted to establish a pre-excavation topographic surface. The recorded topographic information (coordinates and elevations) will be used by the design engineer to create final electronic files to be used by the RC's grade-controlled excavation equipment. Prior to commencing excavation activities, the design limits of each excavation area will be identified in the field by the RC's surveyor.

In order to reduce the volume of stormwater that would require management, the RC will limit the area of open excavation to minimize contact water volumes in excavations.

5.1.3 Excavation Methodology

It is anticipated that the required excavation activities to implement the Southern Impoundment RD will be performed from the ground surface using standard track-mounted and extended-reach excavators. The technical specifications that have been developed as part of this Southern Impoundment 100% RD require that the bucket of the excavator be outfitted with GPS indication equipment (i.e., Topcon 3DXi). This will allow for the collection of survey data (elevation and location) accurate to within approximately ±1/10 of an inch, without the necessity for personnel entry into the excavation to collect this data (see Appendix E). In addition, the RC will be required to engage a licensed land surveyor to perform data collection from the ground surface outside the limits of the excavation by electronic means for as-constructed documentation of the excavation activities (i.e., vertical and horizontal limits).

5.1.4 Excavation Limits

The sample results for all borings from the RI, PDI-1, and PDI-2 were evaluated against the soil clean-up value of 240 ng/kg $TEQ_{DF,M}$ DWA. The results are presented in Table 5, with the borings containing DWA concentrations in excess of the clean-up level identified by red dots in the right hand column and borings containing DWA concentrations less than the clean-up level identified by green dots in the right hand column. Based on these results, specific 2-foot interval vertical soil horizons were identified for excavation such that, following their removal, the resulting soil would be below the 240 ng/kg $TEQ_{DF,M}$ DWA. A zone of impact was then defined for each polygon, consisting of one or more 2-ft vertical intervals, to be removed during excavation.

In each polygon, material will be excavated and temporarily stockpiled (as shown in Drawing CO-44 in Appendix D) to access the zone of impact for that particular polygon. Any material that will be transported off-site for disposal will be replaced with a mixture of overburden soils removed from above the zone of impact and imported clean backfill.

As described in Section 2, the vertical intervals requiring excavation (along with the horizontal extents) were based on the combined results from the RI, PDI-1, and PDI-2 to generate Thiessen polygons. These polygons are represented by approximate areas of one-half-acre or less, each corresponding to data from one boring, as shown on Figure 9. The polygon areas have been grouped into four distinct areas within the Southern Impoundment and the groups have been given the following designations - Northeast (NE), North Central (NC), South Central (SC), and Southwest (SW). The polygons in each of these areas have been further divided into smaller sampling grids. Additional samples will be taken from within each of these sampling grids during the pre-construction sampling event, as described in Section 5.2 and in the PC FSP (Appendix C, Attachment 3) to better refine the extents of excavation and the volume of overburden available for reuse. The resulting DWA of each sampling grid will be calculated to ensure it meets the target clean-up level.

It is currently anticipated that all excavation activities will occur on the Musgrove property and on the parcel on which Market Street is located. For the areas requiring excavation near Market Street and the Glendale Boat Works property, the lateral limits of the excavation will extend up to the boundary of Market Street and the Glendale Boat Works property but not beyond, with the excavation being sloped down at 2:1 from either the west edge of the street pavement or the southern boundary of the Glendale Boat Works property. This approach was discussed with the EPA and TCEQ in the TWG Meeting on July 29, 2020 and described in a letter submitted to the EPA on August 24, 2020 (GHD, 2020c) and in the TWG Meeting Summary submitted to the EPA on August 26, 2020 (GHD, 2020d).

For the areas requiring excavation in the southwest portion of the Southern Impoundment, a bulkhead will be installed along the shoreline adjacent to the San Jacinto River. Upon installation of the bulkhead, the excavation will be completed to the required depth up to the lateral limit of this bulkhead.

In July 2020, a property survey was completed with respect to the boundaries of the Musgrove property, the Market Street right-of-way, the Glendale Boat Works property, and other properties. The results of that property survey are reflected on the design drawings.

5.1.5 Excavation Sequencing

To reduce the risk of flooding of any work areas within the Southern Impoundment, excavation activities are planned to occur between the months of November and May, when water levels in the San Jacinto River and rainfall amounts in the area are historically lower resulting in a reduced likelihood of flooding of open excavations.

As part of the excavation process, sloping will be used. The results that will be obtained from the pre-construction sampling event (described in Section 5.2 and the PC FSP [Appendix C, Attachment B]), will facilitate the use of sloping. The design drawings (included in Appendix D) assume 2:1 side slopes for the excavations in order to define the outer limits of each excavation area and ensure that the toe of slope is inclusive of the previously defined polygon boundaries. This same 2:1 sloping will be used within each polygon when making adjustments for excavation depths between polygons. Excavation of each polygon is anticipated to be conducted by removing the overburden soils located above the zone of impact in one complete lift within each sampling grid (as defined in Section 5.2). This approach is required in order to keep track of removed material located above the identified zones of impact, such that these temporarily staged overburden soils can be placed back into the excavation from which they came. This approach will be used so that the resulting DWA within each sampling grid meets the 240 ng/kg $TEQ_{DF,M}$ clean-up level. The vertical interval of material removed will vary between polygons, and therefore the limits of excavation and the required sloping between polygons will be refined after completion of the pre-construction confirmation sampling event.

For the majority of the excavation materials to be disposed of off-site, solidification is not expected to be required prior to loading into trucks for transport to an approved off-site waste disposal facility. However, in the deeper excavation areas, there is the potential for seepage into the excavation (likely starting at 6 - 8 ft bgs) and for stormwater accumulation in the excavation. As an initial step, wet soils will be staged on-site to allow water to decant to a lined sump in a containment area and be treated through the wastewater treatment system. If stockpiled materials do not pass the paint filter test for landfill acceptance, other methods may be utilized to facilitate drying of such soils, such as solidification by the addition of amendments, in coordination with the disposal facility (e.g., fly ash, lime, or absorbent polymer). Paint filter testing will be performed on-site at the discretion of the RC, in coordination with the selected waste disposal facility. The RC may elect to use solidification agents, depending on the soil conditions and progress of excavation.

5.1.6 Excavation Volumes and Disposal Volumes

Based on the results of the RI, PDI-1, and PDI-2, specific 2 foot-interval vertical horizons were identified for excavation such that, following their removal, the resulting soil DWA concentration for that polygon would be less than 240 ng/kg $TEQ_{DF,M}$. This results in total excavation volume of approximately 47,500 cubic yards (cy), of which approximately 22,900 cy will be overburden that will be temporarily stockpiled and then used as backfill (because it does not require off-site disposal) and an estimated approximately 24,600 cy will be transported off-site for disposal. These volumes will be further refined following the pre-construction confirmation sampling event (described in Section 5.2).

5.1.7 Vehicle Decontamination Procedures

Hauling vehicles will be decontaminated prior to leaving the work site. Vehicle decontamination procedures that may be implemented include requiring hauling vehicles, after loading, to proceed to the vehicle decontamination area (i.e., decontamination pad) to be visually inspected and cleaned, as needed. Vehicle decontamination procedures may also include provisions for keeping loaded material from falling on the outside of the hauling containers. Prior to implementation of the Southern Impoundment RA, The RC will be asked to develop detailed specifications for vehicle decontamination, as outlined in the TODP (Appendix C, Attachment 8).

5.1.8 Protection of Structures and Utilities

On the south end of the Musgrove property, in the vicinity of the SW excavation area, there is an existing building (elevated frame structure) and a concrete slab that will need to be demolished and removed prior to excavation work in those locations. The location of this existing building is shown on Design Drawing C-03 (Appendix D) and is south of boring location SJSB023-S1 and east of boring location SJSB066. It is not currently anticipated that the elevated structure will need to be replaced after the Southern Impoundment RA is completed.

All existing utilities will be protected, relocated, or removed (if abandoned) as necessary to complete excavation work safely. Further evaluation of how to address specific utilities will be conducted as the project nears implementation. In addition, the RC will be responsible for obtaining the necessary utility clearances prior to commencing excavation work. This includes contacting the Texas "One-Call 811" service for a public utility locate, as well as retaining the services of a private utility locator to mark private on-site utilities.

5.1.9 Backfill Placement

For each excavation, once material from the zone of impact has been removed, the excavation will require backfilling to the original ground surface elevations. Stockpiled overburden soils removed from an excavation will generally be returned to the same excavation as part of the process of achieving a DWA concentrations below 240 ng/kg $TEQ_{DF,M}$ (after removal of the materials from the zone of impact). The removed overburden will be placed within the base of the excavations in approximately 12-inch lifts and compacted, with the compaction equipment being used multiple times for each lift (i.e., minimum of three passes of a compaction roller wheel, vibratory plate tamper, or dozer). Upon completion of overburden placement and compaction within each sampling grid/polygon, imported clean common fill and topsoil would be placed to bring the area back up to the previously existing grade. Detailed specifications for backfill placement are contained in Appendix E.

Specifications for the imported fill material will include physical requirements, including requirements that the fill be well graded and compactible to specified standards. The specifications will also require that the imported fill material meet specified testing standards, such that the fill material be free of rocks larger than a certain size, organic matter, and other materials that may be difficult to compact, such as very soft clays, swelling clays, or fine uniform sands. In addition to these physical requirements, in accordance with Technical Specification Section 31 23 23, all imported fill will be required to be characterized for COPCs (including volatiles, semi-volatiles, metals, pesticides, herbicides, PCBs, hexavalent chromium, and cyanide) using US EPA SW846 analytical methods and TPH using Tx1005/1006. Results will be compared to EPA residential screening levels. Imported fill will also be characterized for dioxins and furans using EPA Method 1613b.

Upon completion of backfilling, a professional land surveyor will be used to document the final ground surface elevations, with the intent to match the pre-existing ground surface elevations, to the extent possible. The drainage ditch along the east side of the Southern Impoundment (west side of Market Street) will be reconstructed, as needed, once the backfilling is completed. Measures will be taken during excavation in this area to manage stormwater from the work site from entering the area of the drainage ditch.

5.1.10 Excavation Area Restoration

Upon completion of excavation and backfilling, the ground surface of the excavation areas will be restored to its pre-construction condition. Depending on the location of the excavation and current surface characteristics, restoration efforts may include replacement of any existing granular surfaces, such as gravel, placement of six inches of vegetated topsoil, or other measures.

All topsoil material will be imported from an approved source and will be required to meet specified standards, including that it be a friable loam material (neither of heavy clay nor of very light sandy nature), be capable of supporting growth of grass or other specified vegetative cover, be free roots, rocks, or lumps larger than a specified size, and noxious weeds, meet minimum and maximum percentages of organic matter, and have a pH in a specified range. Imported topsoil will also be analyzed for the same COPCs as the imported common fill (Section 5.1.9).

5.2 Pre-Construction Confirmation Sampling

Pre-construction confirmation sampling can be used to demonstrate that the applicable clean-up level will be achieved. There are three different types of pre-construction confirmation sampling to be performed as part of the Southern Impoundment RA:

- Overburden soils that are to be placed back in the excavations will be sampled to ensure that dioxin concentrations after replacement of the overburden meet the established 240 ng/kg $TEQ_{DF,M}$ clean-up level on a DWA
- Sidewall samples will be collected to confirm that the lateral extent of material requiring excavation has been defined and such material has been excavated
- Bottom of excavation samples will be collected to confirm the vertical extent of impact has been achieved (down to the maximum 10-foot depth bgs)

This Southern Impoundment 100% RD assumes that pre-construction borings will be completed before RA excavation activities take place in order to fully understand the vertical extent of overburden located above the zone of impact and the horizontal and vertical extent of such soils. Samples of the impacted material will also be collected and analyzed for waste characterization at a frequency specified by the selected off-site disposal facility.

This proposed pre-excavation sampling plan was discussed with the EPA and TCEQ at length during the July 29, 2020 TWG Meeting, and was further explained in a memorandum submitted to the EPA on August 24, 2020 in response to a request from the EPA (GHD, 2020c). The scope of work for the pre-construction sample collection program is outlined in the PC-FSP (Appendix C, Attachment 3), with the general approaches to the four different types of pre-construction sampling are described below.

5.2.1 Overburden Sampling

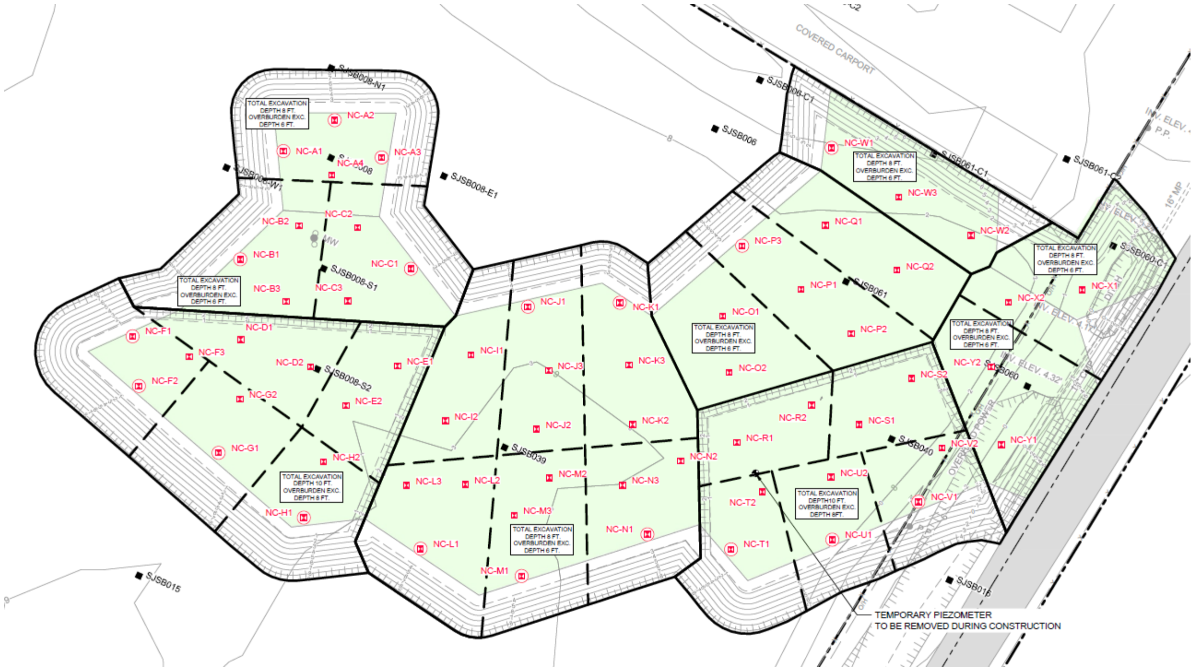
During the RI and PDI sampling programs, soil borings were installed to 10 ft bgs, with soil samples typically collected at 2-foot intervals for dioxin analysis. A mathematical average was calculated from the individual sample results from each soil boring to arrive at a DWA concentration for each boring (or assigned Thiessen polygon). The results for the discrete sample intervals and calculated DWAs for the RI/PDI borings are summarized in Table 9. At all boring/polygon locations where the DWA exceeded the Southern Impoundment clean-up level of 240 ng/kg TEQ_{DFM}, excavation of the zone of impact is required in order to reduce the post-excavation DWA to less than 240 ng/kg TEQ_{DFM}.

At many of the boring/polygon locations, there were samples from locations above the zone of impact that had dioxin concentrations at levels below the 240 ng/kg TEQ_{DFM} cleanup level. These overburden soils do not require removal for disposal, but they do require excavation to facilitate access to the zone of impact. The removed overburden soils will be placed back in the excavation after removal of the impacted soils, along with clean imported fill (to be placed at the surface where possible), resulting in a DWA less than the 240 ng/kg TEQ_{DFM} cleanup level. The removed overburden soils will be placed within the base of the excavations in approximately 12-inch lifts and compacted, as stated in Technical Specification 1-31 23 23 found in Appendix E. Upon completion of overburden placement and compaction within each sampling grid/polygon, imported fill would be placed to bring the area back up to the previously existing grade. Detailed specifications for imported fill placement are contained in Appendix E.

There are also boring/polygon locations where the sample from soil located above the zone of impact had dioxin concentrations greater than the 240 ng/kg TEQ_{DFM} cleanup level, but this soil may be reused as overburden for backfill because the resulting DWA after removal of the zone of impact will be less than the DWA of 240 ng/kg TEQ_{DFM}. Where practicable, soils above 240 ng/kg TEQ_{DFM} in the 0-2 ft interval will be replaced with imported fill even in instances in which the DWA for that location is less than 240 ng/kg $TEQ_{DFM.}$

Embedded Figure 5.1 below is for one of the four excavation areas, the NC area. The area shaded in green indicates the extent of impacted soils to be excavated, based upon PDI and RI sample data. The bold lines outline the limits of the proposed excavation polygons defined by the associated PDI or RI soil boring. The hashed lines represent the sampling grid, with each area of the sampling grid representing approximately 500 cy of volume of overburden. As further detailed in the PC FSP, overburden samples consisting of a 5-point (or more) composite samples will be collected for every 500 cy sampling grid. The estimated depth/thickness of the overburden in each sampling grid will determine how many borings are installed in that grid to provide a representative composite sample.

Figure 5.1 Pre-Construction Confirmation Sampling - North Central



The samples required to create the overburden pre-construction confirmation composite samples for each of the four excavation areas (NE, NC, SC, and SW) are detailed in the PC FSP (Appendix C Attachment 3).

5.2.2 Sidewall Confirmation Sampling

Representative sidewall soil samples will also be collected during the pre-construction confirmation sampling event. Based on the currently defined polygons that delineate the known areas of impact, the overburden sample locations on the perimeter of the areas of impact will also be sampled to confirm that the extent of impact has been defined. During excavation, the excavation will be sloped in at a 2:1 slope. The toe of the 2:1 side slopes would terminate at the currently defined horizontal limits of each polygon. The proposed sidewall confirmation borings will be installed at the polygon limits, and therefore would be representative of the sidewall at the excavation limits for that polygon. It is anticipated that sidewall borings around the perimeter of the four excavation areas will be installed first and the samples will be put on a rush turnaround time (TAT) with the laboratory. Results from these samples will determine if step-out locations need to be added to fully delineate the horizontal extent of material for excavation.

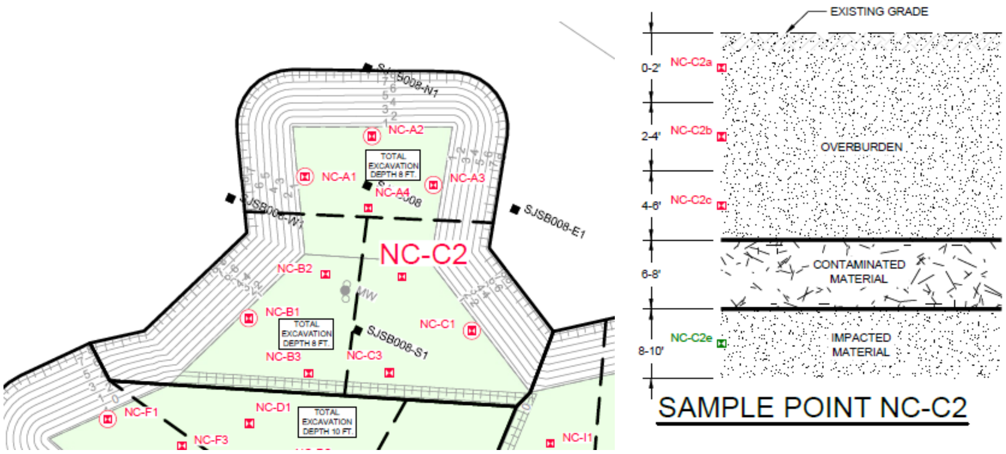
For sidewall composite sampling, each of the borings located at the outer edges of the excavated polygons within the various sampling grids would be sampled at 2-ft bgs intervals to a total depth of 10 ft, with the five 2-ft samples composited into one vertical composite sample for each boring. Where the individual 2-ft sample intervals for sidewall sampling are the same as those identified for overburden sampling, the 2-ft sample core would be split in advance of compositing, as described further in the Section 5.2.5.

The samples required to create the sidewall confirmation composite samples for each of the four excavation areas (NE, NC, SC, and SW) are detailed in the PC FSP, included as Attachment 3 in Appendix C.

5.2.3 Bottom of Excavation Confirmation Sampling

For bottom of excavation confirmation sampling, many of the same borings used for overburden confirmation sample collection will be extended through the zone of impact in order to sample the materials located directly below the zone of impact to establish a "clean" bottom. Where the bottom of excavation is less than 10 ft, samples would be collected from the 2-ft interval directly below the zone of impact (as shown in the example cross-section below in Figure 5.2) to confirm that the remaining such materials have dioxin concentrations less than the established 240 ng/kg TEQ_{DFM} cleanup level, based on a DWA. Samples would be composited from five individual borings with at least one 5-point composite taken per polygon.

Figure 5.2 Confirmation Sampling Example Cross-Section



The samples required to create the bottom of excavation confirmation composite samples for each of the four excavation areas (NE, NC, SC, and SW) are detailed in the PC FSP, included as Attachment 3 in Appendix C.

5.2.4 Sample Collection and Compositing Procedures

Composite samples from the installed borings within any sampling grid could potentially use the same 2-ft depth interval for both horizontal compositing (overburden or bottom of excavation) and vertical compositing (sidewall sampling). For common sample intervals that will be used for multiple composites, the material from the 2-ft depth interval will be split evenly between the different composites. Where there is no further need to split a sample, the remainder of the collected sample would be containerized and properly disposed of. Sample collection and compositing procedures are described in more detail in the PC FSP (Attachment 3 in Appendix C).

5.3 Structural Design of Bulkhead

As previously indicated, excavation activities will be required to extend to the shoreline in a section of the SW excavation area. In this area, a steel sheet-pile bulkhead approximately 210 feet in length will be installed directly adjacent to the San Jacinto River. The details of the sheet-pile wall are shown on Design Drawings C-40, Sheet Pile Plan and Profile, and C-41, Sheet Pile Sections and Details in Appendix D. The sheet-pile bulkhead will allow the excavation to be performed in polygon SJSB065-C1 (which is immediately adjacent to the river) in dry conditions. Subject to the consent of the property owner, it is anticipated the bulkhead will be left in place after completion of the excavation.

5.3.1 Basis of Design

5.3.1.1 River Water Level

The surveyed level of river flow ranges between +1 and +2 ft North American Vertical Datum of 1988 (NAVD88).

5.3.1.2 Freeboard

The top of the sheet-pile bulkhead will provide 3 to 4 feet of freeboard above the mean river flow elevation.

5.3.1.3 Design Water Level

Subject to continuing evaluation of river water levels, a design water level of +5 ft NAVD88 above mean river flow elevation has been utilized for the sheet-pile bulkhead. This elevation was selected to provide 3-4 feet of freeboard such that the excavation in polygon SJSB065-C1 can be completed with a low likelihood of flooding while working in that area. As previously stated, excavation activities in this area and the associated installation of sheet-piles will be limited to the low-water months of the year (approximately November to May) to minimize the risk of overtopping and/or flooding during sheet-pile installation or excavation activities.

5.3.1.4 Excavation Depth

Based on the DWA calculation for the excavation polygons, the elevation of excavation in polygon SJSB065-C1 adjacent to the sheet-pile bulkhead would range from slightly above -2 ft NAVD88 down to -7 ft NAVD88, directly adjecent to the bulkhead.

5.3.1.5 Corrosion Protection & Maintenance

Since it is anticipated that the bulkhead will be left in place permanently, protection against corrosion through the design life of the structure will be provided in the form of sacrificial thickness of the wall. This sacrificial thickness would be in addition to the thickness required to withstand design loads. A corrosion rate, or loss of steel thickness, expressed in mils per year, was used for design life calculations with 1 mil being equal to 0.001 inches.

For steel sections embedded into soil on both faces, a corrosion rate of 2 mils per year was used for each face (4 mils total for the entire thickness). For the section of steel that resides above the typical water level and is exposed to wake and tidal influence on the river face, referred to as the zone of splashing or splash zone, a corrosion rate of 3.5 mils per year was used for each face (7 mil total for the entire thickness). This rate as applied to the splash zone for each face was conservative, since only one face is exposed, but the opposite face is assumed to corrode at the same rate. However, as discussed below, the corrosion rate of the splash zone does not govern the design of the bulkhead.

The controlling design moments in the pile section occur at a depth of -15 to -20 feet NAVD88. This is well below ground level on both faces of the pile so design life estimates were based on the corrosion rate for embedded sections of 2 mils per year of steel loss. For a 50 year design life, expected steel loss will be 0.1 inches on each face with a total amount of 0.2 inches of reduced thickness.

Results of this corrosion loss on the analysis are discussed in Section 5.3.3 below.

5.3.1.6 Material

Sheet-piles will be marine grade steel ASTM A690, Grade 60 in order to provide corrosion protection, extend the design life of the structure, and minimize maintenance by the property owner after completion of the RA.

5.3.1.7 Design Loads

In-Situ Soil

The soil parameters specific to the Southern Impoundment are listed in Table 10. These soil parameters were developed by Ardaman and Associates based on the geotechnical laboratory testing results on samples collected from soil borings SJGB028 and SJGB029. The presence of cohesive materials in the soil profile required the consideration of both quick (Q) and slow (S) loading cases. Therefore both drained and undrained soil properties were established for the different construction stages and loading conditions being considered in the sheet pile bulkhead design. These stages and conditions are listed as design cases in Table 11.

The analyses estimated the deflections and minimum embedment of the sheet-pile walls using the limit-equilibrium method provided by the computer program DeepEx for each design case. The embedment depth was determined by using a factor of safety of 1.5 on the passive resistance afforded by the soils based on the known geotechnical conditions. The shear forces, bending moments, and deflections provided by the analyses are based on a structural factor of safety of 1.0 for the steel pile, as in Section 5.3.2. Ardaman and Associates concluded that the S case at the end of construction and after the excavation area has been backfilled to match the bulkhead elevation is the governing case. It is recommended that a sheet-pile section equivalent to an AZ 26-700 manufactured by Skyline Steel and installed to a tip elevation of -40 ft NAVD88 will provide rotational stability for the sheet-pile bulkhead for the Southern Impoundment.

River Water

The loading from the river water with a density of 62.4 pounds per cubic foot has been applied as hydrostatic pressure to the exterior of the wall. Hydrostatic pressure for both mean water level and design water level are considered in this design.

River Flooding

Based on FEMA Flood Map (effective on January 16, 2017), the Southern Impoundment is designated a special flood hazard area Zone AE. Based on the anticipated excvation depths, and as the excavation will be completed over a short duration outside the flooding event season (November to May), flood load was not considered for the design of the sheet-pile wall.

Wind

Pressure from wind loading corresponding to wind velocity of 115 miles per hour and Exposure Category C as defined in ASCE 7 will be applied on the exterior of the wall. Wind load hasonly been applied to the exposed height of wall above mean water level; therefore at design water level, the wall exterior is not exposed to the wind.

5.3.1.8 Load Combinations

The design loads are considered to act in the following combinations, in accordance with Allowable Stress Design as defined in ASCE 7 for the structural design.

(1) D + H + F

(5) D + H + F + 0.6W

(6A) D + H + F + 0.75(0.6W)

(7) 0.6D + H + F + 0.6W

WHERE,

D = DEAD LOAD

F = LOAD DUE TO FLUIDS (HYDROSTATIC PRESSURE)

H = LOAD DUE TO LATERAL EARTH PRESSURE

W = WIND LOAD

ASCE 7 load case (7) requires the load factor for resisting (passive) lateral earth pressure be reduced to 0.6. The intent of the reduction to design the wall against overturning by reducing the resistance. Since the wall has been designed for overturning (rotational) stability with adequate embedment as described in Section 5.2.2.1, a reduction for lateral earth pressure was not considered.

5.3.2 Design Criteria

The sheet-pile bulkhead has been designed as a rigid cantilever wall in accordance with EM 1110-2-2504. As the wall is anticipated to remain in place permanently, both the undrained and drained conditions were evaluated to determine the sheet-pile section that meets the criteria below. However, it should be noted that drainage will be provided (after completion of excavation and backfilling) to relieve the build-up of hydrostatic pressure on the interior side of wall hence, the drained condition represents a conservative loading for purposes of the design.

5.3.2.1 Rotational Stability

It is a standard design assumption that rotational stability is directly proportional to the embedment of a rigid cantilever wall. The total embedment of the pile is the maximum of the depths required for undrained and drained loading condition.

The sheet-pile bulkhead has been designed with a factor of safety of 1.5 for rotational stability. The required pile depth elevation is -40 ft NAVD88.

5.3.2.2 Section Strength

The sheet-pile bulkhead was designed and analyzed as a rigid cantilever wall for the loads described in Section 5.2.1.8. The allowable stress in the sheet-pile would be 0.67 F_y (an equivalent factor of safety of 1.5) for combined and axial bending and 0.33 F_y (with a factor of safety of 3.0) for shear.

5.3.2.3 Deflection

Total system displacements comprised of structural steel deformation, rotation and translation of the entire wall and soil system was evaluated. Since the sheet-pile bulkhead will be designed as a cantilever wall, maximum deflections occur at the top of the wall.

EM 1110-2-2504 or ASCE 7 does not provide guidance on limiting system deflection. Structural steel can deform significantly causing visual concern for personnel working within the cell before structural failure occurs; hence, structural steel deformation cannot be used as a limiting parameter for the design.

A general rule of 0.01 x wall height, measured from top of wall to bottom of excavation was applied to limit the total deflections.

WALL HEIGHT = +5FT - (-7FT) = 12 FT

ALLOWABLE DEFLECTION = 0.01 X 12 FT = 0.12 FT = 1.5 INCHES.

5.3.3 Sheet-Pile Design Results

Sheet-pile stability and steel section forces were determined by Ardaman and Associates using DeepEx design software. The results of their efforts are provided in their Geotechnical Report in Appendix A.

Stability analysis indicates that the required depth of embedment of the sheet-pile wall shall be to a pile tip elevation of -40 ft NAVD88. The resulting maximum steel design moment for this case is 30.35 kip-ft. Using the required allowable stress for sheet piles of 0.67xFy, the allowable design stress is 40 kilopound per square inch for A690, Gr 60 material.

The resulting required section modulus, S, is 9.1 cubic inches per foot (in^3/ft). The AZ 26-700 sheet pile selected provides a section modulus of 48.4 in^3/ft. The excess capacity was utilized to provide long term design life by allowing corrosion to occur at the rates discussed in Section 5.2.1.6 above.

For a 50 year design life, the expected steel loss is 0.2 inches total. The steel thickness for a new AZ 26-700 pile is 0.48 inches based on manufacturer product tables. After 50 years the estimated total thickness will be approximately 0.28 inches given the steel loss expected. This results in an estimate of about 58% steel remaining at 50 years.

The reduced section modulus is approximately proportional to the reduced thickness so the expected section modulus in 50 years is estimated to be about 58% of 48.4 in^3/ft, or 28 in^3/ft.

This value still exceeds the required section modulus of 9.1 in^3/ft from the geotechnical analysis.

Since rates of corrosion can vary significantly due to site conditions such as salinity of the water or corrosion potential of the soil itself, this spread in values is appropriate to provide a wall that will have a 50 year design life utilizing a method based on sacrificial steel as discussed in Section 5.2.1.6 above.

5.4 Characterization, Transportation, and Disposal

The RD elements related to the characterization of excavated material that requires off-site disposal, transportation and off-site disposal of such excavated material are outlined in the TODP (Appendix C, Attachment 8). The TODP summarizes the regulatory requirements, characterization results, disposal facility profiling requirements, on-site management and loading, transportation plans, and record keeping.

5.5 Water Management

5.5.1 Basis of Design

5.5.1.1 Contact Water Characterization

During PDI-2, a borehole water sample was collected from Southern Impoundment boring SJSB059 and was analyzed to provide a representative sample of potential contact water that may be generated during the RA and require treatment. During treatability testing, results from this location were compared to the characteristics of the contact water collected from the Northern Impoundment and the characteristics were determined to be similar. Evaluation of the results from the two samples analyzed indicates that the COPCs present in the Southern Impoundment borehole water are similar to the Northern Impoundment excavation contact water. COPCs present in both the Northern Impoundment and Southern Impoundment contact water include dioxins, metals, ammonia, and suspended solids. Neither contains PCBs, SVOCs or VOCs. Therefore, treatability testing was only performed on the Northern Impoundment infiltration water and the results are being applied to the Southern Impoundment water treatment. Additionally, where data is not available for the Southern Impoundment, Northern Impoundment data has been used for characterization due to similar characteristics of Southern Impoundment borehole water to Northern Impoundment excavation contact water. Results of the treatability testing were presented in Section 3.

The average TSS concentration in the Northern Impoundment simulated contact water sample was approximately 4,000 mg/L and that value is being used as the basis for the Southern Impoundment 100% RD. This is expected to be a maximum value since in the treatability study, the waste solids were actively mixed with water to create the contact water, a step which would increase TSS concentrations. During the RA, BMPs, which may include installation of a geotextile-wrapped screen on the suction hose, placement of hay bales around the dewatering sump area, placement of a perforated 55-gallon drum within the sump and wrapping the drum in geotextile fabric, will be used to reduce the volume of solids that are captured with contact water. The RC will make the determination of which BMPs to implement during the RA.

To evaluate the fraction of dioxins and metals that are associated with the suspended solids versus dissolved in the water, a characterization water sample was filtered using an 0.45 micron filter and analyzed for dissolved dioxins and furans and metals. The majority of the metals and dioxins were determined to be associated with the solids and not dissolved. Additional dioxin filtration testing was conducted as part of the treatability study and the results were presented in Section 3.

5.5.1.2 Contact Water Volume and Treatment Rate

For the Southern Impoundment, contact water may be generated by:

1. Pore water which remains after waste material is excavated
2. Infiltration through the soil matrix (perched surface runoff)
3. Stormwater accumulating in the excavation
4. Equipment decontamination water
5. Water within the bulkhead following installation of the sheet pile wall that has come into contact with waste material

Contact water will be collected, stored, and treated. During the RA, the maximum expected excavation size that will be open at one time is estimated to be three cells with an area of approximately 25 ft by 25 ft each. The maximum daily storage volume was calculated using the following method for each of the three potential sources of water for an excavation area of 3 by 25 ft by 25 ft (1,875 ft^2 total):

1. Pore water volume is equal to the average depth of water multiplied by the cell area multiplied by a porosity of 0.4
2. Rainfall is based on the area of the excavation multiplied by the 100 year storm event of 18 inches
3. Infiltration volume was calculated based on the estimated infiltration rate for a 24 hour period. The basis for the infiltration calculation is summarized below

A review of available boring log data confirms that the upper 10-ft soil interval is all within the fill and alluvium layer that is eventually underlain by the Beaumont clay. The subsurface in this 10-ft zone varies considerably based on historical disposal activities. To refine the estimated quantity of water for storage and treatment, hydrogeological investigation work will be conducted as part of the pre-construction field sampling event. More detail about the planned investigation is included in the PC FSP (Appendix C, Attachment 3).

During the PDI, the perched water zone water was observed to be as high as the ground surface itself, but is typically between 2.5 and 4.5 ft bgs (depending on the excavation area). Once below the perched zone, the water table would be found between 6 to 10 ft bgs. The water entering the excavation would not deplete and would require water management in the open excavations as it is encountered.

Using existing soil boring data matched with first observed water level data, averages for first encountered sand and first encountered water in the excavations were calculated for each of the four defined excavation areas to serve as a basis of design for the water treatment system. Water infiltration rates were calculated for each of the four excavation areas based on excavation depth, water level, and soil type. For a 10 ft deep excavation, the highest calculated level of water infiltration for a 25 ft wide excavation was approximately 40 gallons per minute (gpm). This is a highly conservative estimate and that rate of infiltration should decline once the perched zone water is depleted in the surrounding soil. The maximum storage volume for a 24-hour period is estimated to be 260,000 gallons, based on cumulative volume of water generated through the means outlined above. This is the maximum amount of water expected to be generated over a 24 hour period and is estimated based on a 10-ft excavation depth. Management of this volume of water will be necessary to maintain excavation activities. The calculations assume that an excavation is open for 24 hours while material is removed and then backfilled. Infiltration rates were based on limited hydrogeological information. Additional information on infiltration will be collected as part of the pre-construction sampling event, described in the PC FSP (Appendix C, Attachment 3).

Subject to obtaining access to the Musgrove property, it is anticipated that the contact water will be stored in multiple covered tanks and treated over a one-day period, at a maximum treatment flow rate of approximately 300 gpm.

5.5.1.3 Parameters Requiring Treatment

Discharge criteria were calculated assuming the receiving stream is the San Jacinto River. Treated and untreated contact water for the Northern Impoundment were compared to estimated discharge criteria. Dioxins and several metals were present in untreated contact water above estimated discharge criteria (in addition to suspended solids). For the Southern Impoundment, the parameters requiring treatment are assumed to be the same as the Northern Impoundment and include suspended solids, metals, and dioxins and furans. Estimated discharge criteria are included in Table 7.

5.5.1.4 Compliance with Texas Surface Water Quality Standard Applicable or Relevant and Appropriate Requirement (ARAR)

As stated in Section 3.4, the EPA has made the determination regarding the ARAR for compliance with the dioxins and furans TSWQS based on the substantive requirements of the state's regulation for surface water discharge. As detailed in e-mail correspondence dated February 18, 2020 (EPA, 2020a), "EPA has determined that compliance with the TSWQS ARAR will be attained as follows:

- The state surface water quality standard for Dioxins/Furans is 7.97×10^{-8} µg/L [0.0797 pg/L] (as TCDD equivalents).
- Compliance with the TSWQS will be determined using the minimum level of the EPA approved method (1613B), cited in 40 CFR Part 136 (Guidelines Establishing Test Procedures for the Analysis of Pollutants), in sampling of surface water discharges during the Site remedial action.

- If an effluent sample analyzed for dioxin is below the minimum level using the EPA approved method, the sample result would be identified as non-detect and the discharge would be determined to be in compliance with the ARAR.

This approach is consistent with the state's guidance and other permits issued by the TCEQ."

5.5.2 Treatment System Design

A treatment train with multiple processes will be employed to reduce concentrations of suspended solids, dioxins and furans, and metals in the contact water. Based on the estimated volumes of water and the assumption that the excavation activities will be completed in one working season (November to April), a water treatment system is anticipated to be utilized during the RA. Details of the basis of design of the water treatment system are provided below.

5.5.2.1 Major Equipment List and Sizing Basis

The major water treatment system components and basis of sizing are detailed in Table 12. This includes sizing criteria assumptions, preliminary design value, and notes for each major equipment and process component.

5.5.2.2 Water Treatment Equipment General Arrangement and Site Layout

It is contemplated that water treatment system(s) for the Southern Impoundment will be staged on the west edge of the Southern Impoundment area, in close proximity to the San Jacinto River for potential discharge. Assuming that access to the Musgrove property is secured, an area of approximately 200 ft by 100 ft has been allocated for the staging of the Southern Impoundment water treatment equipment. The area intended for water treatment equipment is shown in Drawing P-04 and on the Southern Impoundment Overall Site Plan (Drawing C-03) included in Appendix D. The water treatment system will be located within an impermeable bermed containment area so that in the event of a release or overflow from the system, contact water will be contained, captured, and treated.

5.5.2.3 Specification and Equipment Data Sheet List

The detailed design drawings associated with the water treatment system are supplemented with technical specifications detailing the potential water treatment equipment, consumables, staging/sequencing, and operation. The technical specifications for the water treatment system are listed in Section 7.2 and are included in Appendix E.

5.5.3 Operations and Maintenance Requirements

The water treatment system associated with remediation of the Southern Impoundment will operate intermittently based on need to treat contact water. A preliminary discussion of the operational and maintenance requirements (including consumables and utilities) associated with water treatment is provided below.

5.5.3.1 Consumables

Effective treatment of contact water will require the use of several water treatment chemicals to facilitate solids separation, metals precipitation, and pH adjustment. A brief discussion of the water treatment chemicals that may be utilized is provided below.

Organosulfide - Organosulfide is a commonly used water treatment additive for the removal of metals (via sulfide precipitation). Organosulfide may be added depending on influent soluble metals concentrations. Precipitated metals will be removed through the solids separation processes of the water treatment system. Required dosages will be confirmed based on on-site jar testing. It is anticipated that organosulfide will be delivered to the work site in intermediate bulk container (IBC) totes (~300 gallons).

Coagulant - Coagulants (such as ferric chloride or polyaluminum chloride) may be dosed to facilitate enhanced removal of metals (through co-precipitation) and suspended solids in the clarification process of the water treatment system. Required dosages will be confirmed based on-site jar testing. It is anticipated that coagulant will be delivered to the work site in intermediate bulk containers (IBC) totes (~300 gallons).

Acid/Caustic - Acid and/or caustic may be added to the contact water to adjust the water pH to optimize metals removal and enhance the effectiveness of the added coagulants. Required dosages will need to be confirmed based on-site jar testing. It is anticipated that acid/caustic will be delivered to the work site in IBC totes (~300 gallons).

Polymer - It is anticipated that liquid polymers will be utilized to enhance the settling of suspended solids and precipitated metals in the clarification step of the water treatment system. Polymer may also be required to enhance the settling/thickening of chemical sludge. Polymer will be activated/diluted prior to dosing into the water treatment process. Required dosages will be confirmed based on on-site jar testing. It is anticipated that polymer will be managed in drums or IBC totes.

Nominal Rated Filters - Nominally rated filters (10 micron and 1 micron) will be configured downstream of the treatment system multimedia filters. As the nominally rated filters are fouled (with captured solids), they will need to be removed and replaced.

Absolute Rated Filters - Absolute rated filters (1 micron) will be configured downstream of the treatment system nominally rated filters. As the absolute rated filters are fouled (with captured solids), they will need to be removed and replaced.

Granular Activated Carbon (GAC) - The proposed GAC treatment vessels will be filled with bitumen based GAC media. The GAC vessels will be configured in a lead- lag arrangement. Effluent quality of the lead GAC vessel will be monitored for chemical breakthrough to identify the need for media replacement.

5.5.3.2 Power

The water treatment system (as well as other facilities) in the Southern Impoundment will require electricity for operation. The estimated electrical load for the Southern Impoundment water treatment system is 100 kilowatts, 480 volts, 3 Phase. A 480 volt power service will be required in the vicinity of the Southern Impoundment. The RC or another contractor installing the water treatment system will have flexibility to step down the power service (i.e., to 120 volt, etc.) as needed for minor electrical loads, trailers, etc.

5.5.3.3 Labor

The water treatment system is expected to operate in a semi-automatic mode of operation. Key process decisions and operations will be executed with the oversight of the contractor's treatment system operators. It is expected that operation of the water treatment system will require at least two full-time operators, depending on the activities being performed. The need for licensed wastewater treatment operators for the water treatment system is currently being evaluated.

5.5.3.4 Residuals

The operation of the water treatment system will result in the generation of a number of residuals. A discussion of the residuals resulting from water treatment is provided below. Waste characterization and disposal of these residuals is discussed in the TODP (Appendix C, Attachment 8).

Chemical Sludge: The contact water is expected to contain solids from the waste material in the excavation. The addition of coagulants, organosulfide, and polymer will result in the precipitation of metals and removal of suspended solids. The resulting chemical sludge will be withdrawn as the underflow of the inclined plate clarifier. The chemical sludge will be directed to a gravity thickener tank where it is estimated that it will be thickened to a solids concentration of 6 (weight) %. As previously noted, polymer may need to be added to enhance the thickening effect. During operation of the water treatment system, thickened chemical sludge will be generated at a rate of 600 pounds per hour (dry solids basis). This thickened sludge will be directed to holding tanks prior to solidification.

Spent Filter Elements: As previously noted, the nominally rated and absolute rated filter elements will become fouled with solids as the treatment system operates. These fouled elements will need to be removed and replaced.

Exhausted GAC Media: GAC media has a finite capacity to remove dissolved constituents (including metals and dioxins and furans) from water. As previously noted, the GAC vessels will be operated in a lead-lag configuration. The discharge of both the lead and lag GAC vessels will be monitored to identify when the GAC media is exhausted. When concentrations of constituents of concerns are detected at elevated levels in the lead GAC vessel, the media in this vessel will be removed and replaced. Once back in service, this vessel will become the lag vessel.

5.5.4 Compliance Monitoring

Routine effluent compliance monitoring requirements associated with the water treatment system are expected to include pH, TSS, metals, and dioxins/furans. Treated effluent samples from the water treatment system will be collected from the effluent line of the service water storage tank, prior to discharge to the San Jacinto River. In accordance with 30 TAC Part 1 Chapter 319 Subchapter A Rul 319.5, Section A, (30 TAC 319.5 (a)), samples and measurements of the effluent will be taken at a location following the last treatment unit. Monitoring frequencies and sample types from 30 TAC 319.9 (c) Table 3 (for treatment units with effluent flow from 0.50 to less than 2.00 million gallons a day (MGD)) are identified below:

Parameter	Minimum Frequency of Measurement [3]	Standard Analytical TAT (business days)[4]	Sample Type
Flow	1 per operating shift	---	Instantaneous
pH	1 per day	---	Grab
TSS	2 per week	10 days	Composite
Metals[1]	1 per week	10 days	Composite
Dioxin/Furans[2]	1 per week	15 days	Composite

[1] The most conservative frequency for metals included in Table 3 (Copper, Lead, Nickel, Silver, Zinc) is twice per week, but based on characterization, dissolved metals in the untreated contact water were significantly less than discharge criteria. Therefore, the collection of weekly samples is proposed.
[2] Dioxin/Furans are not specified in Table 3
[3] Samples will be collected only while discharging
[4] Flow rate and pH data will be collected on-site using real-time in-line monitors.

During pilot testing, clarifier effluent and filter effluent turbidity were measured to evaluate performance of the system and adjust chemical dosage rates. In addition, a direct correlation was established between turbidity, suspended solids, and dioxin/furan concentrations as discussed in the treatability testing, Section 3.4.3.3. Based on the strong correlation between turbidity and dioxin/furan concentrations, it is anticipated that during the RA, real-time turbidity readings will be used as an indicator for operational performance as related to TSS and dioxin/furans. TSS may also be used as a performance indicator. In addition, process monitoring samples will be collected within the treatment process (e.g., influent, post clarifier, post filtration, post lead GAC column) to inform necessary operational adjustments, such as chemical dose refinement and GAC change out. As discussed, turbidity will be monitored through online instrumentation to evaluate treatment system performance and adjust operations as needed. Operational parameter monitoring that may require a response may be incorporated into a future treatment system monitoring plan.

If analyses at the point of discharge indicate that effluent has not met discharge criteria for a regulated parameter, the EPA will be notified immediately and the system will then be shut down and/or effluent may be recirculated to the contact water storage tank(s), and additional performance checks may be performed on the treatment system, including but not limited to, checks and appropriate modifications with respect to chemical dose, checking to determine whether GAC and/or filter media and bag filters should be replaced, etc. Contingency measures may also include, but are not limited to, increased monitoring and notifications.

The RC or another contractor operating the treatment system will be required to prepare a detailed treatment system monitoring plan, which will be made available to the EPA for review.

5.6 Monitoring and Controls

This section includes discussion of monitoring and controls to be implemented on-site during Southern Impoundment RA activities, including dust and emissions controls, stormwater management, and nuisance odor control.

5.6.1 Control of Dust and Emissions

The RC will be required to use methods that minimize raising dust from construction operations. The RC may be instructed to use potable water for potential misting operations to provide positive means to prevent airborne dust from dispersing into the atmosphere. Detailed specifications for perimeter dust monitoring and associated controls are outlined in the SWMP (Appendix C, Attachment 6).

5.6.2 SWPPP and BMPs

During the time an excavation is open, it will need to be maintained by the RC to be free of water as much as possible. Measures that may be adopted include requiring that the immediate area surrounding any excavation be graded to drain surface water away from the excavation or that other controls, such as berm construction be used to prevent water from entering the excavation. Those measures may also include requiring that any surface water in areas adjacent to an excavation be directed to existing surface drainage systems together with requirements that existing surface drainage systems be kept open and operational.

In addition to surface water control outside the excavation limits, the RC will provide, operate, and maintain necessary dewatering equipment appropriately sized to maintain an excavation to be free of water, as much as possible, both precipitation landing within the excavation area and inflowing perched water, if present. Requirements may be imposed on the RC that the pumping equipment, machinery, and tankage be in good working condition for potential emergencies, including power outages, and that appropriately trained workers be employed to operate the pumping equipment. All water removed from any open excavation is to be contained, collected, and then transferred to staged water storage tanks for eventual treatment and discharge.

The RC will also be responsible for managing any stormwater that may come in contact with temporarily staged and stockpiled excavated material. The dewatering pads and decontamination pads will be maintained by the RC to contain, collect, and transfer contact water to the water storage tanks for treatment. Stormwater that has not been in contact with impacted material would be discharged in accordance with the SWPPP that the RC will be required to develop. Details of the dewatering pads, overburden stockpiles, and decontamination pads are shown on Drawings C-43 through C-45 in Appendix D.

Excavation dewatering may employ methods such as sheeting and shoring; perched water control systems; surface or free water control systems employing ditches, diversions, drains, pipes and/or pumps; and any other measures necessary to enable excavation activities to be carried out in the dry. The RC will be required to use BMPs for the provision of all dewatering and water removal activities. A SWPPP will be developed by the RC for the Southern Impoundment excavation program prior to commencement of any excavation work.

5.6.3 Odors

There is the potential for odors resulting from the Southern Impoundment RA or associated activities. Odors are most likely to occur during excavation activities when previously buried material are unearthed and exposed to air. The main concern regarding odors involves impact of the odors on adjacent businesses, neighboring businesses, and Southern Impoundment RA workers. As needed, the RC will implement odor mitigation and suppression measures during the implementation of the Southern Impoundment RA.

6. Environmental Footprint (Greener Cleanups)

The Southern Impoundment RD will consider the EPA's *Principals for Greener Cleanups (August 2009)*. The EPA and state agencies have developed a framework outlining the desired outcomes of a potential standard for greener cleanups. The framework focuses on five principals associated with a cleanup project's environmental footprint. These principals are listed below along with the potential methods in which they may be incorporated into the Southern Impoundment RD.

Minimizing Total Energy Use and Maximize Use of Renewable Energy. Reducing total energy use while also identifying means to increase the use of renewable energies throughout the clean-up. This principal may be incorporated into the RD by:

- Limiting traffic at the work site by requiring workers to carpool to the work site
- Requiring the RC to use energy efficient equipment or vehicles where applicable

Minimizing Air Pollutants and Greenhouse Gas Emissions. Reducing total air emissions, including emissions of air pollutants and greenhouse gases, throughout the clean-up. This principal may be incorporated into the Southern Impoundment RD by:

- Specifying that the RC control dust emissions in and around the work site and on Market Street
- Requiring air emission control devices on equipment that delivers solidification agents
- Specifying the use of electricity at the work site rather than portable diesel generators where applicable

Minimizing Water Use and Impacts to Water Resources. Minimizing the use of water and impacts to water resources throughout the clean-up. This principal may be incorporated into the Southern Impoundment RD by:

- Employing BMPs for stormwater, erosion, and sedimentation control

Reduce, Reuse, and Recycle Materials and Waste. Minimizing the use of virgin materials and generation of waste throughout the clean-up as well as maximizing the use of recycled materials. This principal may be incorporated into the Southern Impoundment RD by:

- Implementing a recycle program for workers
- Requiring contractors to consider recycled material when purchasing material for the project

Protect Land and the Environment. Reducing impacts to land and the environment throughout the clean-up. This principal may be incorporated into the Southern Impoundment RD by:

- Minimizing the footprint of disturbed areas within the work site, to the extent practicable
- Including pollinators and/or native sustainable gasses in the cover design for the vegetated areas

7. Preliminary Drawings and Specifications

7.1 Design Drawings

The Southern Impoundment 100% RD design drawings presented in Appendix D and include the following:

- Drawing C-01 - Overall Plan
- Drawing C-02 - Existing Conditions
- Drawing C-03 - Site Works
- Drawing C-04 - Soil Erosion and Sediment Control Plan
- Drawing C-05 - Soil Erosion and Sediment Control Details
- Drawing C-06 - Project Traffic Control Plan
- Drawing C-07 - Northeast Excavation Area Overburden Sampling Plan
- Drawing C-08 - Northeast Excavation Area Sidewall Sampling Plan
- Drawing C-09 - Northeast Excavation Area Bottom Of Excavation Sampling Plan
- Drawing C-10 - Northeast Excavation Area Overburden Excavation Plan
- Drawing C-11 - Northeast Excavation Area Final Excavation Plan
- Drawing C-12 - Northeast Excavation Area Excavation Sections 1 of 2
- Drawing C-13 - Northeast Excavation Area Excavation Sections 2 of 2
- Drawing C-14 - Northeast Excavation Area Restoration Plan
- Drawing C-15 - North Central Excavation Area Overburden Sampling Plan
- Drawing C-16 - North Central Excavation Area Sidewall Sampling Plan
- Drawing C-17 - North Central Excavation Area Bottom Of Excavation Sampling Plan
- Drawing C-18 - North Central Excavation Area Overburden Excavation Plan
- Drawing C-19 - North Central Excavation Area Final Excavation Plan
- Drawing C-20 - North Central Excavation Area Excavation Sections 1 of 2
- Drawing C-21 - North Central Excavation Area Excavation Sections 2 of 2
- Drawing C-22 - North Central Excavation Area Restoration Plan
- Drawing C-23 - South Central Excavation Area Overburden Sampling Plan
- Drawing C-24 - South Central Excavation Area Sidewall Sampling Plan
- Drawing C-25 - South Central Excavation Area Bottom Of Excavation Sampling Plan
- Drawing C-26 - South Central Excavation Area Overburden Excavation Plan
- Drawing C-27 - South Central Excavation Area Final Excavation Plan
- Drawing C-28 - South Central Excavation Area Excavation Sections 1 of 2

- Drawing C-29 - South Central Excavation Area Excavation Sections 2 of 2
- Drawing C-30 - South Central Excavation Area Restoration Plan
- Drawing C-31 - Southwest Excavation Area Overburden Sampling Plan
- Drawing C-32 - Southwest Excavation Area Sidewall Sampling Plan
- Drawing C-33 - Southwest Excavation Area Bottom Of Excavation Sampling Plan
- Drawing C-34 - Southwest Excavation Area Overburden Excavation Plan
- Drawing C-35 - Southwest Excavation Area Final Excavation Plan
- Drawing C-36 - Southwest Excavation Area Sheet Pile Wall Excavation Plan
- Drawing C-37 - Southwest Excavation Area Excavation Sections 1 of 2
- Drawing C-38 - Southwest Excavation Area Excavation Sections 2 of 2
- Drawing C-39 - Southwest Excavation Area Restoration Plan
- Drawing C-40 - Sheet Pile Plan and Profile
- Drawing C-41 - Sheet Pile Sections and Details
- Drawing C-42 - Typical Details 1 of 3
- Drawing C-43 - Typical Details 2 of 3
- Drawing C-44 - Typical Details 3 of 3
- Drawing P-01 - Water Treatment System Process Flow Diagram/Mass Balance
- Drawing P-02 - Water Treatment System P&ID (1 of 2)
- Drawing P-03 - Water Treatment System P&ID (2 of 2)
- Drawing P-04 - Water Treatment System Site Plan

These drawings, insofar as they reflect use of specific means and methods for carrying out the site work, may be modified as the design process proceeds and means and methods for performing the Southern Impoundment remedy are further defined.

7.2 Technical Specifications

To supplement the Southern Impoundment 100% RD design drawings, technical specifications are presented in Appendix E and include the following:

- Section 01 10 00 - Summary
- Section 01 30 00 - Administrative Requirements
- Section 01 33 00 - Submittal Procedures
- Section 01 35 00 - Temporary Traffic Controls
- Section 01 35 29 - Health and Safety
- Section 01 40 00 - Quality Requirements
- Section 01 50 00 - Temporary Facilities and Controls

- Section 01 57 13 - Temporary Soil Erosion and Sediment Control
- Section 01 57 19 - Temporary Environmental Controls
- Section 01 60 00 - Product Requirements
- Section 01 70 00 - Execution and Closeout Requirements
- Section 01 91 00 - Water Treatment Consumables
- Section 01 91 20 - Facility Testing and Commissioning
- Section 02 61 14 - Material Handling and Transportation
- Section 02 61 16 - Off-Site Transportation and Disposal
- Section 22 05 03 - Pipe Data Sheet - PVDF Tubing and Carrier Piping
- Section 23 05 53 - Identification for Piping and Equipment
- Section 31 10 10 - Site Clearing
- Section 31 23 16 - Excavation
- Section 31 23 19 - Dewatering
- Section 31 23 23 - Fill
- Section 31 41 16 - Sheet Piles
- Section 32 31 13 - Chain Link Fences and Gates
- Section 32 92 19 - Seeding
- Section 35 49 25 - Turbidity Curtain
- Section 40 05 13 - Common Work Results for Process Piping
- Section 40 05 51 - Common Requirements for Process Valves
- Section 40 70 00 - Instrumentation for Process Systems
- Section 46 07 01 - Water Treatment System

8. Supporting Deliverables

Pursuant to the SOW, supporting deliverables have been prepared as part of the Southern Impoundment 100% RD, as summarized below. Most of these plans contemplate that the RC will be required to prepare its own plans that address the topics covered by these plans and detail the means and measures to be implemented to accomplish the objectives of such plans.

8.1 Construction Health and Safety Plan

The Construction HASP (Appendix C, Attachment 1) has been prepared in accordance with CFR 1910 and 1926 to provide protection of human health and the environment during all activities performed. It includes all expected physical, chemical and all other hazards posed by the work required to perform the Southern Impoundment RA.

8.2 Emergency Response Plan

The ERP (Appendix C, Attachment 2) describes procedures to be used in the event that there is an emergency at the work site. This includes the entity(ies) responsible for responding to an emergency, the plan for meeting with those involved in the response, contingency plans for spills, and release reporting and response. The ERP also includes procedures in case of a potential high water event, which describe the weather monitoring procedures and the emergency actions that will be taken during a potential high water event.

8.3 Pre-Construction Field Sampling Plan

The PC FSP (Appendix C, Attachment 3) describes the confirmation and overburden sampling activities to be conducted prior to mobilization for the RA to better refine the extents of excavation and the volume of material available for reuse. Results from this sampling event will be incorporated into updated drawings and a detailed cut/fill plan to be provided to the RC prior to the RA.

8.4 Field Sampling Plan

The FSP (Appendix C, Attachment 4) describes the sampling activities for all media to be sampled at the work site, other than those described in the PC FSP. The FSP will detail the sample locations and describe the protocol for sample handling and analysis.

8.5 Quality Assurance Project Plan

The QAPP (Appendix C, Attachment 5) provides an explanation of the quality assurance and quality control procedures and chain-of-custody procedures for all sampling at the work site. This includes quality assurance during data generation and acquisition and during data validation and review.

8.6 Site-Wide Monitoring Plan

The SWMP (Appendix C, Attachment 6) describes the procedures to obtain information on the contamination levels at the work site throughout the remedial process and to demonstrate whether the performance standards for the Southern Impoundment are achieved.

8.7 Construction Quality Assurance/Quality Control Plan

The CQA/CQP (Appendix C, Attachment 7) describes the planned and systemic activities that verify that the remedial construction in the Southern Impoundment will achieve clean-up goals and performance requirements set forth in the ROD.

8.8 Transportation and Off-Site Disposal Plan

The TODP (Appendix C, Attachment 8) details, for the Southern Impoundment, waste characterization activities and the disposal options. It addresses the transportation routes for off-site shipments from the Southern Impoundment, identifies procedures to protect any communities that may be affected by the shipments, and describes the procedures for on-site management and loading of the waste materials.

8.9 Institutional Controls Implementation and Assurance Plan

The ICIAP (Appendix C, Attachment 9) describes the institutional controls applicable to the Southern Impoundment. The ICIAP also provides the procedures to implement, maintain, and enforce the institutional controls.

8.10 Operation & Maintenance Manual

Per discussion with the EPA, this plan is not anticipated to be necessary based on the RD of the selected remedy.

8.11 Operation & Maintenance Plan

Per discussion with the EPA, this plan is not anticipated to be necessary based on the RD of the selected remedy.

9. References

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Integral and Anchor QEA, 2018e. *Remedial Design Work Plan*, San Jacinto River Waste Pits Superfund Site. Prepared for McGinnes Industrial Maintenance Corporation, International Paper Company, and U.S. Environmental Protection Agency, Region 6. December 2018.

GHD, 2018. Letter to G. Baumgarten, U.S. Environmental Protection Agency, regarding Schedule Extension and Approval of Submission Date - Draft Treatability Study Work Plan and Draft Second Phase Pre-Design Investigation Work Plan, dated December 7, 2018. GHD Services Inc.

GHD, 2019a. *Draft Second Phase Pre-Design Investigation Work Plan*, San Jacinto River Waste Pits Superfund Site. Prepared for McGinnes Industrial Maintenance Corporation, International Paper Company, and U.S. Environmental Protection Agency, Region 6. February 11, 2019.

GHD, 2019b. *Draft Treatability Study Work Plan*, San Jacinto River Waste Pits Superfund Site. Prepared for McGinnes Industrial Maintenance Corporation, International Paper Company, and U.S. Environmental Protection Agency, Region 6. February 11, 2019.

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GHD, 2019d. *Final Second Phase Pre-Design Investigation Work Plan*, San Jacinto River Waste Pits Superfund Site. Prepared for McGinnes Industrial Maintenance Corporation, International Paper Company, and U.S. Environmental Protection Agency, Region 6. June 3, 2019.

GHD, 2019e. Letter to G. Baumgarten, U.S. Environmental Protection Agency, regarding Written Notification of Force Majeure Event, dated September 27, 2019. GHD Services Inc.

GHD, 2019f. Letter to G. Baumgarten, U.S. Environmental Protection Agency, regarding Second Phase Pre-Design Investigation Work Plan Refinement Notice, dated October 11, 2019. GHD Services Inc.

GHD, 2019g. Letter to G. Baumgarten, U.S. Environmental Protection Agency, regarding Second Phase Pre-Design Investigation Work Plan Third Refinement Notice, dated November 8, 2019. GHD Services Inc.

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GHD, 2020b. *Preliminary 30% Remedial Design - Northern Impoundment*, San Jacinto River Waste Pits Superfund Site. Prepared for International Paper Company and U.S. Environmental Protection Agency, Region 6. May 28, 2020.

GHD, 2020c. Letter to G. Baumgarten, U.S. Environmental Protection Agency, regarding the July Technical Working Group Meeting Follow-up Items, dated August 24, 2020. GHD Services Inc.

GHD, 2020d. Memorandum to G. Baumgarten, U.S. Environmental Protection Agency, regarding the July Technical Working Group Meeting - Meeting Summary, dated August 26, 2020. GHD Services Inc.

GHD, 2020e. *Pre- Final 90% Remedial Design - Southern Impoundment*, San Jacinto River Waste Pits Superfund Site. Prepared for International Paper Company and U.S. Environmental Protection Agency, Region 6. September 24, 2020.

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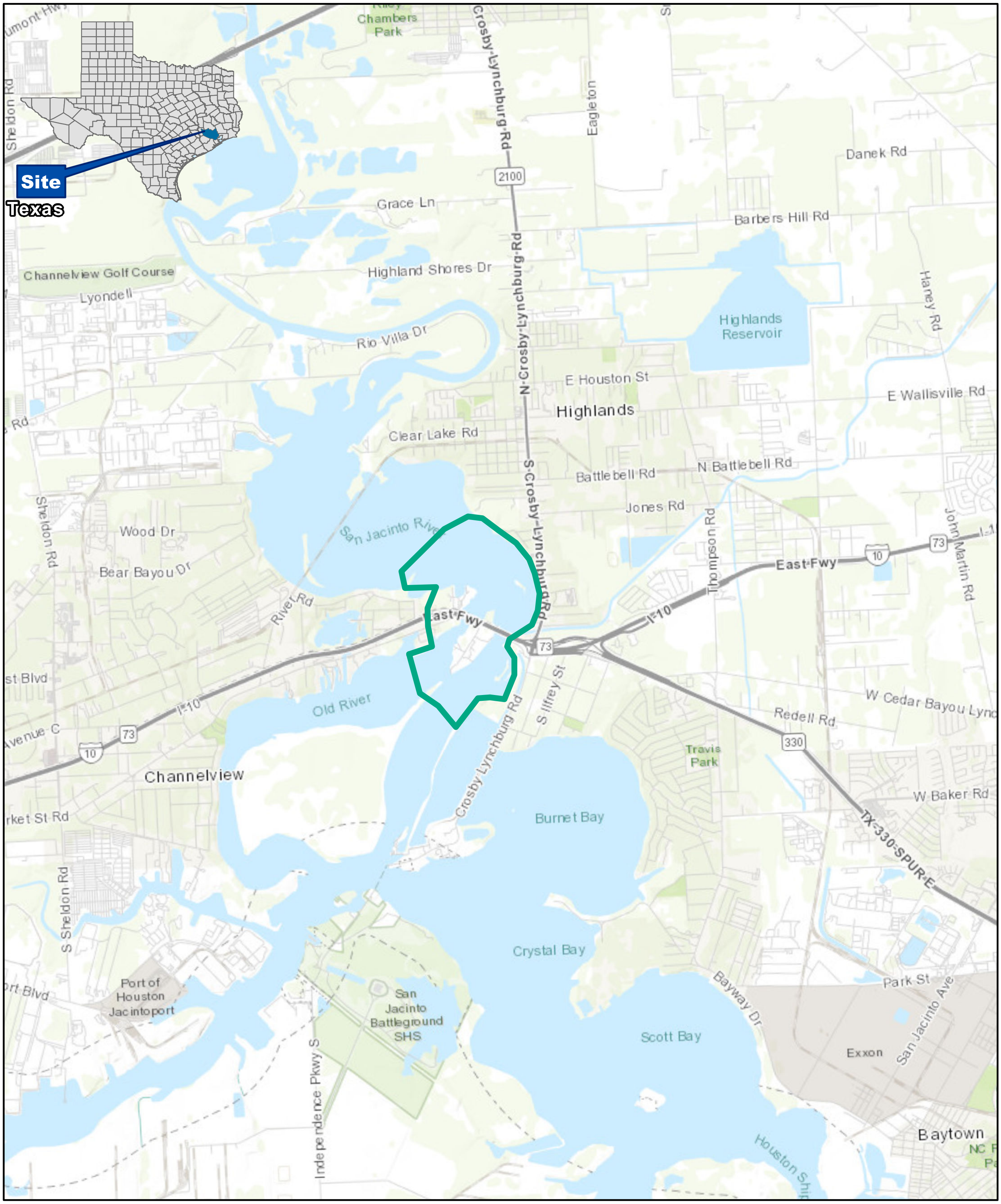
GHD, 2020g. *Final 100% Remedial Design - Southern Impoundment*, San Jacinto River Waste Pits Superfund Site. Prepared for International Paper Company and U.S. Environmental Protection Agency, Region 6. December 18, 2020.



Source: ESRI World Topographic Maps.

0 0.5 1
Miles

Coordinate System:
NAD 1983 UTM Zone 14N

SAN JACINTO RIVER WASTE PITS SITE
HARRIS COUNTY, TEXAS
FINAL 100% REMEDIAL DESIGN –
SOUTHERN IMPOUNDMENT (AMENDED
APRIL 2021)

VICINITY MAP

11215131
Apr 5, 2021

FIGURE 1

GIS File: I:\GIS\GIS\Projects\11200000s\11215131\Layouts\REPORT003\11215131-00(REPORT_003)GIS-BR001.mxd

Source: ESRI World Imagery Basemap Services. 9/9/2017. Assumed limits of the TCRA cap. Extracted from 0557-RP-001 (Buoy Anchors).dwg file extracted from Anchor QEA April 2019.

0 625 1,250
Feet

Coordinate System:
NAD 1983 StatePlane Texas South Central FIPS 4204 Feet

SAN JACINTO RIVER WASTE PITS SITE
HARRIS COUNTY, TEXAS
FINAL 100% REMEDIAL DESIGN – SOUTHERN IMPOUNDMENT
(AMENDED APRIL 2021)

SITE PLAN

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FIGURE 2

GIS File: I:\GIS\GIS\Projects\11200000s\11215131\Layouts\REPORT003\11215131-00(REPORT_003)GIS-BR002.mxd

008529

Source: Image ©2021 Google, Imagery date: 10/28/2017

0 70 140
Feet
Coordinate System:
NAD 1983 StatePlane Texas South Central FIPS 4204 Feet

N

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SAN JACINTO RIVER WASTE PITS SITE
HARRIS COUNTY, TEXAS
FINAL 100% REMEDIAL DESIGN – SOUTHERN IMPOUNDMENT
(AMENDED APRIL 2021)

SOUTHERN IMPOUNDMENT

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FIGURE 3

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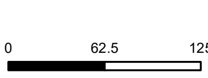
Source: Image ©2021 Google, Imagery date: 10/28/2017



Coordinate System:
NAD 1983 StatePlane Texas South
Central FIPS 4204 Feet

SAN JACINTO RIVER WASTE PITS SITE
HARRIS COUNTY, TEXAS
FINAL 100% REMEDIAL DESIGN – SOUTHERN IMPOUNDMENT
(AMENDED APRIL 2021)

11215131
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FIRST PHASE PRE-DESIGN INVESTIGATION BORING LOCATIONS FIGURE 4

GIS File: I:\GIS\GIS\Projects\11200000s\11215131\Layouts\REPORT003\11215131-00(REPORT_003)GIS-BR004.mxd

008531

Source: Image ©2021 Google, Imagery date: 10/28/2017

0 62.5 125
Feet

Coordinate System:
NAD 1983 StatePlane Texas South
Central FIPS 4204 Feet

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SAN JACINTO RIVER WASTE PITS SITE
HARRIS COUNTY, TEXAS
FINAL 100% REMEDIAL DESIGN – SOUTHERN IMPOUNDMENT
(AMENDED APRIL 2021)

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FIRST PHASE PRE-DESIGN INVESTIGATION RESULTS

FIGURE 5

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Source: Image ©2021 Google, Imagery date: 10/28/2017

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Feet

Coordinate System:
NAD 1983 StatePlane Texas South
Central FIPS 4204 Feet

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SAN JACINTO RIVER WASTE PITS SITE
HARRIS COUNTY, TEXAS
FINAL 100% REMEDIAL DESIGN – SOUTHERN IMPOUNDMENT
(AMENDED APRIL 2021)

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SECOND PHASE PRE-DESIGN INVESTIGATION BORING LOCATIONS FIGURE 6

GIS File: I:\GIS\GIS\Projects\11200000s\11215131\Layouts\REPORT003\11215131-00(REPORT_003)GIS-BR006.mxd

008533

Source: Image ©2021 Google, Imagery date: 10/28/2017

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Feet

Coordinate System:
NAD 1983 StatePlane Texas South
Central FIPS 4204 Feet

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SAN JACINTO RIVER WASTE PITS SITE
HARRIS COUNTY, TEXAS
FINAL 100% REMEDIAL DESIGN – SOUTHERN IMPOUNDMENT
(AMENDED APRIL 2021)

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TREATABILITY SAMPLE LOCATIONS

FIGURE 7

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Notes:
ng/kg = nanograms per kilogram
RI = Remedial Investigation
PDI-1 = First Phase Pre- Design Investigation
PDI-2 = Second Phase Pre-Design Investigation
2,3,7,8-TCDD = 2,3,7,8-tetrachlorodibenzo-p-doxin
WHO = World Health Organization
TEQ = Toxicity Equivalents
1) Sample location results were measured in ng/kg.
2) dwa = depth weighted average
3) >240 ng/kg represents an exceedance for a boring's dwa.
4) All sample results are for 2,3,7,8-tetrachlorodibenzo-p-doxin (TCDD) Total World Health Organization (WHO) dioxin toxicity equivalents (TEQ) for Human/Mammal with ND=0.5.
5) RI data can be found in the Remedial Investigation Report (Integral, Anchor QEA, 2013).

Legend

- RI Soil Boring Locations < 240 ng/kg dw
- RI Soil Boring Locations > 240 ng/kg dw
- PDI-1 Boring Locations (Archive)
- PDI-1 Boring Locations <240 ng/kg dw
- PDI-1 Boring Locations >240 ng/kg dw
- PDI-2 Soil Boring Locations (Archive)
- PDI-2 Soil Boring Locations < 240 ng/kg dwa
- PDI-2 Soil Boring Locations > 240 ng/kg dwa
- Southern Impoundment Perimeter

Source: Image ©2021 Google, Imagery date: 10/28/2017

0 62.5 125
Feet
Coordinate System:
NAD 1983 StatePlane Texas South Central FIPS 4204 Feet

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SAN JACINTO RIVER WASTE PITS SITE
HARRIS COUNTY, TEXAS
FINAL 100% REMEDIAL DESIGN – SOUTHERN IMPOUNDMENT
(AMENDED APRIL 2021)

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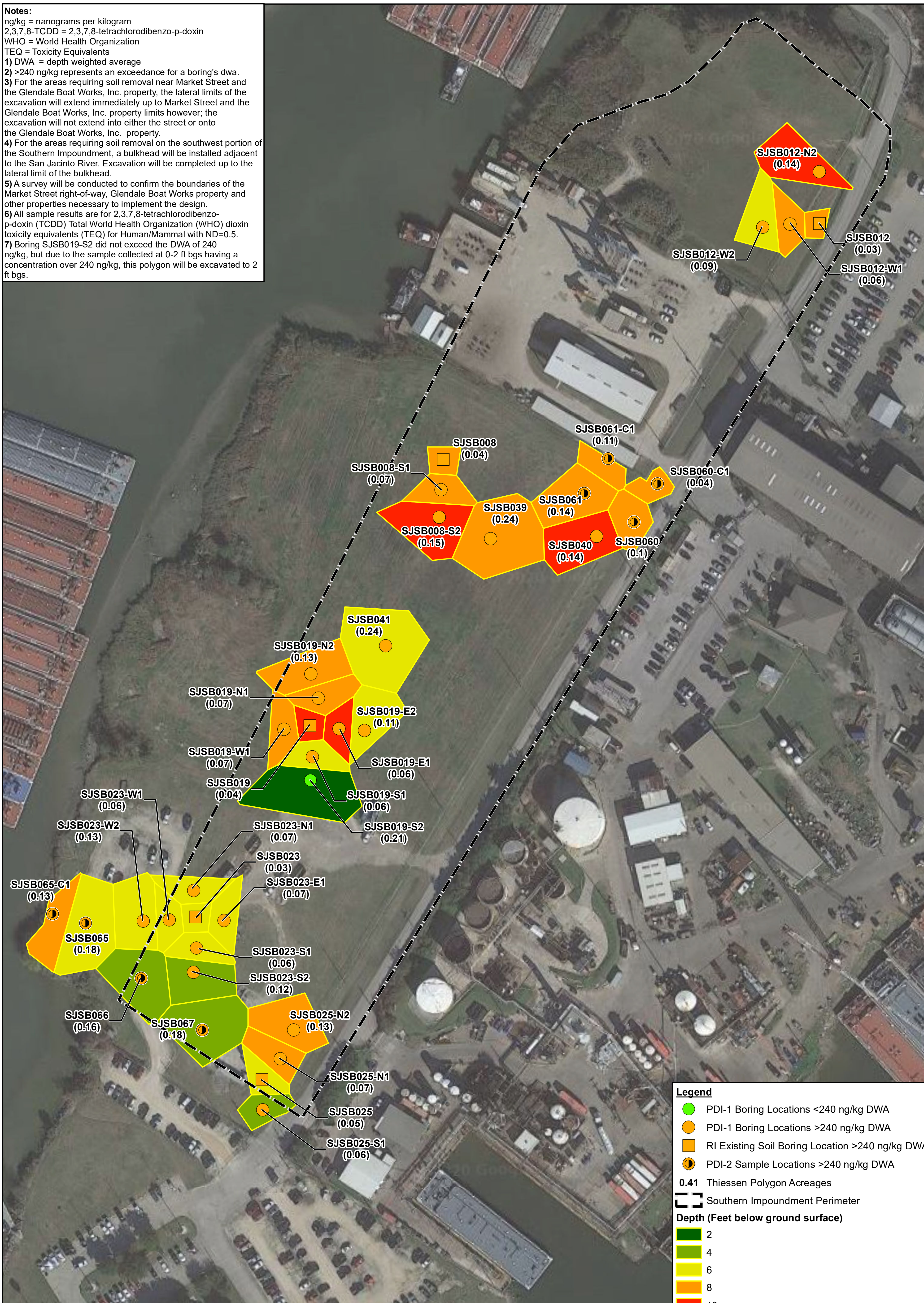
RI, PDI-1, AND PDI-2 INVESTIGATION RESULTS

FIGURE 8

GIS File: I:\GIS\GIS\Projects\11200000s\11215131\Layouts\REPORT003\11215131-00(REPORT_003)GIS-BR008.mxd

Notes:
ng/kg = nanograms per kilogram
2,3,7,8-TCDD = 2,3,7,8-tetrachlorodibenzo-p-doxin
WHO = World Health Organization
TEQ = Toxicity Equivalents
1) DWA = depth weighted average
2) >240 ng/kg represents an exceedance for a boring's dwa.
3) For the areas requiring soil removal near Market Street and the Glendale Boat Works, Inc. property, the lateral limits of the excavation will extend immediately up to Market Street and the Glendale Boat Works, Inc. property limits however; the excavation will not extend into either the street or onto the Glendale Boat Works, Inc. property.
4) For the areas requiring soil removal on the southwest portion of the Southern Impoundment, a bulkhead will be installed adjacent to the San Jacinto River. Excavation will be completed up to the lateral limit of the bulkhead.
5) A survey will be conducted to confirm the boundaries of the Market Street right-of-way, Glendale Boat Works property and other properties necessary to implement the design.
6) All sample results are for 2,3,7,8-tetrachlorodibenzo-p-doxin (TCDD) Total World Health Organization (WHO) dioxin toxicity equivalents (TEQ) for Human/Mammal with ND=0.5.
7) Boring SJSB019-S2 did not exceed the DWA of 240 ng/kg, but due to the sample collected at 0-2 ft bgs having a concentration over 240 ng/kg, this polygon will be excavated to 2 ft bgs.



Source: Image ©2021 Google, Imagery date: 10/28/2017

0 62.5 125
Feet
Coordinate System;
NAD 1983 StatePlane Texas South Central FIPS 4204 Feet

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SAN JACINTO RIVER WASTE PITS SITE
HARRIS COUNTY, TEXAS
FINAL 100% REMEDIAL DESIGN – SOUTHERN IMPOUNDMENT
(AMENDED APRIL 2021)

THIESSEN POLYGONS

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FIGURE 9

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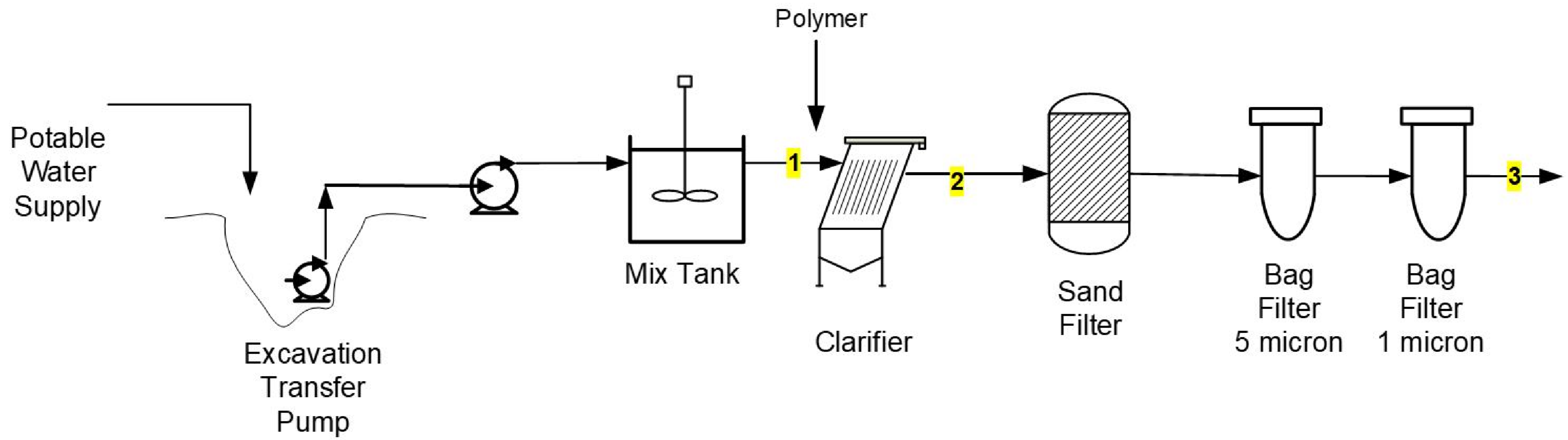

Parameter		Sample Point 1: Contact Water (average)	Sample Point 2: Clarifier Effluent	Sample Point 3: Filter Effluent
2,3,7,8 TCDD	pg/L	16,500	13	<10
Copper	mg/L	0.10	0.0081 U	0.0081 U
Lead	mg/L	0.11	0.0022 U	0.0022 U
Zinc	mg/L	0.38	0.045	0.036
TSS	mg/L	4,050	11	2

Notes:
pg/L = pictogram per liter
mg/L = milligram per liter
TCDD = 2,3,7,8-Tetrachlorodibenzodioxin
TSS = total suspended solids
U = not detected at the associated reporting limit

1) The Minimum Level (ML) for 2,3,7,8 TCDD is 10 pg/L
2) Full analytical data set included in Table 7.
Lab Reports included in Appendix B

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SAN JACINTO RIVER WASTE PITS SITE
HARRIS COUNTY, TEXAS
FINAL 100% REMEDIAL DESIGN – SOUTHERN IMPOUNDMENT
(AMENDED APRIL 2021)

PILOT TEST PROCESS FLOW DIAGRAM

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FIGURE 10

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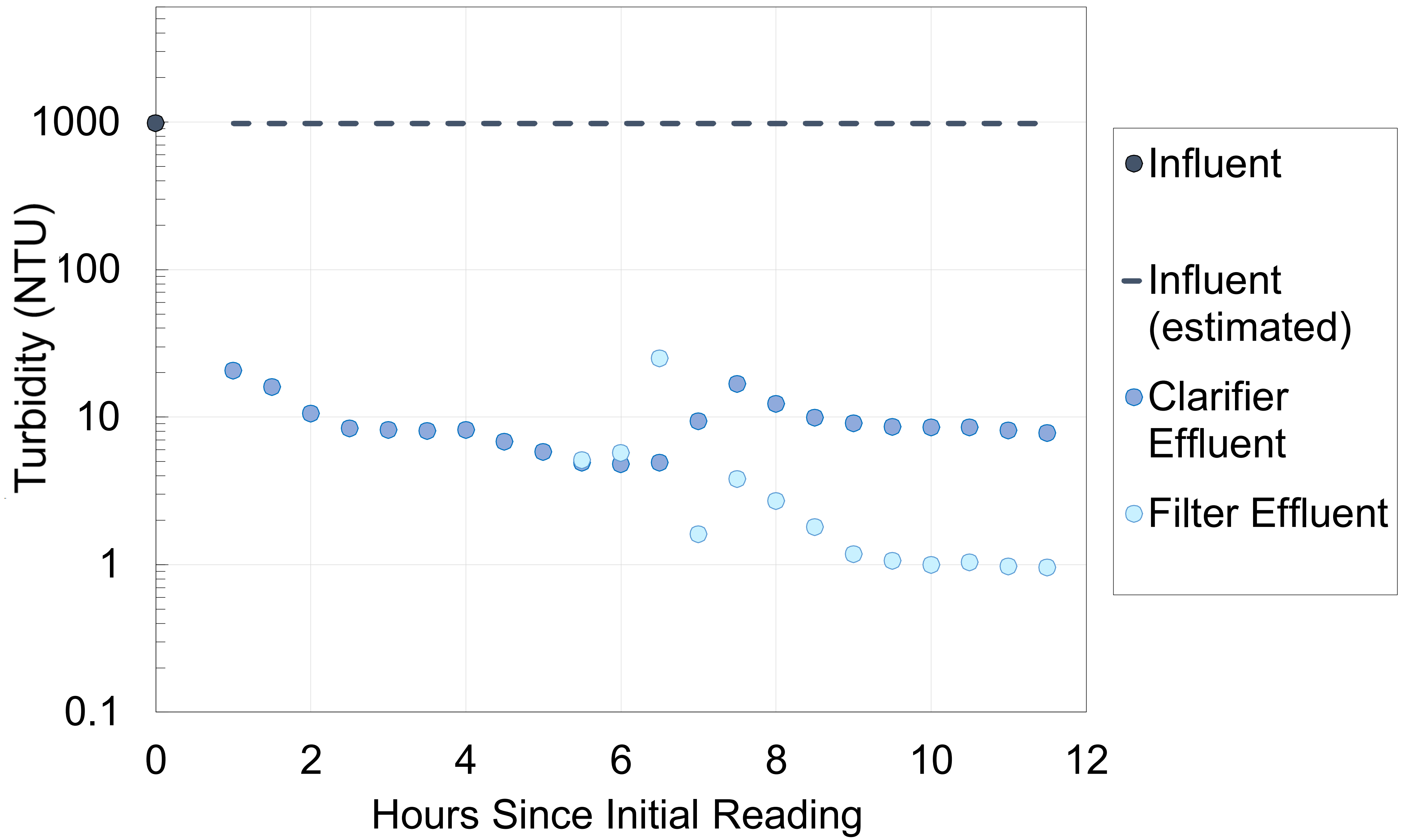
Notes:
NTU = Nephelometric Turbidity Unit

Turbidity was measured during the on-site water treatment pilot test. Real-time turbidity readings were taken for the influent, the post-clarification effluent, and the post-filtration effluent.



SAN JACINTO RIVER WASTE PITS SITE
HARRIS COUNTY, TEXAS
FINAL 100% REMEDIAL DESIGN – SOUTHERN IMPOUNDMENT
(AMENDED APRIL 2021)

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PILOT TEST EFFLUENT TURBIDITY

FIGURE 11

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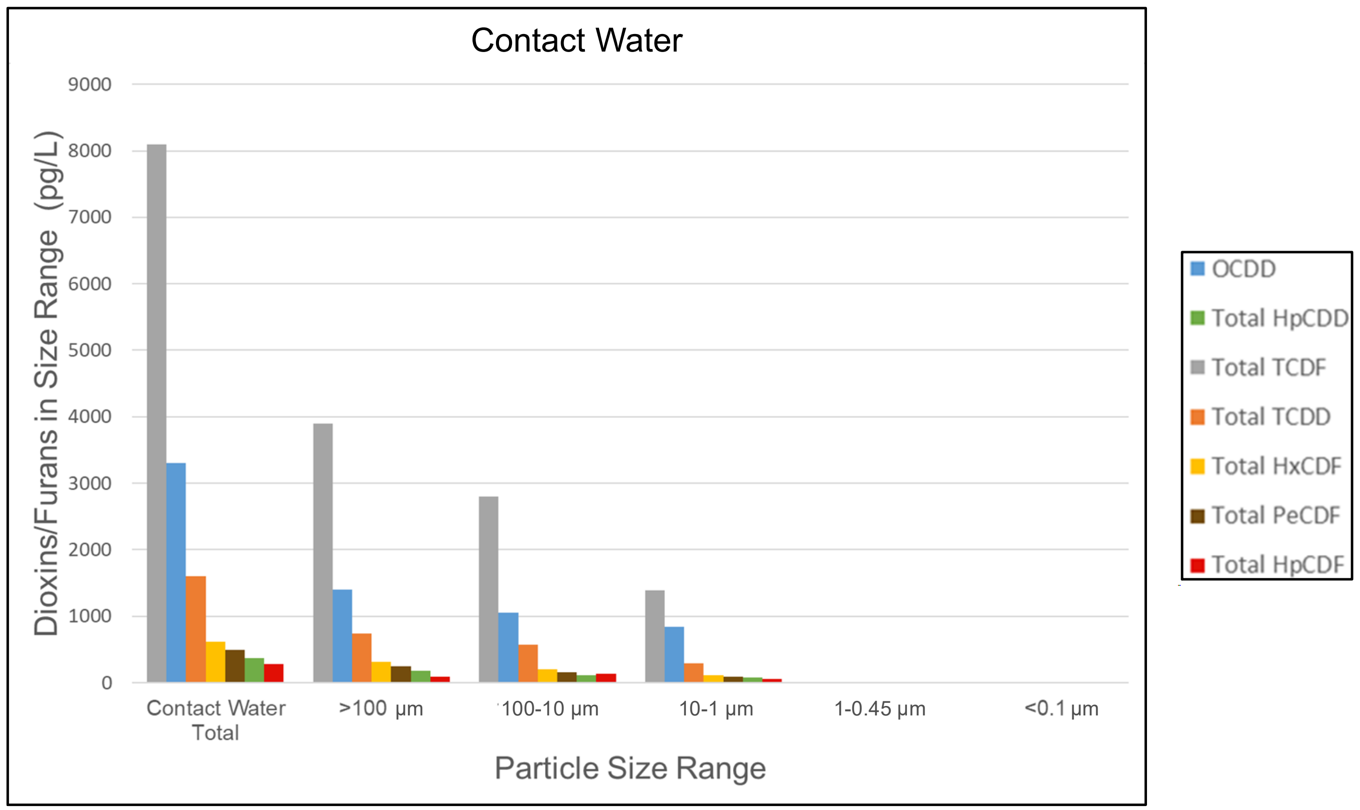
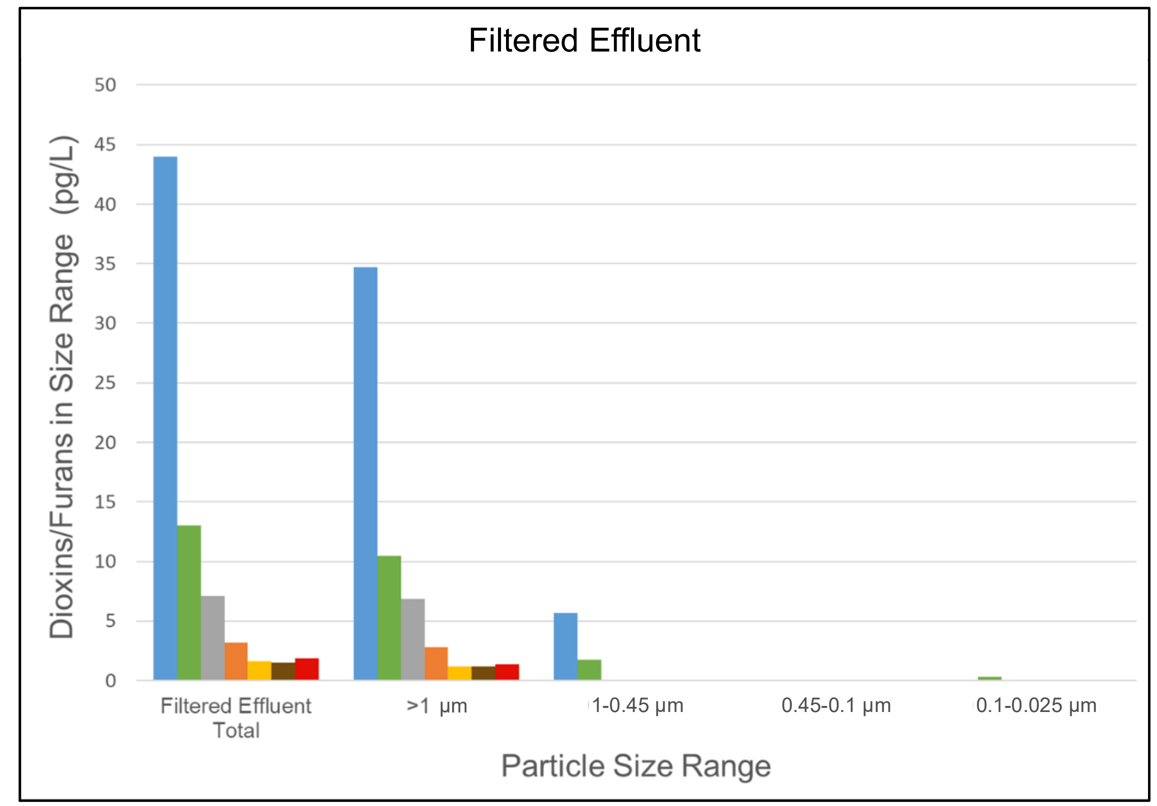
Notes:
pg/L = picogram per liter
µm = micron
TCDF =Tetrachlorodibenzofuran
OCDD = Octachlorodibenzodioxin
TCDD = Tetrachlorodibenzodioxin
HxCDF = Hexachlorodibenzofuran
PeCDF = Pentachlorodibenzofuran
HpCDD = Heptachlorodibenzodioxin
HpCDF = Heptachlorodibenzofuran

The graph on the left shows dioxin/furan results after the raw contact water was filtered through 100 µm, 10 µm, 1 µm, 0.45 µm, and 0.1 µm filters.

The graph on the right shows dioxin/furan results after the clarified and filtered effluent from the on-site pilot test was then filtered through 1 µm, 0.45 µm, 0.1 µm, 0.05 µm, and 0.025 µm filters.





SAN JACINTO RIVER WASTE PITS SITE
HARRIS COUNTY, TEXAS
FINAL 100% REMEDIAL DESIGN – SOUTHERN IMPOUNDMENT
(AMENDED APRIL 2021)

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FILTRATION TESTING RESULTS

FIGURE 12

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Table 1

Response to Comments – 100% Remedial Design - Southern Impoundment
Southern Impoundment
San Jacinto River Waste Pits Site
Harris County, Texas

tem No	Reference	Comment	Response
Specific Comments from the EPA			
1	Section 3.3.3.2	In a letter dated November 19, 2020, EPA stated they reviewed the description of the waste characterization sampling and associated analytical test results. From review of the analytical testing results, EPA agreed the samples reviewed are all nonhazardous. However, EPA has also determined that additional hazardous waste characterization is warranted prior to final disposal. Revise Section 3.3.3.2 to clarify that that the intent of this additional characterization is to ensure that the excavated material does not meet the definition of a characteristically hazardous waste as defined in 40 CFR part 261. When performing this additional evaluation, the facility should follow the guidelines of SW846 chapter 9.	The final paragraph of Section 3.3.3.2 has been updated to state: Additional sampling may be required to further characterize excavated material *to confirm that it meets the definition of a non-hazardous waste and* to determine whether it meets the definition of Class 1 or Class 2 non hazardous waste under the regulations governing classification of non hazardous industrial solid waste in Texas.
2	Section 3.3 Waste Characterization Table 9, ARAR Requirements Appendix C, Attachment 8 Transportation and Off-Site Disposal Plan	The design should consider if a portion of the waste were to meet the definition of a hazardous waste, and affirm that the disposal of any hazardous waste would be in compliance with EPA regulations. Please add language to address this comment in the following locations in the report: (1) Section 3.3 Waste Characterization, (2) Table 9, ARAR Requirements, and (3) Appendix C, Attachment 8, Transportation and Off-Site Disposal Plan.	Language within Section 3.3, Table 9, and Appendix C (Attachment 8) has been updated to state: *If hazardous waste is identified, as defined in 40 CFR part 261, it will be managed and disposed of in accordance with RCRA regulations.*
3	Section 5.5.4	Revise Section 5.5.4 of the 100% RD to include a proposed timeline for each of the compliance monitoring steps from the first sample taken with turn-around time for analytical results to the second sample taken (if needed) with turn-around time for analytical results, through system shutdown/effluent reroute.	The schedule for analysis and resampling for each parameter (if needed) would be dictated by the protocols and methods of the selected analytical laboratory, in conjunction with the QAPP. If analyses at the point of discharge indicate that effluent has not met treatment discharge criteria for a certain regulated parameter, the EPA will be notified immediately and corrective action will be initiated. The third paragraph of Section 5.4.4 has been updated accordingly and a column has been added to the table to identify the standard analytical turn-around-time for each parameter.
4	Figure 8	Figure 8 of the RD report identifies soil borings SJSB006, SJSB009, SJSB013, SJSB024, and SJSB026 as archived samples; however, Table 5 contains analytical results and depth weighted average values for these Remedial Investigation borings. Please update Figure 8 to reflect the results displayed in Table 5.	Figure 8 has been updated accordingly.
5	Appendix C, Attachment 2 ERP, Page 6	On page 6, the Phase III and Phase IV Preparation sections include the phrase “In the event of a Phase II scenario…” that should refer to Phase III and Phase IV respectively.	The text in Section 5.0 (*Phase III Preparation* and *Phase IV Preparation*) has been updated accordingly.
6	Appendix C, Attachment 5 QAPP, Table 1	Table 1 does not include TPH analysis by analytical methods TX 1005/1006 for the imported backfill soil samples. Section 2.3 and Table 2.3 of the Field Sampling Plan (Appendix C, Attachment 4) indicate that the imported fill soil samples will be analyzed for TPH. Please update the QAPP Table 1 to include this analysis.	Table 1 of the QAPP has been updated to include TPH analysis for imported fill.
7	Appendix C, Attachment 9, Institutional Control Implementation and Assurance Plan, Section 3	This section proposes a proprietary control in the form of an environmental restrictive covenant (ERC) or soil management plan (SMP). According to the ROD, deed restrictions should be applied to parcels where previous soil sampling results showed dioxin concentrations exceeding EPA’s protective level of 51 ng/kg for unlimited use and unrestricted access. EPA and TCEQ request that an ERC be pursued to ensure potential future purchasers are aware of the presence of waste and soil with dioxin concentrations exceeding EPA’s protective level. The ERC should also restrict land use to industrial/commercial purposes. Soil Management Plans may also be recorded with the deed to describe how soil would be managed if construction were to occur.	With respect to any necessary restrictions, Respondent is prepared to seek landowner consent to an ERC in the first instance. The language in Section 3 has been updated.

Table 2

First Phase Pre-Design Investigation Waste Characterization Analytical Results - Southern Impoundment
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Area: Sample Location: Sample Identification: Sample Date: Sample Depth: Integral Sample ID:	Units	Southern Impoundment - Waste Pits SJSB008-N1-Composite SL0153 11/13/2018 (0-10) ft bgs SJSB008-N1-C6	Southern Impoundment - Waste Pits SJSB012-N1-Composite SL0146 11/13/2018 (0-10) ft bgs SJSB012-N1-C6	Southern Impoundment - Waste Pits SJSB019-N1-Composite SL0022 11/3/2018 (0-10) ft bgs SJSB019-N1-C6	Southern Impoundment - Waste Pits SJSB019-N1-Composite SL0022 11/13/2018 (0-10) ft bgs SJSB019-N1-C6	Southern Impoundment - Waste Pits SJSB023-N1-Composite SL0064 11/5/2018 (0-10) ft bgs SJSB023-N1-C6	Southern Impoundment - Waste Pits SJSB025-N1-Composite SL0084 11/8/2018 (0-10) ft bgs SJSB025-N1-C6
TCLP-Volatile Organic Compounds (VOCs)							
1,1,2,2-Tetrachloroethane	mg/L	0.04 U	0.04 U	0.04 U	--	0.04 U	0.04 U
1,1-Dichloroethene	mg/L	0.032 U	0.032 U	0.032 U	--	0.032 U	0.032 U
1,2-Dichloroethane	mg/L	0.032 U	0.032 U	0.032 U	--	0.032 U	0.032 U
1,4-Dichlorobenzene	mg/L	0.048 U	0.048 U	0.048 U	--	0.048 U	0.048 U
2-Butanone (Methyl ethyl ketone) (MEK)	mg/L	0.76 UJ	0.76 UJ	0.76 UJ	--	0.76 UJ	0.76 UJ
Benzene	mg/L	0.025 U	0.025 U	0.025 U	--	0.025 U	0.025 U
Carbon tetrachloride	mg/L	0.039 U	0.039 U	0.039 U	--	0.039 U	0.039 U
Chlorobenzene	mg/L	0.044 U	0.044 U	0.044 U	--	0.044 U	0.044 U
Chloroform (Trichloromethane)	mg/L	0.029 U	0.029 U	0.029 U	--	0.029 U	0.029 U
Tetrachloroethene	mg/L	--	--	--	--	0.04 U	--
Trichloroethene	mg/L	0.04 U	0.04 U	0.04 U	--	0.03 U	0.04 U
Vinyl chloride	mg/L	0.03 U	0.03 U	0.03 U	--		0.03 U
TCLP-Semi-Volatile Organic Compounds (SVOCs)							
2,4,5-Trichlorophenol	mg/L	0.011 UJ	0.014 UJ	0.0087 UJ	--	0.0087 UJ	0.0087 U
2,4,6-Trichlorophenol	mg/L	0.0084 UJ	0.011 UJ	0.0069 UJ	--	0.0069 UJ	0.0069 UJ
2,4-Dinitrotoluene	mg/L	0.016 UJ	0.021 UJ	0.013 UJ	--	0.013 UJ	0.013 U
2-Methylphenol	mg/L	0.011 UJ	0.014 UJ	0.0086 UJ	--	0.0086 UJ	0.0086 U
4-Methylphenol	mg/L	0.0058 UJ	0.0074 UJ	0.0047 UJ	--	0.0047 UJ	0.0047 U
Hexachlorobenzene	mg/L	0.012 UJ	0.015 UJ	0.0094 UJ	--	0.0094 UJ	0.0094 U
Hexachlorobutadiene	mg/L	0.0078 UJ	0.01 UJ	0.0064 UJ	--	0.0064 UJ	0.0064 U
Hexachloroethane	mg/L	0.0058 UJ	0.0075 UJ	0.0048 UJ	--	0.0048 UJ	0.0048 U
Nitrobenzene	mg/L	0.0097 UJ	0.013 UJ	0.0079 UJ	--	0.0079 UJ	0.0079 U
Pentachlorophenol	mg/L	0.014 UJ	0.017 UJ	0.011 UJ	--	0.011 UJ	0.011 U
Pyridine	mg/L	0.31 UJ	0.4 UJ	0.25 UJ	--	0.25 UJ	0.25 U
TCLP-Pesticides							
Chlordane	mg/L	0.001 U	0.001 UJ	0.001 UJ	--	0.001 UJ	0.001 UJ
Endrin	mg/L	0.0001 U	0.0001 UJ	0.0001 UJ	--	0.0001 UJ	0.0001 UJ
gamma-BHC (lindane)	mg/L	0.0001 U	0.0001 UJ	0.0001 UJ	--	0.0001 UJ	0.0001 UJ
Heptachlor	mg/L	0.0001 U	0.0001 UJ	0.0001 UJ	--	0.0001 UJ	0.0001 UJ
Heptachlor epoxide	mg/L	0.0001 U	0.0001 UJ	0.0001 UJ	--	0.0001 UJ	0.0001 UJ
Methoxychlor	mg/L	0.0001 U	0.0001 UJ	0.0001 UJ	--	0.0001 UJ	0.0001 UJ
Toxaphene	mg/L	0.002 U	0.002 UJ	0.002 UJ	--	0.002 UJ	0.002 UJ
TCLP-Herbicides							
2,4,5-TP (Silvex)	ug/L	25 U	32 U	20 UJ	--	20 UJ	20 U
2,4-Dichlorophenoxyacetic acid (2,4-D)	ug/L	130 U	160 U	100 UJ	--	100 UJ	100 U
TCLP-Metals							
Arsenic	mg/L	0.02 U Dup 0.02 U	0.02 U	0.02 U Dup 0.02 U	--	0.02 U	0.02 U Dup 0.02 U
Barium	mg/L	0.9 J Dup 0.8 J	0.7 J	0.9 J Dup 0.9 J	--	1.3	1.1 Dup 1
Cadmium	mg/L	0.004 J Dup 0.004 J	0.001 U	0.011 J Dup 0.011 J	--	0.003 J	0.002 J Dup 0.002 J
Chromium	mg/L	0.01 U Dup 0.01 U	0.01 U	0.01 U Dup 0.01 U	--	0.01 U	0.01 U Dup 0.01 U
Lead	mg/L	0.015 U Dup 0.015 U	0.015 U	0.015 U Dup 0.015 U	--	0.024 J Dup 0.025 J	0.015 U Dup 0.015 U
Mercury	mg/L	0.0001 U Dup 0.0001 U	0.0001 U	0.0001 U Dup 0.0001 U	--	0.0001 U	0.0001 U Dup 0.0001 U
Selenium	mg/L	0.02 U Dup 0.02 U	0.02 J	0.02 U Dup 0.02 U	--	0.02 U	0.02 U Dup 0.02 U
Silver	mg/L	0.004 U Dup 0.004 U	0.004 U	0.004 U Dup 0.004 UJ	--	0.004 U	0.004 U Dup 0.004 U
Misc							
Asbestos	%	0	0	0	--	0 Dup 0.25	0
Total Petroleum Hydrocarbons (TPH)							
Total Petroleum Hydrocarbons	mg/kg	--	--	22 J	--	--	--
Total Petroleum Hydrocarbons (C12-C28)	mg/kg	8.1 J	1300 J	22 J	--	340 J Dup 430 J	33 J
Total Petroleum Hydrocarbons (C25-C36) ORO	mg/kg	60 J	1500 J	--	--	510 J Dup 600 J	130 J
Total Petroleum Hydrocarbons (C28-C35)	mg/kg	--	--	8.5 U	--	--	--
Total Petroleum Hydrocarbons (C6-C12)	mg/kg	30 Dup 1.4 J	52 J	6.5 U	--	8.3 Dup 14	1.7 J
General Chemistry							
Cyanide (total)	mg/kg	17 U Dup 17 U	--	17 UJ	--	17 UJ	17 UJ
Flash point (closed cup)	Deg C	110 > Dup 110 >	110 >	--	110 >	> 110	110 >
Moisture	%	--	--	24 J	--	26 J Dup 36 J	22 J Dup 21.5
Percent solids	%	--	--	--	76.7	--	--
pH, lab	s.u.	8.33 J	9.62 J	8.52 J	--	8.15 J Dup 8.29 J	8.13 J
Reactive cyanide	mg/kg	--	--	--	100 U	--	--
Sulfate	mg/kg	--	746 J Dup 659	--	--	--	--
Sulfide	mg/kg	39 U	98	32 U	--	32 U	32 U Dup 32 U
Sulfur	mg/kg	--	2600	--	--	--	--
Total solids	%	82 Dup 80.8 Dup 69.1	65.2	73.9 Dup 76.7 J	--	74.9 J Dup 65.3 J	74.3 Dup 77.5 Dup 76.4 Dup 77.5

Notes:
- TCLP - Toxicity Characteristic Leaching Procedure
- mg/L - milligrams per Liter
- ug/L - microgram per Liter
- Deg C - Degrees in Celsius
- s.u. - standard unit

- U - Not detected at the associated reporting limit.
- J - Estimated concentration.
- UJ - Not detected; associated reporting limit is estimated.
- Dup - indicates the result from a duplicate sample

First Phase Pre-Design Investigation Analytical Results - Southern Impoundment
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Area:	Units	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits
Sample Location:		SJSB008-E1-Composite	SJSB008-N1-Composite	SJSB008-S1	SJSB008-S1	SJSB008-S1	SJSB008-S1	SJSB008-S1	SJSB008-S1-Composite	SJSB008-S2	SJSB008-S2	SJSB008-S2	SJSB008-S2	SJSB008-S2	SJSB008-W1-Composite	SJSB012-E1-Composite	SJSB012-E1-Composite	SJSB012-N1	SJSB012-N1
Sample Identification:		SL0078	SL0153	SL0170	SL0171	SL0172	SL0173	SL0174	SL0175	SL0176	SL0177	SL0178	SL0179	SL0180	SL0164	SL0100	SL0101	SL0141	SL0142
Sample Date:		11/7/2018	11/13/2018	11/14/2018	11/14/2018	11/14/2018	11/14/2018	11/14/2018	11/14/2018	11/14/2018	11/14/2018	11/14/2018	11/14/2018	11/14/2018	11/13/2018	11/10/2018	11/10/2018	11/13/2018	11/13/2018
Sample Type:																	Duplicate		
Sample Depth:		(0-10) ft bgs	(0-10) ft bgs	(0-2) ft bgs	(2-4) ft bgs	(4-6) ft bgs	(6-8) ft bgs	(8-10) ft bgs	(0-10) ft bgs	(0-2) ft bgs	(2-4) ft bgs	(4-6) ft bgs	(6-8) ft bgs	(8-10) ft bgs	(0-10) ft bgs	(0-10) ft bgs	(0-10) ft bgs	(0-2) ft bgs	(2-4) ft bgs
Integral Sample ID:		SJSB008-E1-C6	SJSB008-N1-C6	SJSB008-S1-C1	SJSB008-S1-C2	SJSB008-S1-C3	SJSB008-S1-C4	SJSB008-S1-C5	SJSB008-S1-C6	SJSB008-S2-C1	SJSB008-S2-C2	SJSB008-S2-C3	SJSB008-S2-C4	SJSB008-S2-C5	SJSB008-W1-C6	SJSB012-E1-C6	SJSB012-E1-C6 (Field split	SJSB012-N1-C1	SJSB012-N1-C2
Dioxins/Furans																			
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	ng/kg	238	142	153	29.1	163	3510	11100	2100	119	64.5	81.8	55.1	414	60.8	753	337	28.8	85.2
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD	ng/kg	2060 J	1510	2870	639	7700 J	36300	4810	4300	2060	1030	2160	108000 J	37500	1270	2960	1380	72700 J	2770
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	ng/kg	22.3 J	19.5	32.2	4.89 U	38.5	512	145	99.8	25.5	9.44 U	16	7.03	776	11.7	21.4	12.5	9.67	21.7
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD	ng/kg	105	69.6	195	26.1	149	573	232	193	97	45.5	84.4	319	384	53.1	56.9	33.9	200	157
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	ng/kg	2.31 J	2.35 J	3.41	0.436 U	3.96 U	153	14.9	20.5	3.18	0.844 J	2.97 U	3.11 U	335	1.54 J	2.25 J	2.03 J	0.6 U	2.91 U
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	11.9	4.59	6.01	1.03 J	15.4	1410	34.9	153	7.56	2.33 U	4.35	0.965 J	3570	6.3	10.3	9.28	0.618 U	1.44 J
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	0.772 U	1.01 J	1.97 J	2.89 U	1.26 U	3.33 U	3.42 J	1.64 J	1.11 U	0.698 U	0.962 J	1.26 J	1.6 U	0.812 J	0.575 J	3.25 U	1.98 J	0.807 J
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	3.25	1.26 J	1.93 U	0.6 U	4.18	349	10.9	37.8	2.46 J	0.916 U	1.17 U	0.741 U	870	1.67 J	2.82 U	2.45 U	0.547 U	1.23 J
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	3.67	3.8	6.61	1.53 J	6.87	21.6	15	7.45	5.11	3.08	3.36	4.71	10.6	2.32 U	2.24 J	1.14 U	3.97	4.43
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	ng/kg	1.09 J	0.796 U	0.756 U	2.89 U	1.47 U	119	5.26	12.1	0.634 U	0.475 U	0.847 J	0.452 U	303	0.588 J	1.07 U	1.03 J	3.19 U	2.91 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	2.2 J	1.77 U	3.08 U	0.875 U	3.1 U	8.62	8.23	3.52 U	2.96 U	1.96 U	2.6 J	3.99 U	4.54 J	1.93 J	1.56 U	0.814 U	3.61	2.11 J
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	7.66	1.61 J	2.38 J	0.653 U	8	836	23.2	89.6	2.92 J	1.26 U	2.39 J	0.638 U	2110	3.09	6.62	5.41	0.269 U	0.494 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	1.04 U	0.403 U	1.73 U	0.473 J	0.889 U	83.1	6.51 U	10.5	1.26 U	1.04 U	1.25 U	1.17 U	141	0.935 U	1.56 J	1.09 U	1.21 J	0.707 U
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	1.53 U	1.11 U	2.43 J	0.317 U	2.64 J	72.7	7.56	9.82	2.05 J	0.922 U	1.2 J	0.818 J	158	1.02 J	1.54 J	0.969 J	0.691 U	1.59 J
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	5.76	0.867 U	2.71 U	2.89 U	7.26	644	28.5	79.2	2.9 J	1.42 J	2.27 J	0.742 U	1550	3.17	7.24	5.39	0.571 J	1.25 J
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	ng/kg	189	21.3	43.8	22.8	165	26800	818	5350	39.4	29	45.5	3.27	62500	100	271	208	2.88	2.87
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	57.5	8.6 U	24.4	8.74	88.2	22100	609	3120	17.5 U	11.6	24.8	1.89	41600	48.8	88.8	70.9	1.27 U	1.4
Octachlorodibenzofuran (OCDF) 13C12	ng/kg	238	142	153	29.1	163	3510	11100	2100	119	64.5	81.8	55.1	414	60.8	753	337	28.8	85.2
Total dioxin/furan	pg/g	2710	1780	3340	729	8350	93500	17900	15600	2370	1190	2430	108000	152000	1560	4180	2070	73000	3050
Total dioxin/furan (ND*0.5)	pg/g	2710	1780	3350	733	8350	93500	17900	15600	2380	1200	2430	108000	152000	1570	4190	2070	73000	3050
Total dioxin/furan (ND*1)	pg/g	2710	1790	3350	737	8360	93500	17900	15600	2390	1200	2430	108000	152000	1570	4190	2080	73000	3050
Total heptachlorodibenzofuran (HpCDF)	ng/kg	74	46.6	103	2.89 U	121	970	333	226	66.7	18.7	52.6	28.1	1400	35.2	47.7	27.6	24.6	76.9
Total heptachlorodibenzo-p-dioxin (HpCDD)	ng/kg	292	168	805	70.6	361	1270	589	597	239	127	239	1030	823	153	166	92.7	528	500
Total hexachlorodibenzofuran (HxCDF)	ng/kg	36.9	19.1	24.5	4.86	53.9	2210	166	266	35.7	0.62 J	21	9.57	5300	18.4	28.4	16	9	25.9
Total hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	40	30.5	103	9.9	49.6	211	159	82	25.7	23.2	37.6	212	131	36.2	37.4	17.1	51.4	39.1
Total pentachlorodibenzofuran (PeCDF)	ng/kg	27.6	8.66	12.7	0.838 J	25.1	2360	143	270	18.7	3.52	12.6	4.12	5620	13.5	29.7	21.5	1.03 J	11.5
Total pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	1.85 J	3 U	1.67 J	1.07 J	2.69 U	111	10.3	16.6	1.98 J	2.76 U	3.82	13.9	175	3.92	4.68	1.48 J	3.22	2.19 J
Total TEQ 1998 (Avian) (ND*0.5)	ng/kg	256	27.7	72.8	32.5	266	49900	1470	8590	54	43.2	74.9	17.9	107000	154	371	287	13.5	7.29
Total TEQ 1998 (Fish) (ND*0.5)	ng/kg	73.3	7.55	31.1	10.8	105	24100	680	3470	15.1	15	30.7	15	46300	57.7	110	87.2	11	4.1
Total TEQ Dioxin 1998 (Bird) (ND=0)	ng/kg	255	22.6	70.3	32.2	265	49900	1470	8590	44.5	42.2	74.3	16.6	107000	154	371	286	12.7	6.9
Total TEQ Dioxin 1998 (Bird) (ND=1)	ng/kg	257	32.8	75.3	32.9	266	49900	1470	8590	63.6	44.2	75.6	19.1	107000	155	372	288	14.2	7.68
Total TEQ Dioxin 1998 (Fish) (ND=0)	ng/kg	72.5	2.73	29.5	10.6	104	24100	677	3470	5.43	14	30	14.1	46300	57.2	110	85.7	10.3	3.72
Total TEQ Dioxin 1998 (Fish) (ND=1)	ng/kg	74.1	12.4	32.8	11	106	24100	683	3470	24.8	16	31.4	15.8	46300	58.2	110	88.7	11.8	4.48
Total TEQ Dioxin Texas TEF (ND=0)	ng/kg	81.9	3.28	30.6	11.5	112	25400	715	3730	7.25	15.5	31.9	2.99	49300	61.8	122	95.8	2.13	3.47
Total TEQ Dioxin Texas TEF (ND=0.5)	ng/kg	82.2	8.08	32	11.7	112	25400	716	3730	16.6	16.2	32.3	3.75	49300	62.1	122	96.4	2.88	3.67
Total TEQ Dioxin Texas TEF (ND=1)	ng/kg	82.6	12.9	33.4	11.9	113	25400	718	3730	25.9	16.8	32.7	4.5	49300	62.5	123	97.1	3.63	3.87
Total tetrachlorodibenzofuran (TCDF)	ng/kg	317	29.4	65.3	32.3	272	39400	2000	5650	54	33.3	79.6	11	92000	168	478	367	5.76	5.91
Total tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	66.8	1.02	25.3	8.74	92.9	12400	540	1620	1.58 U	11.6	27.6	4.35	25100	58.9	101	77.4	0.638 U	1.18
Total WHO Dioxin TEQ(Human/Mammal)(ND=0)	ng/kg	82.6	4.65	33.8	12.2	114	25300	717	3720	8.53	16	33.1	38.7	49000	62.1	123	95.6	26.5	5.87
Total WHO Dioxin TEQ(Human/Mammal)(ND=0.5)	ng/kg	83.2	9.47	35.3	12.4	115	25300	721	3720	18.1	17	33.8	39.6	49000	62.7	123	96.5	27.3	6.24
Total WHO Dioxin TEQ(Human/Mammal)(ND=1)	ng/kg	83.8	14.3	36.9	12.6	116	25300	724	3720	27.8	17.9	34.5	40.6	49000	63.3	124	97.5	28	6.61
Asbestos																			
Asbestos	%	--	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Polychlorinated biphenyls (PCBs)																			
Aroclor (unspecified)	ug/kg	--	50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1016 (PCB-1016)	ug/kg	--	3.2 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1221 (PCB-1221)	ug/kg	--	3.2 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1232 (PCB-1232)	ug/kg	--	3.2 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1242 (PCB-1242)	ug/kg	--	10 J	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1248 (PCB-1248)	ug/kg	--	3.2 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1254 (PCB-1254)	ug/kg	--	21	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1260 (PCB-1260)	ug/kg	--	19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1262 (PCB-1262)	ug/kg	--	3.2 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1268 (PCB-1268)	ug/kg	--	3.2 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs	ug/kg	--	69.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs (7)	ug/kg	--	50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs (ND*0)	ug/kg	--	50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs (ND*0.5)	ug/kg	--	59.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (TPH)																			
Total Petroleum Hydrocarbons	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C12-C28)	mg/kg	--	8.1 J	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C25-C36) ORO	mg/kg	--	60 J	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C28-C35)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C12)	mg/kg	--	1.4 J Dup 30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
General Chemistry																			
Cyanide (total)	mg/kg	--	17 U Dup 17 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Flash point (closed cup)	Deg C	--	110 > Dup 110 >	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Moisture	%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Percent solids	%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH, lab	s.u.	--	8.33 J	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Reactive cyanide	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfate	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfide	mg/kg	--	39 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfur	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total solids	%	81.1	82 Dup 80.8 Dup 69.1	81.3	81.6	88.3	66	60.7	76.1	81.6	82.6	80.5	77.7	46.8	80	75	75.5	78.1	83.6

Notes:
- ng/kg - nanograms per kilogram
- ug/kg - microgram per kilogram
- mg/kg - milligram per kilogram
- Deg C - Degrees in Celsius
- s.u. - standard unit
- U - Not detected at the associated reporting limit.
- J - Estimated concentration.
- UJ - Not detected; associated reporting limit is estimated.
- Dup - indicates the result from a duplicate sample

Table 3

First Phase Pre-Design Investigation Analytical Results - Southern Impoundment
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Area:	Units	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits
Sample Location:		SJSB012-N1	SJSB012-N1	SJSB012-N1	SJSB012-N1-Composite	SJSB012-N2	SJSB012-N2	SJSB012-N2	SJSB012-N2	SJSB012-N2	SJSB012-S1-Composite	SJSB012-S1-Composite	SJSB012-W1	SJSB012-W1	SJSB012-W1	SJSB012-W1	SJSB012-W1-Composite	SJSB012-W1-Composite	SJSB012-W2
Sample Identification:		SL0143	SL0144	SL0145	SL0146	SL0136	SL0137	SL0138	SL0139	SL0140	SL0107	SL0108	SL0124	SL0126	SL0127	SL0128	SL0129	SL0130	SL0131
Sample Date:		11/13/2018	11/13/2018	11/13/2018	11/13/2018	11/12/2018	11/12/2018	11/12/2018	11/12/2018	11/12/2018	11/10/2018	11/10/2018	11/11/2018	11/11/2018	11/11/2018	11/11/2018	11/11/2018	11/11/2018	11/12/2018
Sample Type:												Duplicate						Duplicate	
Sample Depth:		(4-6) ft bgs	(6-8) ft bgs	(8-10) ft bgs	(0-10) ft bgs	(0-2) ft bgs	(2-4) ft bgs	(4-6) ft bgs	(6-8) ft bgs	(8-10) ft bgs	(0-10) ft bgs	(0-10) ft bgs	(0-2) ft bgs	(4-6) ft bgs	(6-8) ft bgs	(8-10) ft bgs	(0-10) ft bgs	(0-10) ft bgs	(0-2) ft bgs
Integral Sample ID:		SJSB012-N1-C3	SJSB012-N1-C4	SJSB012-N1-C5	SJSB012-N1-C6	SJSB012-N2-C1	SJSB012-N2-C2	SJSB012-N2-C3	SJSB012-N2-C4	SJSB012-N2-C5	SJSB012-S1-C6	SJSB012-S1-C6 (Field split	SJSB012-W1-C1	SJSB012-W1-C3	SJSB012-W1-C4	SJSB012-W1-C5	SJSB012-W1-C6	SJSB012-W1-C6 (Field split	SJSB012-W2-C1
Dioxins/Furans																			
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	ng/kg	454	30100	5760	4380	34.7	77.4	109	943	23200	117	123	201	1440	27400	4.91 J	2650 J	3420 J	6.49 U
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	ng/kg	7360 J	32700 J	4070	14500 J	22700 J	1780	3990 J	26900 J	20000 J	909	945	41500 J	27400	21300	1430	65300 J	87000 J	32700 J
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	ng/kg	72.2	270	131	109	10.9	68.7	62 J	592 J	364	9.56	9.08	33.1	246	281	2.38 J	128	189 J	0.786 J
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD	ng/kg	332	472	177	286	95.1	114	250	1300	319	59.1	60.4	661	855	383	27.2	639	739	112
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	ng/kg	4.12	23.2	11.4	9.36	1.01 U	1.77 J	4.18 UJ	141 J	80.9 J	0.874 J	0.64 J	3.9	39.3	39.8	0.181 U	14.6 J	30.2 J	3.24 U
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	5.61	35.2	21.2	15	1.6 J	2.14 U	6.84	1310	618	1.51 J	1.48 J	1.66 J	262	195	0.184 U	85.8	204	0.119 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	2.8 J	4.42 U	2.99 J	2.15 U	1.24 U	1.14 U	1.69 U	20.9	4.4 J	0.92 J	0.79 J	1.72 U	5.44	5.06	0.47 U	3.03 J	3.74 J	1.39 U
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	3.9 J	12.1	7.81	5.13	0.927 U	4.72	5.82 U	340	159	0.509 U	0.581 J	0.757 J	73	52.7	0.271 U	23.6 J	55.5	0.198 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	12.9	26.6	13.5	12.4	2.66 U	5.19	11.8	69.3	23.7	1.93 J	1.65 J	7.88	34.5	26.3	0.901 U	15.6	20.2	2.07 J
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	ng/kg	1.35 J	5.69	4.37 J	2.51 J	0.382 U	3.18 U	1.39 J	113	57.8	0.537 U	0.561 U	3.04 U	23.4	19.7	0.138 U	7.59	16.9	0.314 J
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	7.09	10.4 U	5.6	6.93	2.09 U	2.61 J	5.78	36.5	9.66	1.45 J	1.21 U	3.58	14	11.9	1.33 U	7.21	10	2.53 J
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	1.91 J	20.2	13.1	8.01	1.13 J	1.08 J	3.09 J	876	417	0.495 J	0.357 U	3.04 U	175	105	4.12 U	52.9	126	3.24 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	2 U	8.69	5.03	3.68	1.01 U	1.09 U	1.71 U	132	67.2	0.368 J	0.435 J	1.17 J	27.3	21.3	0.635 U	9.09	19.6	0.861 U
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	3.78 J	10.4	6.9	5.62	1.17 U	2.19 J	7.77	85.3	41.2	0.543 U	0.62 J	0.866 U	27.6	19	0.197 U	9.4	16.8	0.27 J
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	3.37 J	30.1	18.6	9.32	1.77 J	0.909 U	5.79	738	387	1.06 U	1.13 J	0.429 U	162	104	4.12 U	51.5	123	0.235 U
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	ng/kg	47.6	1390	678	475	7.96	4.8 U	45.9 U	17500	14400	11.6	11.6	1.01 U	4820	5100	1.38	2330	5090	2.47
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	19.2	513	314	186	3.5	3.41	25 U	13300	10500	3.48	2.86	0.696 U	3780	3840	0.968 U	790	1750	2.28
Octachlorodibenzofuran (OCDF) 13C12	ng/kg	454	30100 J	5760	4380	34.7	77.4	109 J	943 J	23200 J	117	123	201	1440	27400	4.91 J	2650 J	3420 J	0.439 U
Total dioxin/furan	pg/g	8330	65600	11200	20000	22900	2060	4450	64400	70600	1120	1160	42400	39400	58900	1470	72100	98800	32800
Total dioxin/furan (ND*0.5)	pg/g	8330	65600	11200	20000	22900	2070	4500	64400	70600	1120	1160	42400	39400	58900	1470	72100	98800	32800
Total dioxin/furan (ND*1)	pg/g	8330	65600	11200	20000	22900	2070	4540	64400	70600	1120	1160	42400	39400	58900	1470	72100	98800	32800
Total heptachlorodibenzofuran (HpCDF)	ng/kg	215	668	283	268	32.8	160	186	1490	741	26.4	26.7	209	840	620	2.59 J	427	602	0.786 J
Total heptachlorodibenzo-p-dioxin (HpCDD)	ng/kg	739	1260	430	697	248	279	575	3850	815	245	292	1250	1960	940	97.8	1510	1780	276
Total hexachlorodibenzofuran (HxCDF)	ng/kg	81	254	134	109	14.9	50.2	71.5	2330	1100	13.9	15	44.2	635	476	4.12 U	247	475	2.54 J
Total hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	135	282	123	136	26	45.4	105	963	202	37.4	32.7	50.9	353	264	35.7	174	244	25.9
Total pentachlorodibenzofuran (PeCDF)	ng/kg	34.5	154	108	76.3	8.27	5.91	36.4	2630	1370	2.85 J	4.59	3.6	683	448	2.12 J	232	490	2.82 J
Total pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	21	46.3	22.7	21.5	0.931 J	1.51 J	9.72	333	114	2.88 J	3 J	3.32	100	38.2	3.52 J	25.1	29.2	2.4 J
Total TEQ 1998 (Avian) (ND*0.5)	ng/kg	75.7	1960	1020	682	16.8	9.09	46.3	32000	25500	16.7	16.7	8.22	8850	9110	2.62	3210	7040	9.08
Total TEQ 1998 (Fish) (ND*0.5)	ng/kg	29.3	625	371	225	8.44	6.55	21.3	14900	11600	5.71	5.43	7.7	4190	4210	1.3	967	2140	6.76
Total TEQ Dioxin 1998 (Bird) (ND=0)	ng/kg	74.7	1960	1020	682	16	5.53	9.67	32000	25500	16.1	16.6	7.05	8850	9110	1.57	3210	7040	8.47
Total TEQ Dioxin 1998 (Bird) (ND=1)	ng/kg	76.7	1960	1020	682	17.5	12.7	83	32000	25500	17.3	16.8	9.39	8850	9110	3.67	3210	7040	9.69
Total TEQ Dioxin 1998 (Fish) (ND=0)	ng/kg	28.3	624	371	225	7.48	5.24	6.11	14900	11600	5.36	5.38	6.73	4190	4210	0.263	967	2140	5.9
Total TEQ Dioxin 1998 (Fish) (ND=1)	ng/kg	30.3	626	371	226	9.41	7.86	36.6	14900	11600	6.05	5.47	8.67	4190	4210	2.33	967	2140	7.61
Total TEQ Dioxin Texas TEF (ND=0)	ng/kg	29.5	681	401	245	5.4	4.93	6.41	15700	12300	5.43	5.31	1.97	4410	4450	0.138	1070	2370	3.05
Total TEQ Dioxin Texas TEF (ND=0.5)	ng/kg	30	682	401	245	6.07	5.87	22	15700	12300	5.77	5.41	2.62	4410	4450	1.02	1070	2370	3.41
Total TEQ Dioxin Texas TEF (ND=1)	ng/kg	30.5	683	401	245	6.75	6.8	37.6	15700	12300	6.12	5.51	3.27	4410	4450	1.89	1070	2370	3.77
Total tetrachlorodibenzofuran (TCDF)	ng/kg	118	1990	1200	864	19.3	4.27	16	48500	26800	19.4	17.8	0.608 U	9350	7010	3.81	3410	7700	6.47
Total tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	29.7	571	343	207	3.5	3.41	9.11	17900	8820	6.14	6.04	0.608 U	3460	2300	7.17	710	1720	2.28
Total WHO Dioxin TEQ(Human/Mammal)(ND=0)	ng/kg	35.2	706	405	255	12.9	7.32	9.54	15700	12200	6.61	6.33	22	4410	4460	0.864	1090	2390	14
Total WHO Dioxin TEQ(Human/Mammal)(ND=0.5)	ng/kg	36.2	707	405	255	13.8	8.43	25.6	15700	12200	6.85	6.42	22.7	4410	4460	1.88	1090	2390	14.5
Total WHO Dioxin TEQ(Human/Mammal)(ND=1)	ng/kg	37.2	707	405	255	14.8	9.54	41.6	15700	12200	7.08	6.52	23.3	4410	4460	2.89	1090	2390	15.1
Asbestos																			
Asbestos	%	--	--	--	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Polychlorinated biphenyls (PCBs)																			
Aroclor (unspecified)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1016 (PCB-1016)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1221 (PCB-1221)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1232 (PCB-1232)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1242 (PCB-1242)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1248 (PCB-1248)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1254 (PCB-1254)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1260 (PCB-1260)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1262 (PCB-1262)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1268 (PCB-1268)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs (7)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs (ND*0)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs (ND*0.5)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (TPH)																			
Total Petroleum Hydrocarbons	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C12-C28)	mg/kg	--	--	--	1300 J	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C25-C36) ORO	mg/kg	--	--	--	1500 J	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C28-C35)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C12)	mg/kg	--	--	--	52 J	--	--	--	--	--	--	--	--	--	--	--	--	--	--
General Chemistry																			
Cyanide (total)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Flash point (closed cup)	Deg C	--	--	--	110 >	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Moisture	%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Percent solids	%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH, lab	s.u.	--	--	--	9.62 J	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Reactive cyanide	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfate	mg/kg	--	--	--	746 J Dup 659	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfide	mg/kg	--	--	--	98	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfur	mg/kg	--	--	--	2600	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total solids	%	58.8	52.6	56.3	65.2	82	76.9	66	56.3	54.6	79.2	79.4	77.2	59.2	55.7	57.9	62.3	62.7	76

Notes:
- ng/kg - nanograms per kilogram
- ug/kg - microgram per kilogram
- mg/kg - milligram per kilogram
- Deg C - Degrees in Celsius
- s.u. - standard unit
- U - Not detected at the associated reporting limit.
- J - Estimated concentration.
- UJ - Not detected; associated reporting limit is estimated.
- Dup - indicates the result from a duplicate sample

Table 3

First Phase Pre-Design Investigation Analytical Results - Southern Impoundment
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Area:	Units	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits
Sample Location:		SJSB012-W2	SJSB012-W2	SJSB012-W2	SJSB012-W2	SJSB019-E1	SJSB019-E1	SJSB019-E1	SJSB019-E1	SJSB019-E1	SJSB019-E1-Composite	SJSB019-E2	SJSB019-E2	SJSB019-E2	SJSB019-E2	SJSB019-E2	SJSB019-N1	SJSB019-N1	SJSB019-N1
Sample Identification:		SL0132	SL0133	SL0134	SL0135	SL0053	SL0054	SL0055	SL0056	SL0057	SL0058	SL0012	SL0013	SL0014	SL0015	SL0016	SL0017	SL0018	SL0019
Sample Date:		11/12/2018	11/12/2018	11/12/2018	11/12/2018	11/5/2018	11/5/2018	11/5/2018	11/5/2018	11/5/2018	11/5/2018	11/3/2018	11/3/2018	11/3/2018	11/3/2018	11/3/2018	11/3/2018	11/3/2018	11/3/2018
Sample Type:																			
Sample Depth:		(2-4) ft bgs	(4-6) ft bgs	(6-8) ft bgs	(8-10) ft bgs	(0-2) ft bgs	(2-4) ft bgs	(4-6) ft bgs	(6-8) ft bgs	(8-10) ft bgs	(9-9) ft bgs	(0-2) ft bgs	(2-4) ft bgs	(4-6) ft bgs	(6-8) ft bgs	(8-10) ft bgs	(0-2) ft bgs	(2-4) ft bgs	(4-6) ft bgs
Integral Sample ID:		SJSB012-W2-C2	SJSB012-W2-C3	SJSB012-W2-C4	SJSB012-W2-C5	SJSB019-E1-C1	SJSB019-E1-C2	SJSB019-E1-C3	SJSB019-E1-C4	SJSB019-E1-C5	SJSB019-E1-C6	SJSB019-E2-C1	SJSB019-E2-C2	SJSB019-E2-C3	SJSB019-E2-C4	SJSB019-E2-C5	SJSB019-N1-C1	SJSB019-N1-C2	SJSB019-N1-C3
Dioxins/Furans																			
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	ng/kg	17.7	5960	14.9	3.02 J	61.8	414	44.4	2020 J	45200	1700	79.2	298	933	4.13 U	6.18 U	118	338	142
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	ng/kg	4470	11900	270	427	2720	185000	19200 J	279000 J	40600	7000	2240	53600 J	185000	801	571	4840 J	25500 J	3300
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	ng/kg	4.57	497	1.82 J	5.75	27.7	434	89.9	2440	503	465	25.3	145	451	1.25 U	3.09 U	34.6	216	77.6
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	ng/kg	34.9	735	8.89	8.38	114	2730	854	2680	542	1260	123	792	1980	23	19.7	255	1250	145
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	ng/kg	0.382 J	121	0.483 J	3.57 U	2.91 U	25.8 U	2.58 U	820	98.4	127	2.14 J	9.63	52.7	2.78 U	3.09 U	1.83 U	13.4	24.4
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.554 J	1190	1.07 J	0.398 U	2.29 J	99.9	11.6	13600	879	1070	4.89	8.39	260	1.24 U	0.424 U	3.1	17.1	241
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	0.418 U	5.42	0.259 U	0.325 U	1.57 J	14.4	5.84 U	7.03	3.75 U	6.15	1.41 U	3.88 U	10.1 U	2.78 U	3.09 U	2.28 J	7.93	0.941 U
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.266 U	308 J	0.613 J	0.45 J	1.51 U	43.3 J	17.1 J	2040	223 J	278 J	2.44 J	7.77	111 J	0.607 J	3.09 U	2.04 U	11.5	57.6
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	1.29 J	27.7	0.533 U	0.493 U	4.64	107	31	73.7	26.6 U	38.5	4.46	28.7	80.6	0.782 U	3.09 U	8.73	47.1	4.77 U
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.228 J	80.8	0.488 U	0.441 U	2.91 U	11.5	3.68 U	628	66.1	80.1	0.536 U	3.18 U	24	2.78 U	3.09 U	0.78 U	2.03 U	16.6
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	0.674 J	13.4	0.581 U	0.582 U	2.61 U	39	13.5	19.7	10.8 U	14.6	2.69 J	12.1	32.7	1.53 U	3.09 U	5.04	19.6	2.36 U
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	0.369 J	690	0.981 J	0.423 U	0.808 U	31.5	3.1 J	10300	476	616	2.61 J	3.18 U	154	0.773 U	3.09 U	1.04 J	3.07 U	139
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	0.305 U	86.8	0.68 J	0.665 J	1.04 U	12.1 U	0.994 U	493	59.4	63.6	0.486 U	2.63 J	25.3	2.78 U	3.09 U	1.47 J	5.18	15.7
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.477 J	62	0.445 J	0.292 U	2.58 U	58	21	360	45.3	64.2	2.19 J	9.28	39.5	2.78 U	3.09 U	2.96	20.7	12.1
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	0.689 J	629	0.97 J	0.523 J	2 J	51	16.2	7730 U	436	544	3.91	7.27	135	0.376 U	3.09 U	0.733 U	17.8	115
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	ng/kg	1.89	24200	24.3	6.03	11.4 U	1010	38.4	277000	26900	15600	45.3	18.7	7420	26.4	13.5	10.8	14.2	8080
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	0.798 U	15100	11.9	4.34	4.27 U	361	14	175000	14700	4670	15.8	8.05	4060	13.1	6.2	5.15	3.35 U	4820
Octachlorodibenzofuran (OCDF) 13C12	ng/kg	17.7	5960	14.9	3.02 J	61.8	414	44.4	2020 J	45200	1700	79.2	298	933	4.13 U	1.11 U	118	338	142
Total dioxin/furan	pg/g	4530	61600	337	456	2930	190000	20400	766000	131000	33600	2550	54900	201000	864	610	5290	27500	17200
Total dioxin/furan (ND*0.5)	pg/g	4530	61600	338	458	2950	190000	20400	770000	131000	33600	2560	55000	201000	870	613	5290	27500	17200
Total dioxin/furan (ND*1)	pg/g	4540	61600	339	459	2960	190000	20400	774000	131000	33600	2560	55000	201000	876	616	5290	27500	17200
Total heptachlorodibenzofuran (HpCDF)	ng/kg	13.6	983	3.91	8.88	80.4	1150	170	4520	977	974	73.7	495	1520	2.78 U	3.09 U	106	663	157
Total heptachlorodibenzo-p-dioxin (HpCDD)	ng/kg	93.4	1620	28.8	30.2	304	7320	2470	5210	1370	2940	356	1990	4820	62.6	64	800	2990	357
Total hexachlorodibenzofuran (HxCDF)	ng/kg	6.05	1900	2.53 J	1.34 J	42.4	948	242	12300	1520	1820	41.8	215	1060	1.17 J	3.09 U	30	335	368
Total hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	12	438	9.84	9.8	46.9	1060	366	501	263	363	52.1	263	714	39.3	24.4	106	424	84.3
Total pentachlorodibenzofuran (PeCDF)	ng/kg	3.03 J	1910	1.95 J	0.523 J	22.7	450	139	14200	1610	1680	24.5	64.2	440	2.78 U	3.09 U	25.9	168	390
Total pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	1.88 J	165	1.73 J	1.43 J	2.91 U	55	42.5	645	118	106	1.18 J	7.22	40.7	2.78 U	2.97 J	9.16	46.9	28.3
Total TEQ 1998 (Avian) (ND*0.5)	ng/kg	3.93	40300	38.3	11.8	11.8	1480	79.9	459000	42300	21100	67.5	48.6	11700	40.2	20.2	20.4	53	13100
Total TEQ 1998 (Fish) (ND*0.5)	ng/kg	1.81	16900	14.7	5.88	5.94	500	35.3	194000	16500	5980	22.4	27	4600	15.1	7.43	10.5	32.3	5340
Total TEQ Dioxin 1998 (Bird) (ND=0)	ng/kg	3.36	40300	38.2	11.7	3.02	1480	79.2	455000	42300	21100	67.2	48.4	11700	39.7	19.8	19.9	51.1	13100
Total TEQ Dioxin 1998 (Bird) (ND=1)	ng/kg	4.51	40300	38.3	11.9	20.5	1490	80.6	463000	42300	21100	67.8	48.8	11700	40.8	20.7	21	54.9	13100
Total TEQ Dioxin 1998 (Fish) (ND=0)	ng/kg	1.14	16900	14.6	5.72	2.73	494	33.3	192000	16500	5980	21.8	25.9	4600	14.6	6.95	10.2	30.5	5340
Total TEQ Dioxin 1998 (Fish) (ND=1)	ng/kg	2.47	16900	14.8	6.03	9.15	506	37.3	195000	16500	5980	23	28	4610	15.6	7.91	10.9	34.2	5340
Total TEQ Dioxin Texas TEF (ND=0)	ng/kg	0.874	18100	15.4	5.58	1.85	526	35.5	205000	17800	6720	24.1	21.5	4940	15.8	7.55	9.23	25.3	5730
Total TEQ Dioxin Texas TEF (ND=0.5)	ng/kg	1.38	18100	15.5	5.72	5.2	529	36.1	207000	17800	6720	24.3	21.8	4950	16.2	7.87	9.55	27.2	5730
Total TEQ Dioxin Texas TEF (ND=1)	ng/kg	1.89	18100	15.6	5.86	8.54	532	36.7	209000	17800	6720	24.5	22	4950	16.7	8.18	9.88	29	5730
Total tetrachlorodibenzofuran (TCDF)	ng/kg	4.07	40000	40.8	8.95	4.71	1420	120	253000	32800	34200	78.8	49.9	8370	41.1	23.1	14.1	93.2	8550
Total tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	0.645 U	13200	15.8	4.34	0.6 U	415	35.9	79800	8170	6860	18.6	8.05	2380	27.7	14	5.15	15.8	2500
Total WHO Dioxin TEQ(Human/Mammal)(ND=0)	ng/kg	2.47	18000	15.7	6.08	3.7	603	47.4	205000	17800	6650	25.4	47	5010	16.3	7.92	14.3	46.9	5720
Total WHO Dioxin TEQ(Human/Mammal)(ND=0.5)	ng/kg	3.06	18000	15.8	6.21	7.31	609	48.3	206000	17800	6650	25.8	47.3	5010	16.7	8.31	14.6	48.7	5720
Total WHO Dioxin TEQ(Human/Mammal)(ND=1)	ng/kg	3.65	18000	15.9	6.35	10.9	615	49.1	208000	17800	6650	26.1	47.5	5010	17.2	8.7	14.8	50.5	5720
Asbestos																			
Asbestos	%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Polychlorinated biphenyls (PCBs)																			
Aroclor (unspecified)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1016 (PCB-1016)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1221 (PCB-1221)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1232 (PCB-1232)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1242 (PCB-1242)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1248 (PCB-1248)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1254 (PCB-1254)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1260 (PCB-1260)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1262 (PCB-1262)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1268 (PCB-1268)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs (7)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs (ND*0)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs (ND*0.5)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (TPH)																			
Total Petroleum Hydrocarbons	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C12-C28)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C25-C36) ORO	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C28-C35)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C12)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
General Chemistry																			
Cyanide (total)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Flash point (closed cup)	Deg C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Moisture	%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Percent solids	%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH, lab	s.u.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Reactive cyanide	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfate	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfide	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfur	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total solids	%	76.7	55.7	77.6	69.5	82.2	65.5	63.1	49.4	57.7	63.6	87.5	73.1	77.7	83.4	79.3	84.6	71.4	70.8

Notes:

ng/kg - nanograms per kilogram
ug/kg - microgram per kilogram
mg/kg - milligram per kilogram
Deg C - Degrees in Celsius
s.u. - standard unit
U - Not detected at the associated reporting limit.
J - Estimated concentration.
UJ - Not detected; associated reporting limit is estimated.
Dup - indicates the result from a duplicate sample

Table 3

First Phase Pre-Design Investigation Analytical Results - Southern Impoundment
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Area:	Units	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits
Sample Location:		SJSB019-N1	SJSB019-N1	SJSB019-N1-Composite	SJSB019-N1-Composite	SJSB019-N2	SJSB019-N2	SJSB019-N2	SJSB019-N2	SJSB019-N2	SJSB019-S1	SJSB019-S1	SJSB019-S1	SJSB019-S1	SJSB019-S1	SJSB019-S1-Composite	SJSB019-S2	SJSB019-S2	SJSB019-S2
Sample Identification:		SL0020	SL0021	SL0022	SL0022	SL0023	SL0024	SL0025	SL0026	SL0027	SL0006	SL0007	SL0008	SL0009	SL0010	SL0011	SL0001	SL0002	SL0003
Sample Date:		11/3/2018	11/3/2018	11/3/2018	11/13/2018	11/3/2018	11/3/2018	11/3/2018	11/3/2018	11/3/2018	11/3/2018	11/3/2018	11/3/2018	11/3/2018	11/3/2018	11/3/2018	11/3/2018	11/3/2018	11/3/2018
Sample Type:																			
Sample Depth:		(6-8) ft bgs	(8-10) ft bgs	(0-10) ft bgs	(0-10) ft bgs	(0-2) ft bgs	(2-4) ft bgs	(4-6) ft bgs	(6-8) ft bgs	(8-10) ft bgs	(0-2) ft bgs	(2-4) ft bgs	(4-6) ft bgs	(6-8) ft bgs	(8-10) ft bgs	(0-10) ft bgs	(0-2) ft bgs	(2-4) ft bgs	(4-6) ft bgs
Integral Sample ID:		SJSB019-N1-C4	SJSB019-N1-C5	SJSB019-N1-C6	SJSB019-N1-C6	SJSB019-N2-C1	SJSB019-N2-C2	SJSB019-N2-C3	SJSB019-N2-C4	SJSB019-N2-C5	SJSB019-S1-C1	SJSB019-S1-C2	SJSB019-S1-C3	SJSB019-S1-C4	SJSB019-S1-C5	SJSB019-S1-C6	SJSB019-S2-C1	SJSB019-S2-C2	SJSB019-S2-C3
Dioxins/Furans																			
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	ng/kg	8190	22.5	699	--	38.9	446	3540	32000	92.1	45.9	317	1460	16100	9930	2640	680 J	2.73 U	1.29 U
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD	ng/kg	22200	410	7700	--	2580	29900 J	31700 J	26900	595	1990	8620	29100	12600	8220	4980	111000 J	713	367
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	ng/kg	906	2.65 J	166	--	17.2	342	2370	433	5.71	18.5	246	2510	207	142	410	257 J	1.23 J	0.985 J
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD	ng/kg	1010	13.5	391	--	108	1500	1730	562	17.6	124	672	872	330	254	274	5950	31	11
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	ng/kg	293	0.309 J	42.9	--	2.9 U	20.4 U	902	80.9	1.02 J	1.19 U	16	1060	16.9	12.8	136	38.1 J	0.367 U	0.258 U
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	2960	3.36	409	--	2.67 J	43.3	24500	664 J	7.6	1.86 J	49	16100	35.2	19.2	1150	95.5	1.54 U	0.766 J
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	4.54	0.218 U	1.99 J	--	0.97 U	11	7.49	4.99	0.348 U	1.11 J	5.68 J	5.61 U	3.73	2.54 U	2.13 J	10.3	0.731 U	0.483 U
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	721	0.822 U	105 J	--	1.14 U	26.9 J	2330	164	1.63 U	1.11 J	24.8	2600	11	6.32	284	40	0.816 J	0.246 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	31.7	0.501 U	11.6	--	3.97	70	53.5	28.8	0.846 J	5.49	42.2	35.8	18	13.6	10.5	107	1.51 J	0.66 U
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	ng/kg	224	0.328 U	29	--	0.436 U	7.77	763	50.5	1.01 J	0.31 U	6.6 U	860	4.91	3.22 J	71.4	17.5 U	0.446 J	0.152 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	10.8	0.634 U	5.55	--	2.57 J	28	17.6	14	1.33 J	3.06	25.3	10.2	8.03	5.94	3.94 U	79.4	2.41 J	0.753 J
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	1710	2.05 J	222	--	0.915 U	11.8 J	11700	393	5.27	0.919 J	24.8	6660	19.9	10.5	516	28.9	1.55 J	0.317 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	158	0.606 J	24.6	--	0.555 U	6.79 U	343	36.7	0.866 J	0.466 J	7.93	602	5.37 U	4.05	59	13.6	0.67 J	0.464 U
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	125	0.234 U	21	--	1.53 J	35.4	438	37.5	0.536 J	1.64 J	17.4	476	9.45	6.51	44.2	38.6	0.361 U	2.96 U
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	1660	1.68 J	196	--	1.12 J	41.8	8790	327	3.46	1.84 J	27.2	4960 U	28.3	17.2	405	61.8	1.17 J	0.374 J
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	ng/kg	63000	65.1	11100	--	12.5	280	279000	17200	108	31.5	757	260000	1590	828	11100	400	33.8	14.2
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	36200	30.1	3380	--	5.45	126	165000	9990	48.4	8.43	350	157000	484	285	3450	186	17.9 U	7.25
Octachlorodibenzofuran (OCDF) 13C12	ng/kg	8190	22.5	699	--	38.9	446	3540	32000	92.1	45.9	317	1460	16100	9930	2640	680 J	2.73 U	1.29 U
Total dioxin/furan	pg/g	139000	552	24500	--	2770	32900	533000	88900	889	2240	11200	479000	31500	19800	25500	119000	788	402
Total dioxin/furan (ND*0.5)	pg/g	139000	553	24500	--	2780	32900	533000	88900	890	2240	11200	482000	31500	19800	25500	119000	799	404
Total dioxin/furan (ND*1)	pg/g	139000	555	24500	--	2780	32900	533000	88900	891	2240	11200	484000	31500	19800	25500	119000	811	406
Total heptachlorodibenzofuran (HpCDF)	ng/kg	1720	2.96	365	--	48.8	969	4310	888	9.62	51	610	4440	467	354	795	870	1.23 J	0.985 J
Total heptachlorodibenzo-p-dioxin (HpCDD)	ng/kg	2040	60.9	958	--	316	3420	3510	1320	62.7	275	1340	1750	843	684	727	9560	88.1	44.4
Total hexachlorodibenzofuran (HxCDF)	ng/kg	4440	3.74	662	--	27.4	631	14300	1170	10.9	26.1	324	16000	191	140	1730	570	1.26 J	0.766 J
Total hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	273	36.1	124	--	41.7	553	426	276	42	43.8	312	226	186	145	117	1670	30.2	23.3
Total pentachlorodibenzofuran (PeCDF)	ng/kg	5310	5	586	--	10.9	396	13700	1200	12.4	10.7	143	16100	157	103	1430	400	2.73 J	0.374 J
Total pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	219	5.19	35.6	--	3	48	439	66.2	4.39	3.9	38.9	671	21.3	25.1	78.1	141	3.61	3.73
Total TEQ 1998 (Avian) (ND*0.5)	ng/kg	102000	98.2	14800	--	20.8	476	457000	27700	163	43.7	1160	423000	2120	1140	15200	712	45.4	22.3
Total TEQ 1998 (Fish) (ND*0.5)	ng/kg	40800	35.5	4130	--	8.29	191	187000	11200	57.9	13.1	428	174000	595	348	4450	297	12.5	8.68
Total TEQ Dioxin 1998 (Bird) (ND=0)	ng/kg	102000	98.1	14800	--	20.3	472	457000	27700	162	43.7	1160	420000	2120	1140	15200	711	36.3	22
Total TEQ Dioxin 1998 (Bird) (ND=1)	ng/kg	102000	98.3	14800	--	21.2	479	457000	27700	163	43.8	1160	425000	2120	1140	15200	713	54.4	22.6
Total TEQ Dioxin 1998 (Fish) (ND=0)	ng/kg	40800	35.3	4130	--	7.66	187	187000	11200	57.7	13.1	427	173000	592	347	4450	296	3.3	8.29
Total TEQ Dioxin 1998 (Fish) (ND=1)	ng/kg	40800	35.6	4130	--	8.91	194	187000	11200	58.1	13.1	428	175000	598	348	4450	298	21.8	9.07
Total TEQ Dioxin Texas TEF (ND=0)	ng/kg	43900	38.2	4670	--	8.33	198	201000	12000	62.8	14.2	461	186000	667	384	4970	302	4.9	9.01
Total TEQ Dioxin Texas TEF (ND=0.5)	ng/kg	43900	38.3	4670	--	8.62	199	201000	12000	62.9	14.2	461	187000	669	385	4970	303	14	9.21
Total TEQ Dioxin Texas TEF (ND=1)	ng/kg	43900	38.5	4670	--	8.91	201	201000	12000	63	14.2	462	188000	670	385	4970	304	23.1	9.42
Total tetrachlorodibenzofuran (TCDF)	ng/kg	96000	100	12700	--	20.3	657	182000	18100	170	63.3	1400	314000	2020	1190	30800	861	53.7	14.2
Total tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	27800	46.6	2680	--	5.78	182	56200	5360	53.3	8.43	390	100000	538	313	6650	249	4.82	16.2
Total WHO Dioxin TEQ(Human/Mammal)(ND=0)	ng/kg	43600	38.4	4650	--	10.1	217	199000	12000	62.8	16.1	471	186000	675	392	4920	392	5.5	9.16
Total WHO Dioxin TEQ(Human/Mammal)(ND=0.5)	ng/kg	43600	38.5	4650	--	10.6	220	199000	12000	62.9	16.1	471	187000	678	392	4920	393	14.6	9.48
Total WHO Dioxin TEQ(Human/Mammal)(ND=1)	ng/kg	43600	38.7	4650	--	11	224	199000	12000	63	16.1	472	187000	681	393	4920	394	23.7	9.8
Asbestos																			
Asbestos	%	--	--	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Polychlorinated biphenyls (PCBs)																			
Aroclor (unspecified)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1016 (PCB-1016)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1221 (PCB-1221)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1232 (PCB-1232)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1242 (PCB-1242)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1248 (PCB-1248)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1254 (PCB-1254)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1260 (PCB-1260)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1262 (PCB-1262)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1268 (PCB-1268)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs (7)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs (ND*0)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs (ND*0.5)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (TPH)																			
Total Petroleum Hydrocarbons	mg/kg	--	--	22 J	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C12-C28)	mg/kg	--	--	22 J	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C25-C36) ORO	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C28-C35)	mg/kg	--	--	8.5 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C12)	mg/kg	--	--	6.5 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
General Chemistry																			
Cyanide (total)	mg/kg	--	--	17 UJ	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Flash point (closed cup)	Deg C	--	--	--	110 >	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Moisture	%	--	--	24 J	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Percent solids	%	--	--	--	76.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH, lab	s.u.	--	--	8.52 J	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Reactive cyanide	mg/kg	--	--	--	100 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfate	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfide	mg/kg	--	--	32 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfur	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total solids	%	64.1	82.7	73.9 Dup 76.7 J	--	80.3	73.8	53.4	54.9	76.3	89.1	36.5	46.5	68.7	71.9	66.5	88.1	78.3	78.8

Notes:
- ng/kg - nanograms per kilogram
- ug/kg - microgram per kilogram
- mg/kg - milligram per kilogram
- Deg C - Degrees in Celsius
- s.u. - standard unit
- U - Not detected at the associated reporting limit.
- J - Estimated concentration.
- UJ - Not detected; associated reporting limit is estimated.
- Dup - indicates the result from a duplicate sample

Table 3

First Phase Pre-Design Investigation Analytical Results - Southern Impoundment
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Area:	Units	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits
Sample Location:		SJSB019-S2	SJSB019-S2	SJSB019-W1	SJSB019-W1	SJSB019-W1	SJSB019-W1	SJSB019-W1	SJSB019-W1-Composite	SJSB019-W1-Composite	SJSB019-W2	SJSB019-W2	SJSB019-W2	SJSB019-W2	SJSB019-W2	SJSB023-E1	SJSB023-E1	SJSB023-E1	SJSB023-E1
Sample Identification:		SL0004	SL0005	SL0028	SL0029	SL0030	SL0031	SL0032	SL0033	SL0034	SL0035	SL0036	SL0037	SL0038	SL0039	SL0066	SL0067	SL0068	SL0069
Sample Date:		11/3/2018	11/3/2018	11/4/2018	11/4/2018	11/4/2018	11/4/2018	11/4/2018	11/4/2018	11/4/2018	11/4/2018	11/4/2018	11/4/2018	11/4/2018	11/4/2018	11/6/2018	11/6/2018	11/6/2018	11/6/2018
Sample Type:										Duplicate									
Sample Depth:		(6-8) ft bgs	(8-10) ft bgs	(0-2) ft bgs	(2-4) ft bgs	(4-6) ft bgs	(6-8) ft bgs	(8-10) ft bgs	(0-10) ft bgs	(0-10) ft bgs	(0-2) ft bgs	(2-4) ft bgs	(4-6) ft bgs	(6-8) ft bgs	(8-10) ft bgs	(0-2) ft bgs	(2-4) ft bgs	(4-6) ft bgs	(6-8) ft bgs
Integral Sample ID:		SJSB019-S2-C4	SJSB019-S2-C5	SJSB019-W1-C1	SJSB019-W1-C2	SJSB019-W1-C3	SJSB019-W1-C4	SJSB019-W1-C5	SJSB019-W1-C6	SJSB019-W1-C6 (Field split	SJSB019-W2-C1	SJSB019-W2-C2	SJSB019-W2-C3	SJSB019-W2-C4	SJSB019-W2-C5	SJSB023-E1-C1	SJSB023-E1-C2	SJSB023-E1-C3	SJSB023-E1-C4
Dioxins/Furans																			
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	ng/kg	41.4	6.9	141	937	13500	1550	3.3 J	1850	1470	355 J	11.9 U	0.93 U	5.68 UJ	5.98 U	72.8	165	2690	3760
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	ng/kg	930	542	28200 J	109000	51000	2320	513	23600	19600	15600 J	1390	314	459 J	683	2230	3930	62.8	3950
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	ng/kg	12	3.85 U	151	713	2040	53.4	0.551 U	451	406	249 J	9.49	0.456 U	0.265 UJ	2.99 U	82.3	292	826	114
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	ng/kg	46.4	20.4	2130	6490	1200	109	19.6	1420	922	893 J	55.7	10.7	16.7 J	22.7	121	188	511	171
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	ng/kg	4.32	0.214 U	6.83	224	745	9.51	3.18 U	150	165	17.4 J	3.3 U	3.11 U	2.84 UJ	2.99 U	28.4 U	125	294	15.1
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	37.7	2.26 U	15.8	2020	8460	72.4	1.29 U	1140	1330	25.1 J	1.53 J	0.122 U	2.84 UJ	2.99 U	274	1270	2760	80.1
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	0.687 J	0.346 U	10.4	11.8	7.53	1.49 J	3.18 U	4.35	2.21 U	25.2 J	0.534 U	3.11 U	0.295 UJ	2.99 U	0.754 U	1.01 U	4.29	1.94 U
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	8.93	0.444 U	12.5 J	524	1860	19.4	0.433 U	271	314	42.5 J	0.797 U	0.169 U	2.84 UJ	2.99 U	63.5	302	651	21.2
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	1.29 U	0.955 J	68.5	162	45.2	4.45	3.18 U	39.4	22.5	50 J	2.9 J	0.385 J	0.864 J	0.692 U	4.27	5.69 U	21.7	9.75
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	ng/kg	3.49	0.204 U	2.32 U	148	558	6.07	3.18 U	72.8	80.7	3.72 UJ	0.191 U	3.11 U	2.84 UJ	2.99 U	21	91.9	204	7.61
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	1.66 J	1.23 J	25.3	61.7	16	3.18	1.43 U	14.9	9.06	19.4 UJ	1.7 U	0.492 U	0.943 J	1.7 J	3.06 U	3.36	7.37	5.58
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	15.7	1.02 J	4.31	1110 J	5870	44	0.914 J	498 J	495	7.6 J	0.678 U	0.23 J	2.84 UJ	0.419 U	159	650	1400	47.2
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	1.51 U	0.391 J	4.69 U	129	430	6.81	0.257 U	58.8	46.5	6.55 J	0.574 U	0.344 U	2.84 UJ	0.519 U	14.5	64	203	8.72
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	1.72 U	0.139 U	17.9	111	310	5.18	3.18 U	46.4	50.1	26.2 J	0.71 U	3.11 U	2.84 UJ	2.99 U	13.4	46 U	122	7.1
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	10.8	0.693 J	18.7	978	3160	39.8	0.609 U	416	346	10.9 UJ	1.25 U	0.137 J	2.84 UJ	0.351 U	121	508	1090	45.2
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	ng/kg	328	29.8	16.8	28000	149000	1550 U	31.2	21000	17500	45.3 J	20.5	3.12	3.79 J	4.07	71.3	134	459	297
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	154	15.4	3.33 U	17100	97800	1050	13.7	6510	5800	18.4 J	10.3	1.98 U	1.38 UJ	0.962 U	26.3	55.3	235	131
Octachlorodibenzofuran (OCDF) 13C12	ng/kg	41.4	6.9	141	937	13500	1550	3.3 J	1850	1470	355 J	11.9 U	0.93 U	0.578 UJ	0.788 U	72.8	165	2690	3760
Total dioxin/furan	pg/g	1600	619	30800	168000	336000	5290	582	57500	48600	17400	1490	329	481	711	3270	7780	11500	8670
Total dioxin/furan (ND*0.5)	pg/g	1600	623	30800	168000	336000	6070	585	57500	48600	17400	1500	331	483	714	3290	7800	11500	8670
Total dioxin/furan (ND*1)	pg/g	1600	626	30800	168000	336000	6840	588	57500	48600	17400	1510	334	485	717	3310	7830	11500	8670
Total heptachlorodibenzofuran (HpCDF)	ng/kg	23.6	1.41 J	360	1730	3760	117	3.18 U	863	778	679	21.9	0.456 J	0.452 J	2.99 U	133	528	1450	226
Total heptachlorodibenzo-p-dioxin (HpCDD)	ng/kg	138	72.7	4820	13800	2760	288	61.8	2760	1790	2090	152	38.3	51.4	77.4	300	420	1040	463
Total hexachlorodibenzofuran (HxCDF)	ng/kg	53.9	1.33 J	300	3360	11300	135	3.18 U	1740	1940	512	13.9	3.11 U	2.84 U	2.99 U	431	1830	4090	185
Total hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	40.8	26.1	806	1820	348	72.1	14.4	416	233	362	41.6	10	16.3	24.1	64.7	84.6	182	113
Total pentachlorodibenzofuran (PeCDF)	ng/kg	41.8	1.71 J	174	3450	11200	143	0.914 J	1260	1280	505	3.3 U	0.367 J	2.84 U	2.99 U	454	1790	3730	187
Total pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	4.95	4.61	108	355	515	17.3	3.18 U	107	72.7	28.2	0.662 J	3.11 U	1.3 J	2.56 J	23.1	89.3	254	28.6
Total TEQ 1998 (Avian) (ND*0.5)	ng/kg	501	46.8	55	46600	252000	1890	45.7	28200	23900	93.9	32.4	4.55	4.89	5.31	288	1000	2510	501
Total TEQ 1998 (Fish) (ND*0.5)	ng/kg	183	18	31.8	19500	109000	1130	15.9	8020	7110	58.2	12.6	1.52	1.22	1.28	152	586	1460	194
Total TEQ Dioxin 1998 (Bird) (ND=0)	ng/kg	500	46.6	50.8	46600	252000	1110	45.1	28200	23900	87.3	31.3	3.33	3.96	4.33	287	998	2510	501
Total TEQ Dioxin 1998 (Bird) (ND=1)	ng/kg	502	47	59.1	46600	252000	2660	46.3	28200	23900	101	33.5	5.77	5.82	6.29	288	1000	2510	501
Total TEQ Dioxin 1998 (Fish) (ND=0)	ng/kg	182	17.8	27.7	19500	109000	1090	15.4	8020	7110	55.2	11.8	0.282	0.27	0.312	151	584	1460	194
Total TEQ Dioxin 1998 (Fish) (ND=1)	ng/kg	184	18.3	36	19500	109000	1170	16.4	8020	7110	61.2	13.5	2.76	2.18	2.24	152	589	1460	194
Total TEQ Dioxin Texas TEF (ND=0)	ng/kg	198	19.2	26.3	20800	116000	1090	16.9	9030	7950	43.5	12.8	0.43	0.56	0.577	147	554	1370	203
Total TEQ Dioxin Texas TEF (ND=0.5)	ng/kg	199	19.4	29.2	20800	116000	1160	17.3	9030	7950	47.4	13.5	1.57	1.4	1.37	147	557	1370	203
Total TEQ Dioxin Texas TEF (ND=1)	ng/kg	199	19.5	32.2	20800	116000	1240	17.7	9030	7950	51.2	14.1	2.71	2.23	2.16	147	559	1370	203
Total tetrachlorodibenzofuran (TCDF)	ng/kg	585	47.8	111	64600	222000	3170	45.2	29800	22700	150	29.4	3.52	3.79	16	7420	37700	89000	3500
Total tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	170	22.1	28.3	18900	70800	918	1.17 U	6200	4910	20.4	16	0.861 U	2.44	5.61	2230	11000	29600	1110
Total WHO Dioxin TEQ(Human/Mammal)(ND=0)	ng/kg	197	19.6	53.8	20800	115000	1080	17.2	9000	7920	63	13.9	0.6	0.864	1.01	129	479	1250	203
Total WHO Dioxin TEQ(Human/Mammal)(ND=0.5)	ng/kg	198	19.8	58	20800	115000	1160	17.6	9000	7920	65.8	14.5	1.83	1.74	1.89	130	481	1250	203
Total WHO Dioxin TEQ(Human/Mammal)(ND=1)	ng/kg	198	20	62.1	20800	115000	1240	18.1	9000	7920	68.6	15.2	3.05	2.62	2.78	130	484	1250	203
Asbestos																			
Asbestos	%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Polychlorinated biphenyls (PCBs)																			
Aroclor (unspecified)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1016 (PCB-1016)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1221 (PCB-1221)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1232 (PCB-1232)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1242 (PCB-1242)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1248 (PCB-1248)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1254 (PCB-1254)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1260 (PCB-1260)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1262 (PCB-1262)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1268 (PCB-1268)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs (7)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs (ND*0)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs (ND*0.5)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (TPH)																			
Total Petroleum Hydrocarbons	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C12-C28)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C25-C36) ORO	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C28-C35)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C12)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
General Chemistry																			
Cyanide (total)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Flash point (closed cup)	Deg C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Moisture	%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Percent solids	%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH, lab	s.u.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Reactive cyanide	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfate	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfide	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfur	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total solids	%	78.4	76.6	73.8	55.6	51	73.9	78.2	67.1	68.3	79.9	71.7	79.3	83.2	79.7	86.8	75.4	65.7	69.7

Notes:
- ng/kg - nanograms per kilogram
- ug/kg - microgram per kilogram
- mg/kg - milligram per kilogram
- Deg C - Degrees in Celsius
- s.u. - standard unit
- U - Not detected at the associated reporting limit.
- J - Estimated concentration.
- UJ - Not detected; associated reporting limit is estimated.
- Dup - indicates the result from a duplicate sample

Table 3

First Phase Pre-Design Investigation Analytical Results - Southern Impoundment
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Area:	Units	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits
Sample Location:		SJSB023-E1	SJSB023-E1-Composite	SJSB023-E1-Composite	SJSB023-E2	SJSB023-E2	SJSB023-E2	SJSB023-E2	SJSB023-E2	SJSB023-N1	SJSB023-N1	SJSB023-N1	SJSB023-N1	SJSB023-N1	SJSB023-N1-Composite	SJSB023-N1-Composite	SJSB023-N2	SJSB023-N2	SJSB023-N2
Sample Identification:		SL0070	SL0071	SL0072	SL0233	SL0234	SL0235	SL0236	SL0237	SL0059	SL0060	SL0061	SL0062	SL0063	SL0064	SL0065	SL0206	SL0207	SL0208
Sample Date:		11/6/2018	11/6/2018	11/6/2018	11/16/2018	11/16/2018	11/16/2018	11/16/2018	11/16/2018	11/5/2018	11/5/2018	11/5/2018	11/5/2018	11/5/2018	11/5/2018	11/5/2018	11/15/2018	11/15/2018	11/15/2018
Sample Type:				Duplicate												Duplicate			
Sample Depth:		(8-10) ft bgs	(0-10) ft bgs	(0-10) ft bgs	(0-2) ft bgs	(2-4) ft bgs	(4-6) ft bgs	(6-8) ft bgs	(8-10) ft bgs	(0-2) ft bgs	(2-4) ft bgs	(4-6) ft bgs	(6-8) ft bgs	(8-10) ft bgs	(0-10) ft bgs	(0-10) ft bgs	(0-2) ft bgs	(2-4) ft bgs	(4-6) ft bgs
Integral Sample ID:		SJSB023-E1-C5	SJSB023-E1-C6	SJSB023-E1-C6 (Field split	SJSB023-E2-C1	SJSB023-E2-C2	SJSB023-E2-C3	SJSB023-E2-C4	SJSB023-E2-C5	SJSB023-N1-C1	SJSB023-N1-C2	SJSB023-N1-C3	SJSB023-N1-C4	SJSB023-N1-C5	SJSB023-N1-C6	SJSB023-N1-C6 (Field split	SJSB023-N2-C1	SJSB023-N2-C2	SJSB023-N2-C3
Dioxins/Furans																			
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	ng/kg	2.15 J	1090	1090	39.6	5.33 J	5.07 J	5.55 U	1.57 J	20.8	48.6	820	5190	19.8	1130	1260	71.6	5.19 J	0.716 U
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	ng/kg	554	2320	3040	1220	1970	744	464	351	9120 J	12600	47600	10700	560	1860	14900	16300 J	1270	541
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	ng/kg	0.349 J	153	174	14.3	6.16	2.37 J	3.99	0.554 U	7.29	56 J	1260	146	1.48 U	240	234	16.4	5.37	0.235 J
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	ng/kg	19.3	129	170	63.7	49.1	30.6	16.4	10.4	64.1	102	1390	329	18.2	253	325	268	22.6	16.4
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	ng/kg	3.08 U	45.9	58.6	1.71 U	2.06 J	0.158 J	0.183 J	3.24 U	0.922 U	18.3	426	15.8	0.4 J	73.3	76.9	1.33 J	1.78 J	0.0715 U
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.526 U	483	576	10.1	21.2	1.35 J	1.5 J	0.517 J	6.39	171	6500	46.5	2.69 J	700	759	3.06	15.5	0.243 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	0.53 U	1.01 U	1.28 J	0.9 J	0.973 J	0.775 U	0.522 U	0.258 U	0.901 J	0.771 U	4.79	3.78	0.402 U	0.758 U	1.66 J	2.05 J	0.467 J	0.386 J
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.176 U	119	141	2.88 J	5.32	0.353 U	0.345 J	0.215 U	1.85 J	42.1	949	13.7 J	0.775 J	177	189	1.23 UJ	4	0.149 J
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	1.06 U	5.4	5.94	2.9 J	1.59 U	1.45 J	0.887 J	0.558 U	1.87 J	3.48	46.6	16.3	0.906 U	6.65 U	9.49	5.72	0.795 J	0.621 U
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	ng/kg	3.08 U	34.5	39.6	0.699 U	2.13 J	0.203 U	0.159 J	3.24 U	0.693 J	13.5	328	5.81	0.34 J	52.9	57.2	0.406 U	1.45 J	0.148 J
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	1.44 U	2.15 U	2.8 J	1.82 J	3.92	2.51 U	1.43 J	0.799 U	1.71 J	2.56 J	11.7	8.41	1.59 J	3.11 J	4.11	3.3	1.25 J	1.35 J
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	0.569 J	275	353	5.46	13.6	0.747 J	0.396 U	0.519 J	3.52	107	2680	28.8	2.05 J	412	451	1.45 J	7.29	0.246 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	0.353 U	36.1	45.8	1.53 J	2.29 J	0.685 U	0.576 U	0.346 U	0.965 U	11.7	270	6.8	0.625 U	31.8	39.3	1.09 U	1.29 J	0.373 U
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	3.08 U	21	24.9	1.12 J	1.26 J	0.129 U	0.168 U	3.24 U	0.729 U	9.32	211	7.93	0.201 U	34.2	34.7	1.16 J	0.821 J	0.0534 J
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	0.533 J	240	305	5.1	10.8	0.603 U	0.426 J	0.297 J	3.14	92.3	1140	33	1.8 J	353	400	1.91 J	6.25	0.151 U
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	ng/kg	16.6	22300	14400	167	403	13.4	8.39	14.4 U	69.6	5130	110000	1520	53.2	17400	16900	28.9	201	5.71
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	8.87	6060	4790	87.7	209	6.77	4.87	8.81 J	33.4	3290	75800	520	28	5540	5050	15.2	114	3.07
Octachlorodibenzofuran (OCDF) 13C12	ng/kg	2.15 J	1090	1090	39.6	5.33 J	5.07 J	5.55 U	1.57 J	20.8	48.6	820	5190	19.8	1130	1260	71.6	5.19 J	0.716 U
Total dioxin/furan	pg/g	602	33300	25200	1620	2710	806	503	373	9340	21700	249000	18600	689	28300	40700	16700	1660	569
Total dioxin/furan (ND*0.5)	pg/g	605	33300	25200	1630	2710	809	506	382	9340	21700	249000	18600	691	28300	40700	16700	1660	570
Total dioxin/furan (ND*1)	pg/g	607	33300	25200	1630	2710	811	510	391	9340	21700	249000	18600	692	28300	40700	16700	1660	571
Total heptachlorodibenzofuran (HpCDF)	ng/kg	0.349 J	282	324	38.4	11.5	3.42	4.17	3.24 U	16.1	102	2310	320	1.64 J	437	462	56.7	9.32	0.363 J
Total heptachlorodibenzo-p-dioxin (HpCDD)	ng/kg	64.8	297	391	140	155	99.7	73.2	58.2	174	234	2610	755	98.3	526	687	1220	69.9	73.5
Total hexachlorodibenzofuran (HxCDF)	ng/kg	3.08 U	725	866	25.7	33.1	2.07 J	2.74 J	0.517 J	14.4	262	5930	171	4.22	1060	1150	18.1	24.3	0.434 J
Total hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	24.5	49.4	67.9	29.1	72.9	35.6	34.3	33.3	24.1	44.3	281	170	48.2	62.4	90.8	125	25.2	39.9
Total pentachlorodibenzofuran (PeCDF)	ng/kg	1.1 J	783	1010	16.7	33.1	1.76 J	0.426 J	0.882 J	12.4	309	6640	164	6.66	1180	1330	9.86	18.7	2.88 U
Total pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	4.15	46	58.8	3.43	11.1	7.17	5.51	6.7	0.76 J	21.1	349	27.9	8.77	48.7	59.1	1.43 J	3.79	11.4
Total TEQ 1998 (Avian) (ND*0.5)	ng/kg	26.5	28700	19700	264	630	21.3	14.5	16.7	109	8560	188000	2090	84.2	23500	22500	49.8	326	9.33
Total TEQ 1998 (Fish) (ND*0.5)	ng/kg	10.4	7410	5810	103	241	8.49	6.27	9.71	41.6	3640	83100	634	32.6	6740	6270	21.9	131	3.92
Total TEQ Dioxin 1998 (Bird) (ND=0)	ng/kg	26.1	28700	19700	264	630	20.5	14.1	9.26	109	8560	188000	2090	83.8	23500	22500	49.1	326	9.04
Total TEQ Dioxin 1998 (Bird) (ND=1)	ng/kg	26.8	28700	19700	264	630	22.2	14.8	24.1	110	8560	188000	2090	84.5	23500	22500	50.4	326	9.62
Total TEQ Dioxin 1998 (Fish) (ND=0)	ng/kg	10.1	7410	5810	103	241	7.76	5.83	9.08	41.1	3640	83100	634	32.1	6740	6270	21.3	131	3.67
Total TEQ Dioxin 1998 (Fish) (ND=1)	ng/kg	10.8	7410	5810	103	241	9.23	6.7	10.3	42.1	3640	83100	634	33	6740	6270	22.5	131	4.16
Total TEQ Dioxin Texas TEF (ND=0)	ng/kg	10.8	8510	6500	110	260	8.43	6.35	9.04	43.4	3880	88400	704	34.9	7590	7090	20.6	141	3.85
Total TEQ Dioxin Texas TEF (ND=0.5)	ng/kg	11.1	8510	6500	110	260	8.95	6.54	9.94	43.7	3880	88400	704	35.1	7590	7090	21	141	4.03
Total TEQ Dioxin Texas TEF (ND=1)	ng/kg	11.4	8510	6500	110	260	9.47	6.73	10.9	44	3880	88400	704	35.3	7590	7090	21.4	141	4.21
Total tetrachlorodibenzofuran (TCDF)	ng/kg	25.9	19300	24600	300	703	29	14.8	8.7	129	5560	55000	1950	100	18400	23400	52.3	415	9.1
Total tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	18.5	4060	5040	96.8	230	6.77	16.2	23.4	36.8	1800	42300	587	46.4	3510	4540	16.7	123	17.6
Total WHO Dioxin TEQ(Human/Mammal)(ND=0)	ng/kg	11.1	8480	6460	111	260	8.97	6.61	9.18	46.2	3880	88300	709	34.8	7530	7030	28	141	4.18
Total WHO Dioxin TEQ(Human/Mammal)(ND=0.5)	ng/kg	11.4	8480	6460	111	260	9.6	6.94	10.2	46.7	3880	88300	709	35.2	7530	7030	28.6	141	4.43
Total WHO Dioxin TEQ(Human/Mammal)(ND=1)	ng/kg	11.8	8480	6460	111	260	10.2	7.27	11.2	47.3	3880	88300	709	35.6	7530	7030	29.3	141	4.69
Asbestos																			
Asbestos	%	--	--	--	--	--	--	--	--	--	--	--	--	--	0	0.25	--	--	--
Polychlorinated biphenyls (PCBs)																			
Aroclor (unspecified)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1016 (PCB-1016)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1221 (PCB-1221)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1232 (PCB-1232)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1242 (PCB-1242)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1248 (PCB-1248)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1254 (PCB-1254)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1260 (PCB-1260)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1262 (PCB-1262)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1268 (PCB-1268)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs (7)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs (ND*0)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs (ND*0.5)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (TPH)																			
Total Petroleum Hydrocarbons	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C12-C28)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	340 J	430 J Dup 430	--	--	--
Total Petroleum Hydrocarbons (C25-C36) ORO	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	510 J	600 J Dup 600	--	--	--
Total Petroleum Hydrocarbons (C28-C35)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C12)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	8.3	14 Dup 14	--	--	--
General Chemistry																			
Cyanide (total)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	17 UJ	17 UJ	--	--	--
Flash point (closed cup)	Deg C	--	--	--	--	--	--	--	--	--	--	--	--	--	110 >	110 >	--	--	--
Moisture	%	--	--	--	--	--	--	--	--	--	--	--	--	--	26 J	36 J	--	--	--
Percent solids	%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH, lab	s.u.	--	--	--	--	--	--	--	--	--	--	--	--	--	8.15 J	8.29 J	--	--	--
Reactive cyanide	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfate	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfide	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	32 U	32 U	--	--	--
Sulfur	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total solids	%	76.2	74.4	75.8	83.2	80.4	75.5	74.1	75.8	79.9	84	67.9	70.4	76.9	75.2 Dup 75.2 Dup 74.9 J	74.5 Dup 74.5 Dup 65.3 J	83.6	81.5	81.2

Notes:
- ng/kg - nanograms per kilogram
- ug/kg - microgram per kilogram
- mg/kg - milligram per kilogram
- Deg C - Degrees in Celsius
- s.u. - standard unit
- U - Not detected at the associated reporting limit.
- J - Estimated concentration.
- UJ - Not detected; associated reporting limit is estimated.
- Dup - indicates the result from a duplicate sample

Table 3

First Phase Pre-Design Investigation Analytical Results - Southern Impoundment
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Area:	Units	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits
Sample Location:		SJSB023-N2	SJSB023-N2	SJSB023-S1	SJSB023-S1	SJSB023-S1	SJSB023-S1	SJSB023-S1	SJSB023-S1-Composite	SJSB023-S2	SJSB023-S2	SJSB023-S2	SJSB023-S2	SJSB023-S2	SJSB023-W1	SJSB023-W1	SJSB023-W1	SJSB023-W1	SJSB023-W1
Sample Identification:		SL0209	SL0210	SL0222	SL0223	SL0224	SL0225	SL0226	SL0227	SL0228	SL0229	SL0230	SL0231	SL0232	SL0216	SL0217	SL0218	SL0219	SL0220
Sample Date:		11/15/2018	11/15/2018	11/15/2018	11/15/2018	11/15/2018	11/15/2018	11/15/2018	11/15/2018	11/15/2018	11/15/2018	11/15/2018	11/15/2018	11/15/2018	11/15/2018	11/15/2018	11/15/2018	11/15/2018	11/15/2018
Sample Type:																			
Sample Depth:		(6-8) ft bgs	(8-10) ft bgs	(0-2) ft bgs	(2-4) ft bgs	(4-6) ft bgs	(6-8) ft bgs	(8-10) ft bgs	(0-10) ft bgs	(0-2) ft bgs	(2-4) ft bgs	(4-6) ft bgs	(6-8) ft bgs	(8-10) ft bgs	(0-2) ft bgs	(2-4) ft bgs	(5-6) ft bgs	(6-8) ft bgs	(8-10) ft bgs
Integral Sample ID:		SJSB023-N2-C4	SJSB023-N2-C5	SJSB023-S1-C1	SJSB023-S1-C2	SJSB023-S1-C3	SJSB023-S1-C4	SJSB023-S1-C5	SJSB023-S1-C6	SJSB023-S2-C1	SJSB023-S2-C2	SJSB023-S2-C3	SJSB023-S2-C4	SJSB023-S2-C5	SJSB023-W1-C1	SJSB023-W1-C2	SJSB023-W1-C3	SJSB023-W1-C4	SJSB023-W1-C5
Dioxins/Furans																			
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	ng/kg	6.3 U	6.5 U	63.7	362	13400	1290	2270	2010	257	3780	4.9 J	1.71 J	9.47	83	605	22900	30.9	41.2
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	ng/kg	653	472	1870	8980	13500	1480	2390	3520	4250	3610	663	731	464	3280	28900	24700	519	480
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	ng/kg	3.15 U	3.25 U	35.1	641	1070	54.4	73.9	233	412	2410	5.86	1.45 J	1.18 J	146	1010	768	1.52 U	1.68 J
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	ng/kg	22.7	18.4	84.4	379	379	68.3	125	167	221	175	22.1	22.9	14.8	138	909	461	16.4	16.4
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	ng/kg	3.15 U	3.25 U	10	253	400	4.55	6.51	74.2	152	1300	2.61 J	0.701 J	0.282 U	53.6	365	284	2.95 U	3.17 U
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.213 J	0.229 U	95.1	2360	5000	12.8	10.7	763	1330	12700	19.9	4.8	3.31	572	6130	2570	1.97 J	1.68 J
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	3.15 U	3.25 U	1.09 J	1.64 J	4.72	0.705 J	1.12 U	1.53 J	1.21 J	2 J	0.472 U	0.551 U	0.522 J	0.601 U	2.74 U	5.51	2.95 U	0.537 J
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.22 J	3.25 U	25	598	961	4.85 J	4.19 J	185	308	1650	4.91	1.18 J	0.661 U	138	827	568	0.546 U	0.471 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	1.18 J	3.25 U	2.8	12.2	19.8	3.75	5.75	7.75	6.54	8.27	0.828 U	0.866 U	0.676 J	3.7	26.5	26	0.649 U	0.855 J
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	ng/kg	3.15 U	3.25 U	7.39	172	270	1.43 U	1.85 U	55.5	92	578	1.64 J	0.573 U	0.424 J	42.6	240	165	2.95 U	0.43 J
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	1.21 U	1.58 U	3.25	4.77	10.2	1.81 J	3.07 U	3.28 U	3.38	3.24 J	1.63 U	1.79 J	1.05 J	2.75 U	8.33	12.8	1.29 U	1.37 J
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	3.15 U	3.25 U	52.3	1280	1900	5.16	5.85	461	685	3170	11.2	3.51	2.08 J	313	1890	1160	1.39 J	1.25 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	0.542 U	0.817 J	6.28	161	122	1.88 J	2.71 J	44.2	53.8	161	1.26 U	0.527 U	0.567 J	26	199	128	0.451 U	0.606 U
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	3.15 U	3.25 U	5.49	101	164	3.01 J	3.05 U	37.1	55.6	279	0.929 U	0.288 U	0.223 U	26.1	143	90.3	0.361 U	0.184 U
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	3.15 U	3.25 U	42.9	1080	1190	7.68	9.04	352	504	1680	8.46	2.37 J	1.61 U	242	1670	982	1.26 J	1.23 J
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	ng/kg	4.37	6.85	2200	66000	46100	239	336	19500	19600	64900	382	77.8	60.2	11300	100000	79500	43.1	41.1
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	2.25	3.01 U	1310	40300	30000	106	136	12100	11300	38900	167	36.4	24.8	6790	59800	54700	20.5	17.1
Octachlorodibenzofuran (OCDF) 13C12	ng/kg	1.1 U	1.28 U	63.7	362	13400	1290	2270	2010	257	3780	4.9 J	1.71 J	9.47	83	605	22900	30.9	41.2
Total dioxin/furan	pg/g	684	498	5810	123000	114000	3280	5380	39500	39200	135000	1290	886	583	23200	203000	189000	635	604
Total dioxin/furan (ND*0.5)	pg/g	686	503	5810	123000	114000	3280	5380	39500	39200	135000	1300	887	584	23200	203000	189000	638	605
Total dioxin/furan (ND*1)	pg/g	689	509	5810	123000	114000	3290	5380	39500	39200	135000	1300	888	586	23200	203000	189000	641	606
Total heptachlorodibenzofuran (HpCDF)	ng/kg	3.15 U	3.25 U	73	1130	1910	117	153	419	688	4720	10.9	2.15 J	1.8 J	257	1860	1520	0.691 J	1.68 J
Total heptachlorodibenzo-p-dioxin (HpCDD)	ng/kg	85.5	62.5	212	740	944	177	399	412	221	175	22.1	22.9	54	294	1830	1110	64.5	58.9
Total hexachlorodibenzofuran (HxCDF)	ng/kg	0.433 J	3.25 U	155	3500	5570	52	63.8	1160	1920	12200	28.1	6.82	3.94	843	5240	3740	1.97 J	2.79 J
Total hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	37.9	23	79.7	97.3	210	39.2	82.9	73	37.5	40.5	6.07	8.83	26.7	72.4	191	234	34.6	28
Total pentachlorodibenzofuran (PeCDF)	ng/kg	3.15 U	3.25 U	149	3560	4730	44.8	61.7	1260	1800	6720	28.9	6.23	3.86	844	5360	3190	3	3.56
Total pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	3.1 J	0.817 J	15.9	195	169	7.14	11.3	59.8	77	187	8.46	10.1	5.62	44.1	256	184	6.09	3.02 J
Total TEQ 1998 (Avian) (ND*0.5)	ng/kg	7.3	9.64	3580	108000	78300	358	488	32200	31700	108000	562	118	87.2	18500	163000	136000	65.6	60.3
Total TEQ 1998 (Fish) (ND*0.5)	ng/kg	3.11	3.16	1460	44700	33800	127	164	13400	12800	44900	195	42.8	29.7	7600	66700	59700	24	20.7
Total TEQ Dioxin 1998 (Bird) (ND=0)	ng/kg	6.76	7.73	3580	108000	78300	358	487	32200	31700	108000	561	118	86.4	18500	163000	136000	65.3	59.9
Total TEQ Dioxin 1998 (Bird) (ND=1)	ng/kg	7.83	11.6	3580	108000	78300	358	488	32200	31700	108000	563	118	88.1	18500	163000	136000	66	60.7
Total TEQ Dioxin 1998 (Fish) (ND=0)	ng/kg	2.61	1.23	1460	44700	33800	127	163	13400	12800	44900	194	42.4	29.2	7600	66700	59700	23.6	20.4
Total TEQ Dioxin 1998 (Fish) (ND=1)	ng/kg	3.61	5.09	1460	44700	33800	127	164	13400	12800	44900	195	43.3	30.1	7600	66700	59700	24.5	21.1
Total TEQ Dioxin Texas TEF (ND=0)	ng/kg	2.85	1.09	1570	47900	36000	138	178	14400	13800	48000	213	46.3	31.8	8150	71600	63600	25.7	22.3
Total TEQ Dioxin Texas TEF (ND=0.5)	ng/kg	3.17	2.95	1570	47900	36000	138	178	14400	13800	48000	213	46.6	32.3	8150	71600	63600	26	22.5
Total TEQ Dioxin Texas TEF (ND=1)	ng/kg	3.49	4.8	1570	47900	36000	138	179	14400	13800	48000	214	46.8	32.7	8150	71600	63600	26.3	22.7
Total tetrachlorodibenzofuran (TCDF)	ng/kg	5.7	8.42	3000	85400	64300	429	608	24000	30500	84100	692	133	110	13900	80200	70000	73.8	75.6
Total tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	7.71	5.71	857	25300	19400	108	141	7330	8570	24200	210	61.4	32.7	4030	32200	20300	39.3	24.2
Total WHO Dioxin TEQ(Human/Mammal)(ND=0)	ng/kg	3.27	1.83	1570	47800	35800	139	181	14300	13700	47700	211	46.2	32.3	8110	71300	63500	25.8	22.4
Total WHO Dioxin TEQ(Human/Mammal)(ND=0.5)	ng/kg	3.7	3.64	1570	47800	35800	139	181	14300	13700	47700	212	46.6	32.6	8110	71300	63500	26.2	22.8
Total WHO Dioxin TEQ(Human/Mammal)(ND=1)	ng/kg	4.12	5.45	1570	47800	35800	139	182	14300	13700	47700	213	47	32.9	8110	71300	63500	26.6	23.1
Asbestos																			
Asbestos	%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Polychlorinated biphenyls (PCBs)																			
Aroclor (unspecified)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1016 (PCB-1016)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1221 (PCB-1221)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1232 (PCB-1232)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1242 (PCB-1242)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1248 (PCB-1248)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1254 (PCB-1254)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1260 (PCB-1260)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1262 (PCB-1262)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1268 (PCB-1268)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs (7)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs (ND*0)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs (ND*0.5)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (TPH)																			
Total Petroleum Hydrocarbons	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C12-C28)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C25-C36) ORO	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C28-C35)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C12)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
General Chemistry																			
Cyanide (total)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Flash point (closed cup)	Deg C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Moisture	%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Percent solids	%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH, lab	s.u.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Reactive cyanide	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfate	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfide	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfur	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total solids	%	78.9	75.8	86.2	69.8	64	79.8	76.3	74.7	80.1	69.4	73.5	73.6	78.2	82.2	66.6	58.3	79.4	77.2

Notes:
- ng/kg - nanograms per kilogram
- ug/kg - microgram per kilogram
- mg/kg - milligram per kilogram
- Deg C - Degrees in Celsius
- s.u. - standard unit
- U - Not detected at the associated reporting limit.
- J - Estimated concentration.
- UJ - Not detected; associated reporting limit is estimated.
- Dup - indicates the result from a duplicate sample

Table 3

First Phase Pre-Design Investigation Analytical Results - Southern Impoundment
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Area:	Units	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits
Sample Location:		SJSB023-W1-Composite	SJSB023-W2	SJSB023-W2	SJSB023-W2	SJSB023-W2	SJSB023-W2	SJSB025-E2-Composite	SJSB025-N1	SJSB025-N1	SJSB025-N1	SJSB025-N1	SJSB025-N1	SJSB025-N1-Composite	SJSB025-N2	SJSB025-N2	SJSB025-N2	SJSB025-N2	SJSB025-N2
Sample Identification:		SL0221	SL0211	SL0212	SL0213	SL0214	SL0215	Comp-SL0119-0123	SL0079	SL0080	SL0081	SL0082	SL0083	SL0084	SL0085	SL0086	SL0087	SL0088	SL0089
Sample Date:		11/15/2018	11/15/2018	11/15/2018	11/15/2018	11/15/2018	11/15/2018	11/11/2018	11/8/2018	11/8/2018	11/8/2018	11/8/2018	11/8/2018	11/8/2018	11/8/2018	11/8/2018	11/8/2018	11/8/2018	11/8/2018
Sample Type:																			
Sample Depth:		(0-10) ft bgs	(0-2) ft bgs	(2-4) ft bgs	(4-6) ft bgs	(6-8) ft bgs	(8-10) ft bgs	(0-10) ft bgs	(0-2) ft bgs	(2-4) ft bgs	(4-6) ft bgs	(6-8) ft bgs	(8-10) ft bgs	(0-10) ft bgs	(0-2) ft bgs	(2-4) ft bgs	(4-6) ft bgs	(6-8) ft bgs	(8-10) ft bgs
Integral Sample ID:		SJSB023-W1-C6	SJSB023-W2-C1	SJSB023-W2-C2	SJSB023-W2-C3	SJSB023-W2-C4	SJSB023-W2-C5	SJSB025-E2	SJSB025-N1-C1	SJSB025-N1-C2	SJSB025-N1-C3	SJSB025-N1-C4	SJSB025-N1-C5	SJSB025-N1-C6	SJSB025-N2-C1	SJSB025-N2-C2	SJSB025-N2-C3	SJSB025-N2-C4	SJSB025-N2-C5
Dioxins/Furans																			
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	ng/kg	2090	89.3	162	15.5	2.52 U	0.989 J	5.07 J	18.6	262	95.1	22.9	1.61 J	91.9	13.4	66.3	86.3	15.2	1.84 U
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD	ng/kg	4410	3270	7220	1390	452	528	396	4310	6250	1800	1040	499	2540	4850 J	1740	3320	785	228
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	ng/kg	206	136	262	25.7	0.942 J	0.363 J	2.04 J	8.94	444	168	38.9	2.18 J	156	8.09	100	158	22.3	3.26
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD	ng/kg	189	152	271	37.7	15	15.2	15.7	34.3	307	95.7	49.5	18.6	144	37.4	96.2	203	36.9	8.03
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	ng/kg	66.3	49.4	96	9.3	0.291 U	0.453 J	0.319 J	1.53 J	144	74.3	13.2	0.479 U	57.3	2.99 U	38.2	56.2	8.29	0.583 J
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	634	510	1030	84	1.98 J	0.427 U	1.98 J	16	1160	911	118	7.75	705	4.37	376	519	75.5	2.75 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	0.82 U	0.874 J	1.04 J	3.11 U	0.403 J	0.342 U	0.336 J	0.536 J	1.18 J	0.25 U	0.266 J	0.21 U	0.506 U	0.48 U	0.331 U	0.523 U	0.293 U	0.519 J
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	149	118	258	21.4	0.563 J	0.38 U	0.47 U	4.4	273	186	28.5	1.61 U	156	1.83 J	81.7	122	19.3	0.839 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	6.96 U	4.17	7.49	0.928 J	0.713 J	0.921 J	0.62 U	1.05 U	9.19	3.01 J	1.47 J	0.474 U	3.79	1.47 J	3 J	5.61	1.12 U	0.659 U
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	ng/kg	47.2	36	75.4	6.17	0.252 U	0.446 U	0.16 U	1.67 J	130	72.2	8.39	0.814 J	43.6	0.525 U	24.3	35	5.56	0.306 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	3.32	2.95	2.72 U	1.64 J	1.28 J	1.44 U	0.67 J	1.07 J	4	1.05 J	1.55 J	1.27 J	2.39 J	1.44 U	1.22 J	1.92 U	1.11 J	0.804 U
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	374	281	589	44.6	1.26 J	0.35 U	0.857 U	9.07	551	516	63.8	4.81	319	2.07 J	147	292	43	2.16 J
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	41.4	25.6	50.8	5.07	0.316 U	0.564 U	0.276 U	1.38 J	49	15.9	7.49	0.839 J	21.8	0.783 J	12.3	31.2	4.88	0.547 U
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	30.2	21.4	45.3	4.03	0.104 U	0.329 J	0.151 U	1.06 J	59.3	35.8	5.27	0.424 U	25.4	1.49 J	13.3	22.9	3.64	0.453 J
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	334	228	485	38.5	0.974 J	0.358 U	0.811 U	8.04	464	313	56.9	4.1	215	2.28 U	114	275	36.7	1.88 J
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	ng/kg	20700	10900	20800	1540	29.7	2.42	23.9	308	23600	10400	2930	140	7980	37.2	5350	14300	1830	54.1
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	11600	7330	14500	1020	14	1.36	10.7	159	13400	5640	1630	66.9	2920	17.8	3130	8450	1110	26.5
Octachlorodibenzofuran (OCDF) 13C12	ng/kg	2090	89.3	162	15.5	2.52 U	0.989 J	5.07 J	18.6	262	95.1	22.9	1.61 J	91.9	13.4	66.3	86.3	15.2	1.84 U
Total dioxin/furan	pg/g	40900	23200	45900	4240	519	550	457	4880	47100	20300	6020	748	15400	4980	11300	27900	4000	325
Total dioxin/furan (ND*0.5)	pg/g	40900	23200	45900	4240	521	552	458	4880	47100	20300	6020	749	15400	4980	11300	27900	4000	329
Total dioxin/furan (ND*1)	pg/g	40900	23200	45900	4240	522	554	460	4880	47100	20300	6020	751	15400	4980	11300	27900	4000	333
Total heptachlorodibenzofuran (HpCDF)	ng/kg	391	249	481	45.7	0.942 J	0.453 J	4.72	19.8	816	304	69.7	3.37	283	15.5	183	287	41.4	5.5
Total heptachlorodibenzo-p-dioxin (HpCDD)	ng/kg	435	331	522	108	15	91	59.3	83.2	578	187	109	55	305	95	173	354	88.5	30
Total hexachlorodibenzofuran (HxCDF)	ng/kg	955	745	1530	125	2.65 J	0.329 J	2.59 J	28	1840	1290	175	8.57	1000	15.1	533	757	114	0.682 J
Total hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	76.9	65.2	68.4	55	7.86	45.9	17.4	10.9	91.4	17.1	26.3	25.4	53.2	17.1	20.5	30.2	25.7	17.5
Total pentachlorodibenzofuran (PeCDF)	ng/kg	1060	780	1640	127	1.26 J	2.94 U	0.963 J	26.2	1660	1270	184	11.9	798	8.7	396	876	122	4.04
Total pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	61.2	41.1	71.8	14.3	6.5	7.24	2.25 J	1.83 J	76.1	20.7	10.3	5.54	31.3	2.28 J	17.7	41.6	6.31	3.95
Total TEQ 1998 (Avian) (ND*0.5)	ng/kg	32800	18600	36000	2620	45.5	4.52	35.6	480	37700	16500	4650	214	11300	58.7	8670	23200	3000	83.3
Total TEQ 1998 (Fish) (ND*0.5)	ng/kg	13000	8100	16000	1140	16.8	2.13	12.8	183	15100	6480	1830	78.1	3560	22.7	3530	9420	1240	31.1
Total TEQ Dioxin 1998 (Bird) (ND=0)	ng/kg	32800	18600	36000	2620	45.3	3.9	35	480	37700	16500	4650	213	11300	57.5	8670	23200	3000	82.8
Total TEQ Dioxin 1998 (Bird) (ND=1)	ng/kg	32800	18600	36000	2620	45.6	5.14	36.2	480	37700	16500	4650	214	11300	59.9	8670	23200	3000	83.9
Total TEQ Dioxin 1998 (Fish) (ND=0)	ng/kg	13000	8100	16000	1140	16.6	1.6	12.3	183	15100	6480	1830	78	3560	21.9	3530	9420	1240	30.6
Total TEQ Dioxin 1998 (Fish) (ND=1)	ng/kg	13000	8100	16000	1140	16.9	2.67	13.2	183	15100	6480	1830	78.3	3560	23.4	3530	9420	1240	31.6
Total TEQ Dioxin Texas TEF (ND=0)	ng/kg	14000	8630	17000	1210	18	1.73	13.4	197	16200	6990	1970	84.6	3950	23.1	3790	10100	1330	33.1
Total TEQ Dioxin Texas TEF (ND=0.5)	ng/kg	14000	8630	17000	1210	18.1	2.12	13.8	197	16200	6990	1970	84.7	3950	23.7	3790	10100	1330	33.5
Total TEQ Dioxin Texas TEF (ND=1)	ng/kg	14000	8630	17000	1210	18.2	2.51	14.1	198	16200	6990	1970	84.9	3950	24.3	3790	10100	1330	33.9
Total tetrachlorodibenzofuran (TCDF)	ng/kg	24300	14700	30400	2650	56.3	2.42	42.8	566	27600	11200	3930	245	11900	67.3	7000	18700	2590	90.9
Total tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	6670	4360	8600	755	26.6	14	14.7	175	8070	2930	1130	82.1	2400	19.5	2030	5360	778	33.4
Total WHO Dioxin TEQ(Human/Mammal)(ND=0)	ng/kg	13900	8600	16900	1200	18.1	2.05	13.7	198	16100	6930	1970	84.5	3910	25.3	3770	10100	1320	32.8
Total WHO Dioxin TEQ(Human/Mammal)(ND=0.5)	ng/kg	13900	8600	16900	1200	18.3	2.54	14	198	16100	6930	1970	84.6	3910	25.7	3770	10100	1320	33.4
Total WHO Dioxin TEQ(Human/Mammal)(ND=1)	ng/kg	13900	8600	16900	1200	18.4	3.03	14.4	198	16100	6930	1970	84.7	3910	26.1	3770	10100	1320	33.9
Asbestos																			
Asbestos	%	--	--	--	--	--	--	--	--	--	--	--	--	0	--	--	--	--	--
Polychlorinated biphenyls (PCBs)																			
Aroclor (unspecified)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1016 (PCB-1016)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1221 (PCB-1221)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1232 (PCB-1232)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1242 (PCB-1242)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1248 (PCB-1248)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1254 (PCB-1254)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1260 (PCB-1260)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1262 (PCB-1262)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1268 (PCB-1268)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs (7)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs (ND*0)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs (ND*0.5)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (TPH)																			
Total Petroleum Hydrocarbons	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C12-C28)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	33 J	--	--	--	--	--
Total Petroleum Hydrocarbons (C25-C36) ORO	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	130 J	--	--	--	--	--
Total Petroleum Hydrocarbons (C28-C35)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C12)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	1.7 J	--	--	--	--	--
General Chemistry																			
Cyanide (total)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	17 UJ	--	--	--	--	--
Flash point (closed cup)	Deg C	--	--	--	--	--	--	--	--	--	--	--	--	110 >	--	--	--	--	--
Moisture	%	--	--	--	--	--	--	--	--	--	--	--	--	22 J Dup 21.5	--	--	--	--	--
Percent solids	%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH, lab	s.u.	--	--	--	--	--	--	--	--	--	--	--	--	8.13 J	--	--	--	--	--
Reactive cyanide	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfate	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfide	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	32 U Dup 32 U	--	--	--	--	--
Sulfur	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total solids	%	72	85.9	83.4	77.2	77.2	77.8	78	79.9	79.8	76.7	79.7	78.6	3 Dup 77.5 Dup 76.4 Dup 7	81.2	78.4	74.7	76	77.1

Notes:
- ng/kg - nanograms per kilogram
- ug/kg - microgram per kilogram
- mg/kg - milligram per kilogram
- Deg C - Degrees in Celsius
- s.u. - standard unit
- U - Not detected at the associated reporting limit.
- J - Estimated concentration.
- UJ - Not detected; associated reporting limit is estimated.
- Dup - indicates the result from a duplicate sample

Table 3

First Phase Pre-Design Investigation Analytical Results - Southern Impoundment
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Area:	Units	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits
Sample Location:		SJSB025-S1	SJSB025-S1	SJSB025-S1	SJSB025-S1	SJSB025-S1	SJSB025-S1-Composite	SJSB025-S1-Composite	SJSB025-S2	SJSB025-S2	SJSB025-S2	SJSB025-W1-Composite	SJSB039	SJSB039	SJSB039	SJSB039	SJSB039	SJSB039-Composite	SJSB040
Sample Identification:		SL0244	SL0245	SL0246	SL0247	SL0248	SL0249	SL0250	SL0116	SL0117	SL0118	SL0256	SL0186	SL0187	SL0188	SL0189	SL0190	SL0191	SL0192
Sample Date:		11/16/2018	11/16/2018	11/16/2018	11/16/2018	11/16/2018	11/16/2018	11/16/2018	11/11/2018	11/11/2018	11/11/2018	11/16/2018	11/14/2018	11/14/2018	11/14/2018	11/14/2018	11/14/2018	11/14/2018	11/14/2018
Sample Type:								Duplicate											
Sample Depth:		(0-2) ft bgs	(2-4) ft bgs	(5-6) ft bgs	(6-8) ft bgs	(8-10) ft bgs	(0-10) ft bgs	(0-10) ft bgs	(4-6) ft bgs	(6-8) ft bgs	(8-10) ft bgs	(0-10) ft bgs	(0-2) ft bgs	(2-4) ft bgs	(4-6) ft bgs	(6-8) ft bgs	(8-10) ft bgs	(0-10) ft bgs	(0-2) ft bgs
Integral Sample ID:		SJSB025-S1-C1	SJSB025-S1-C2	SJSB025-S1-C3	SJSB025-S1-C4	SJSB025-S1-C5	SJSB025-S1-C6	SJSB025-S1-C7 (Field split	SJSB025-S2-C3	SJSB025-S2-C4	SJSB025-S2-C5	SJSB025-W1-C6	SJSB039-C1	SJSB039-C2	SJSB039-C3	SJSB039-C4	SJSB039-C5	SJSB039-C6	SJSB040-C1
Dioxins/Furans																			
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	ng/kg	23.8	236	2.15 J	5.12 J	0.202 U	19.4	26.8	5.33 J	7.33	0.444 J	8.77	45.9	67.5	235	1950	0.985 U	710	47.6
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	ng/kg	26100 J	4590	849	2270	385	4420	7340	788	236	280	502	984	1530	4400	8090	441	4580	988
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	ng/kg	9.2	279	2.82 J	8.18 J	0.36 J	27.5	32.9	2.75 J	21.3	0.27 J	11.3	12.3	13.1	72.6	243	0.398 U	94	12.3
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	ng/kg	77.7	258	29.6	77	13.6	43.2	61.4	28.1	8.33	9.01	10.3	54.4	66.9	211	267	13.5	159	51.9
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	ng/kg	1.82 J	108	0.534 U	2.33 U	0.0462 U	10	11.3	0.751 U	0.405 U	0.151 J	3.63	0.941 U	0.994 J	14.2	74	3.14 U	26.5	1.16 J
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	12.9	1070	6.74	22.5	0.194 U	92.6	111	5.55	0.923 J	0.141 U	27.6	3.01 J	2.84 J	98.1	650	0.845 J	206	5.05
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	0.627 J	1.15 J	0.725 J	1.93 U	0.342 U	0.539 J	0.764 U	0.439 U	3.08 U	3.01 U	2.85 U	0.589 J	0.86 J	1.75 U	1.91 J	3.14 U	1.36 J	0.538 U
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	3.62	251 J	2.01 J	6.38 J	0.162 U	21.1	23.9	1.56 J	0.276 U	0.107 U	8.08	1.19 J	1.09 U	23.4	143	0.328 U	49.7	1.23 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	1.3 U	8.03	1.28 J	3.06 J	0.604 U	1.25 J	1.93 U	1.2 U	1.14 J	0.355 U	0.287 U	2.63 J	2.53 J	7.69	9.55	3.14 U	6.93	2.35 J
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	ng/kg	1.03 J	78.7	0.937 J	2.36 J	0.0893 U	7.41	8.1	0.598 U	0.293 J	0.117 U	3.11	0.643 J	0.445 U	7.58	45.6	3.14 U	17.3	0.502 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	1.1 U	3.49	2.23 J	5.46 J	0.94 J	1.04 U	1.41 J	1.32 U	0.951 J	0.775 U	0.277 U	1.55 J	1.92 J	4.37	4.56 U	0.755 U	3.56	1.37 J
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	7.33	509	4.33	14.7 J	0.149 U	47.1	56.3	3.91	3.08 U	3.01 U	10.7	1.59 J	1.59 J	47.5	333	0.701 J	118	1.91 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	1.02 J	45.7	0.926 U	3.14 U	0.319 U	5.39	6.48	1.12 U	0.136 U	0.235 U	1.01 U	0.717 J	0.794 U	5.1	29.1	0.279 J	12	0.605 U
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	1.06 J	49.1	0.647 J	1.66 J	0.134 U	4.7	5	0.372 U	0.562 J	0.102 U	1.92 J	0.944 U	0.96 J	6.78	30.2	0.0934 J	11.6	0.703 U
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	6.89	390	3.95	13.6 J	0.246 U	41.1	47.9	3.41 U	3.08 U	3.01 U	8.75	1.63 J	1.63 J	34.3	298	0.418 U	94.5	2.19 J
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	ng/kg	229	18000	142	513	2.24	1910	2550	143	0.616 U	0.602 U	298	28.1	33.7	1200	10200	15.7 J	6280	38.5
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	108	11400	66.3	253	0.896 U	1240	1650	78	0.836 U	0.74 U	148	11	14.8	710	5940	7.95 J	3750	16.6
Octachlorodibenzofuran (OCDF) 13C12	ng/kg	23.8	236	2.15 J	5.12 J	0.202 U	19.4	26.8	5.33 J	7.33	0.444 J	8.77	45.9	67.5	235	1950	0.985 U	710	47.6
Total dioxin/furan	pg/g	26600	37300	1110	3200	402	7890	11900	1060	277	290	1040	1150	1740	7080	28300	480	16100	1170
Total dioxin/furan (ND*0.5)	pg/g	26600	37300	1120	3200	404	7890	11900	1060	278	292	1040	1150	1740	7080	28300	482	16100	1170
Total dioxin/furan (ND*1)	pg/g	26600	37300	1120	3200	406	7890	11900	1070	280	293	1050	1150	1740	7080	28300	484	16100	1170
Total heptachlorodibenzofuran (HpCDF)	ng/kg	21.1	506	3.99	8.18 J	0.488 J	49.7	63.1	2.82 J	34	0.421 J	20	32.7	39.5	208	474	3.14 U	201	38.2
Total heptachlorodibenzo-p-dioxin (HpCDD)	ng/kg	195	485	87.5	312	44.2	105	144	111	32.7	45.1	28	138	220	609	743	60.9	392	135
Total hexachlorodibenzofuran (HxCDF)	ng/kg	24.9	1570	11.9	36.9	0.128 J	138	160	6.56	9.51	3.01 U	41.8	17.2	14.9	185	978	0.938 J	336	14.8
Total hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	12.2	87	28.8	188	16.9	37.3	28	34.6	17.8	28.7	7.11	28	31	75.5	92.2	46.9	76.4	22.7
Total pentachlorodibenzofuran (PeCDF)	ng/kg	25.9	1370	13.8	36.2	1.17 J	137	160	7.88	3.08 U	0.441 J	24.5	9.83	6.74	115	1010	0.701 J	343	5.77
Total pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	1.36 J	63.9	1.7 J	34.2	2.42 J	8.98	13.8	3.57	1.81 J	3.01 U	1.39 J	1.12 J	4.09	11	42	7.43	21	1.21 J
Total TEQ 1998 (Avian) (ND*0.5)	ng/kg	350	30000	215	787	3.17	3210	4280	225	1.37	0.85	461	42.6	51.8	1970	16600	24.4	10200	58.8
Total TEQ 1998 (Fish) (ND*0.5)	ng/kg	129	12700	77.6	292	0.968	1380	1830	87.8	1.06	0.642	173	15.2	19.1	810	6740	9.43	4160	21.1
Total TEQ Dioxin 1998 (Bird) (ND=0)	ng/kg	350	30000	214	785	2.39	3210	4280	222	0.53	0.0413	460	42.6	51.3	1970	16600	24.2	10200	58.2
Total TEQ Dioxin 1998 (Bird) (ND=1)	ng/kg	350	30000	215	789	3.95	3210	4280	227	2.21	1.66	461	42.7	52.2	1970	16600	24.7	10200	59.3
Total TEQ Dioxin 1998 (Fish) (ND=0)	ng/kg	129	12700	77.2	290	0.177	1380	1830	86.2	0.444	0.0413	172	15.1	18.6	810	6740	9.2	4160	20.5
Total TEQ Dioxin 1998 (Fish) (ND=1)	ng/kg	129	12700	78.1	294	1.76	1380	1830	89.4	1.68	1.24	175	15.2	19.5	811	6740	9.66	4160	21.7
Total TEQ Dioxin Texas TEF (ND=0)	ng/kg	137	13600	84.1	316	0.318	1470	1950	93.2	0.387	0	187	16	20	867	7230	9.79	4470	22.4
Total TEQ Dioxin Texas TEF (ND=0.5)	ng/kg	137	13600	84.4	317	0.987	1470	1950	94.5	0.936	1.15	187	16.1	20.3	867	7230	9.99	4470	22.8
Total TEQ Dioxin Texas TEF (ND=1)	ng/kg	137	13600	84.6	318	1.66	1470	1950	95.9	1.48	1.15	188	16.1	20.5	867	7230	10.2	4470	23.1
Total tetrachlorodibenzofuran (TCDF)	ng/kg	405	24200	250	904	5.59	2580	3290	258	0.616 U	1.64	516	47.4	51.2	1810	16100	21.5	5160	59.6
Total tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	120	7290	78.2	373	5.82	813	1040	86.6	0.836 U	16	161	11.5	18.3	572	4720	19.8	1730	20.2
Total WHO Dioxin TEQ(Human/Mammal)(ND=0)	ng/kg	145	13500	83.9	314	0.573	1470	1950	93.7	0.756	0.178	185	17	20.9	866	7190	10.2	4460	22.9
Total WHO Dioxin TEQ(Human/Mammal)(ND=0.5)	ng/kg	145	13500	84.3	316	1.3	1470	1950	94.9	1.32	0.795	186	17.1	21.4	866	7190	10.3	4460	23.4
Total WHO Dioxin TEQ(Human/Mammal)(ND=1)	ng/kg	145	13500	84.8	318	2.02	1470	1950	96.2	1.89	1.41	187	17.1	21.9	866	7190	10.5	4460	23.9
Asbestos																			
Asbestos	%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Polychlorinated biphenyls (PCBs)																			
Aroclor (unspecified)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1016 (PCB-1016)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1221 (PCB-1221)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1232 (PCB-1232)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1242 (PCB-1242)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1248 (PCB-1248)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1254 (PCB-1254)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1260 (PCB-1260)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1262 (PCB-1262)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1268 (PCB-1268)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs (7)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs (ND*0)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs (ND*0.5)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (TPH)																			
Total Petroleum Hydrocarbons	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C12-C28)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C25-C36) ORO	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C28-C35)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C12)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
General Chemistry																			
Cyanide (total)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Flash point (closed cup)	Deg C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Moisture	%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Percent solids	%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH, lab	s.u.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Reactive cyanide	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfate	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfide	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfur	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total solids	%	84	80.4	76	12.8	76.5	77.6	77.6	80.2	79	76.3	80.7	81.5	82.2	81.2	66.1	79.7	78	79.5

Notes:

ng/kg - nanograms per kilogram
ug/kg - microgram per kilogram
mg/kg - milligram per kilogram
Deg C - Degrees in Celsius
s.u. - standard unit
U - Not detected at the associated reporting limit.
J - Estimated concentration.
UJ - Not detected; associated reporting limit is estimated.
Dup - indicates the result from a duplicate sample

Table 3

First Phase Pre-Design Investigation Analytical Results - Southern Impoundment
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Area:	Units	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits	Southern Impoundment - Waste Pits
Sample Location:		SJSB040	SJSB040	SJSB040	SJSB040	SJSB040-Composite	SJSB041	SJSB041	SJSB041	SJSB041	SJSB041	SJSB041-Composite	SJSB041-Composite	SJSB042-Composite	SJSB042-Composite	SJSB043-Composite	SJSB044-Composite
Sample Identification:		SL0193	SL0194	SL0195	SL0196	SL0197	SL0198	SL0199	SL0200	SL0201	SL0202	SL0203	SL0204	SL0045	SL0046	SL0052	SL0243
Sample Date:		11/14/2018	11/14/2018	11/14/2018	11/14/2018	11/14/2018	11/15/2018	11/15/2018	11/15/2018	11/15/2018	11/15/2018	11/15/2018	11/15/2018	11/4/2018	11/4/2018	11/4/2018	11/16/2018
Sample Type:													Duplicate		Duplicate		
Sample Depth:		(2-4) ft bgs	(4-6) ft bgs	(6-8) ft bgs	(8-10) ft bgs	(0-10) ft bgs	(0-2) ft bgs	(2-4) ft bgs	(4-6) ft bgs	(6-8) ft bgs	(8-10) ft bgs	(0-10) ft bgs	(0-10) ft bgs	(0-10) ft bgs	(0-10) ft bgs	(0-10) ft bgs	(0-9) ft bgs
Integral Sample ID:		SJSB040-C2	SJSB040-C3	SJSB040-C4	SJSB040-C5	SJSB040-C6	SJSB041-C1	SJSB041-C2	SJSB041-C3	SJSB041-C4	SJSB041-C5	SJSB041-C6	SJSB041-C6 (Field split)	SJSB042-C6	SJSB042-C6 (Field split)	SJSB043-C6	SJSB044-C6
Dioxins/Furans																	
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	ng/kg	83.6	202	245	3330	715	158	193	298	6.02 U	3.93 J	142	78.6	45	51.8	1.51 J	12.6
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	ng/kg	1670	3370	3390	3680	1810	3700	4050	1830	393	299	1920	1000	4600 J	4870 J	212	473
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	ng/kg	22.1	54.4	65.1	105	37.4 J	46.3	298	101	2.1 J	2.48 J	78.4	41.8	16.7	19.6	1.06 J	3.67
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	ng/kg	85.5	181	214	174	98.1	185	227	82.6	12.8	10.1	90.7	47.3	135	146	7.06	18.1
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	ng/kg	1.65 U	3.09 J	1.93 U	16.9	4.65	4.19	106	38.8	0.6 J	0.775 J	25.3	14.8	1.09 U	1.51 J	0.177 J	0.434 U
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	6.28	9.12	7.33	104	23.2	7.35	1040	425	6.71	8.66	232	137	2.69 J	3.26	1.63 J	2.83 J
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	0.974 J	1.43 U	1.11 U	1.97 J	0.841 U	2.29 J	1.1 J	0.677 J	0.319 U	2.92 U	0.731 U	0.362 J	0.84 J	0.968 J	2.94 U	0.264 J
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	1.77 J	2.74 J	2.89 J	26.5	6.41	3.53	242	108	1.58 J	2.21 J	57.3	33.8	1.47 J	1.5 U	0.515 J	0.804 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	2.83 U	7.11	10.5	9.75	4.76	7.53	8.04	3.27 J	0.558 U	0.391 U	4.04	2.38 J	3.89	4.41	2.94 U	0.974 J
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.68 J	0.905 U	0.492 U	9.45	2.18 U	1.58 J	76.1	31.9	0.618 U	0.727 J	18.4	11.7	0.314 U	0.567 J	0.145 U	0.219 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	2.33 J	4.16	4.77	4.19	3.15 J	3.24 U	3.09 J	1.94 U	1.06 J	0.422 U	1.75 U	0.961 U	2 J	2.3 J	0.411 U	0.669 U
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	3.56	4.57	4.96	60.9	13.1	2.64 J	576	247	3.72	4.9	148	86	1.14 J	1.21 U	1.08 J	1.46 J
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	0.931 U	1.54 J	1.94 U	7.76 U	2.6 U	0.737 U	52.4	16	0.744 U	0.765 J	14.6	7.99 U	0.384 U	0.69 U	2.94 U	0.374 J
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	1.26 J	1.98 J	2.22 J	8.04	2.2 U	3.78	41.9	18.7	0.391 J	0.467 U	13.1	8.03	0.954 J	1.24 U	0.0866 U	0.776 J
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	3.01 J	4.16	4.87	54.5	11.3	3.42 U	465	168	3.04	4.05	117	68.9	1.65 J	1.85 J	0.651 U	0.897 U
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	ng/kg	52.2	89.7	115	2170	391	23.2	23500	5490	108	155	7270	5040	22.3	26.7	29.7	37.1
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	23.5	41.5	55.4	1640	199 J	11.3	16800	3640	47.6	67.4	4110	2790	7.34	8.69	9.9	18.8
Octachlorodibenzofuran (OCDF) 13C12	ng/kg	83.6	202	245	3330	715	158	193	298	0.554 U	3.93 J	142	78.6	45	51.8	1.51 J	12.6
Total dioxin/furan	pg/g	1960	3980	4120	11400	3320	4160	47700	12500	581	560	14200	9360	4840	5140	265	570
Total dioxin/furan (ND*0.5)	pg/g	1960	3980	4120	11400	3320	4160	47700	12500	582	561	14200	9370	4840	5140	266	571
Total dioxin/furan (ND*1)	pg/g	1960	3980	4130	11400	3320	4160	47700	12500	583	562	14200	9370	4840	5140	267	573
Total heptachlorodibenzofuran (HpCDF)	ng/kg	67.8	185	232	243	105	132	535	188	2.7 J	4.49	149	81.2	59.2	67.9	1.24 J	9.37
Total heptachlorodibenzo-p-dioxin (HpCDD)	ng/kg	230	439	430	440	237	465	464	205	61.5	59.1	217	115	363	402	28.7	49.6
Total hexachlorodibenzofuran (HxCDF)	ng/kg	26.9	57.4	54.3	221	57.9	43.4	1540	635	9.23	12.3	358	215	23.5	24.8	2.63 J	6.84
Total hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	36.3	75.6	75.6	102	23.9	68.8	55.9	45.2	35.3	57	47.9	29.1	56.9	62.5	12.1	14.5
Total pentachlorodibenzofuran (PeCDF)	ng/kg	15.7	24.8	16	213	45.2	25.2	1570	638	6.76	13.4	418	236	11	10.5	1.51 J	16.3
Total pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	3.37	10.6	7.12	13.4	0.916 J	10.2	70.4	26.1	6.32	14.3	23.9	3.27	0.703 J	4.21	1.49 J	0.573 J
Total TEQ 1998 (Avian) (ND*0.5)	ng/kg	81.3	140	180	3890	608	39.9	41000	9400	160	229	11600	7930	33.2	39.3	40.4	57.4
Total TEQ 1998 (Fish) (ND*0.5)	ng/kg	30.3	52.8	67.7	1800	230	17.8	18400	4090	56.1	79.5	4590	3100	11.3	13.2	12	22
Total TEQ Dioxin 1998 (Bird) (ND=0)	ng/kg	80.8	140	179	3890	607	37.7	41000	9400	160	229	11600	7930	33	38.8	40	56.9
Total TEQ Dioxin 1998 (Bird) (ND=1)	ng/kg	81.8	141	181	3900	610	42.1	41000	9400	161	229	11600	7940	33.4	39.9	40.9	58
Total TEQ Dioxin 1998 (Fish) (ND=0)	ng/kg	29.8	52.4	66.5	1800	229	16.5	18400	4090	55.7	79.4	4590	3100	11.1	12.7	11.7	21.7
Total TEQ Dioxin 1998 (Fish) (ND=1)	ng/kg	30.8	53.2	69	1800	232	19	18400	4090	56.6	79.6	4590	3110	11.5	13.8	12.4	22.3
Total TEQ Dioxin Texas TEF (ND=0)	ng/kg	31.7	56.1	72.4	1900	248	16.4	19600	4350	61.1	86.7	4940	3350	11.6	13.4	13.1	23.3
Total TEQ Dioxin Texas TEF (ND=0.5)	ng/kg	32.1	56.2	72.9	1910	249	17.6	19600	4350	61.3	86.8	4940	3350	11.7	13.8	13.4	23.6
Total TEQ Dioxin Texas TEF (ND=1)	ng/kg	32.5	56.3	73.5	1910	250	18.8	19600	4350	61.6	86.9	4940	3360	11.9	14.1	13.7	23.9
Total tetrachlorodibenzofuran (TCDF)	ng/kg	83.2	142	189	3460	690	40.5	31700	9090	189	269	7120	4350	38.4	40.7	42	77
Total tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	23.5	54.2	55.4	1090	218	11.3	8760	2480	65.9	99.8	1970	1210	7.34	12.6	9.9	23.3
Total WHO Dioxin TEQ(Human/Mammal)(ND=0)	ng/kg	32.7	59.4	75.2	1900	248	19.8	19500	4320	60.7	86.4	4930	3340	14.2	16.2	13.3	23.8
Total WHO Dioxin TEQ(Human/Mammal)(ND=0.5)	ng/kg	33.3	59.5	76.2	1900	249	20.9	19500	4320	61.1	86.5	4930	3340	14.4	16.7	13.5	24
Total WHO Dioxin TEQ(Human/Mammal)(ND=1)	ng/kg	33.9	59.6	77.3	1900	251	21.9	19500	4320	61.6	86.6	4930	3350	14.6	17.2	13.8	24.2
Asbestos																	
Asbestos	%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Polychlorinated biphenyls (PCBs)																	
Aroclor (unspecified)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1016 (PCB-1016)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1221 (PCB-1221)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1232 (PCB-1232)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1242 (PCB-1242)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1248 (PCB-1248)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1254 (PCB-1254)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1260 (PCB-1260)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1262 (PCB-1262)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aroclor-1268 (PCB-1268)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs (7)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs (ND*0)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs (ND*0.5)	ug/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (TPH)																	
Total Petroleum Hydrocarbons	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C12-C28)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C25-C36) ORO	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C28-C35)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C12)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
General Chemistry																	
Cyanide (total)	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Flash point (closed cup)	Deg C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Moisture	%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Percent solids	%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH, lab	s.u.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Reactive cyanide	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfate	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfide	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfur	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total solids	%	78.4	73.9	51.1	69.1	72.5	82.6	71.2	74.6	76.7	78.4	77.1	77.3	80	78.7	80.2	79.4

Notes:
- ng/kg - nanograms per kilogram
- ug/kg - microgram per kilogram
- mg/kg - milligram per kilogram
- Deg C - Degrees in Celsius
- s.u. - standard unit
- U - Not detected at the associated reporting limit.
- J - Estimated concentration.
- UJ - Not detected; associated reporting limit is estimated.
- Dup - indicates the result from a duplicate sample

Table 4

Second Phase Pre-Design Investigation Analytical Results - Southern Impoundment
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Sample Location: Sample Identification: Sample Date: Sample Depth: Sample Type:	Units	SJSB059 11187072-101219-BN-SJSB059-S (0-2) 10/12/2019 (0-2) ft bgs	SJSB059 11187072-101219-BN-SJSB059-S (2-4) 10/12/2019 (2-4) ft bgs	SJSB059 11187072-101219-BN-SJSB059-S (4-6) 10/12/2019 (4-6) ft bgs	SJSB059 11187072-101219-BN-SJSB059-S (6-8) 10/12/2019 (6-8) ft bgs	SJSB059 11187072-101219-BN-SJSB059-S (8-10) 10/12/2019 (8-10) ft bgs	SJSB060 11187072-100819-BN-SJSB060-S (0-2) 10/8/2019 (0-2) ft bgs	SJSB060 11187072-100819-BN-SJSB060-S (2-4) 10/8/2019 (2-4) ft bgs	SJSB060 11187072-100819-BN-DUP4 10/8/2019 (4-6) ft bgs Duplicate	SJSB060 11187072-100819-BN-SJSB060-S (4-6) 10/8/2019 (4-6) ft bgs
Dioxins/Furans										
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	ng/kg	25	2.8 U	38	630	91	86	36	20	1.1 U
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD	ng/kg	13000 J	340	700	4300	2600	1600	1300	250	680
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	ng/kg	6.5	0.91 J	8.0 J	99	6.9 J	30	15	1.3 J	0.60 U
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD	ng/kg	130	8.6	54	310	79	160	100	18	48
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	ng/kg	0.61 J	0.057 U	0.23 U	29 J	1.3 J	3.1 J	1.0 U	0.15 U	0.10 U
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	1.2 J	0.29 J	1.1 J	450	6.0 J	9.6	2.3 J	0.56 J	0.39 J
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	1.2 J	0.27 J	0.18 U	2.6 J	1.1 J	1.8 J	1.6 J	0.46 J	0.48 J
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.71 J	0.052 U	0.60 J	110	1.6 J	3.1 J	1.2 J	0.10 U	0.12 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	2.5 J	0.42 J	3.8 J	13 J	2.1 J	6.0 J	4.7 J	1.1 J	2.2 J
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.14 U	0.062 U	0.15 U	13 J	0.10 U	0.43 U	0.16 U	0.12 U	0.15 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	3.4 J	0.69 J	3.7 J	6.4 J	3.9 J	5.4 J	4.3 J	2.0 J	2.1 J
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	0.32 J	0.21 J	0.13 U	360	2.8 J	4.0 J	0.74 J	0.21 J	0.098 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	0.61 J	0.38 J	0.81 J	7.8 J	1.4 J	1.5 J	1.1 J	0.099 U	0.52 U
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.41 J	0.051 U	0.13 U	16 J	0.34 J	1.2 J	0.67 J	0.11 U	0.12 U
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	0.42 J	0.12 J	0.28 J	150	2.0 J	2.5 J	0.83 J	0.10 U	0.42 J
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	ng/kg	5.8	1.6	0.96 J	1400	78	66	13	1.6 U	7.3
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	1.9	0.71 J	0.73 J	730	28	20	4.7	0.86 J	1.4 J
Total heptachlorodibenzofuran (HpCDF)	ng/kg	17 J	1.7 J	25 J	330 J	16 J	88 J	38 J	1.9 J	1.1 J
Total heptachlorodibenzo-p-dioxin (HpCDD)	pg/g	340 J	24 J	120 J	700 J	230 J	430 J	250 J	50 J	120 J
Total hexachlorodibenzofuran (HxCDF)	pg/g	12 J	1.7 J	9.3 J	790 J	15 J	52 J	23 J	0.94 J	1.4 J
Total hexachlorodibenzo-p-dioxin (HxCDD)	pg/g	38 J	6.2 J	35 J	110 J	54 J	71 J	48 J	18 J	28 J
Total pentachlorodibenzofuran (PeCDF)	ng/kg	6.0 J	1.4 J	3.7 J	880 J	14 J	29 J	12 J	0.60 J	0.58 J
Total pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	2.5 J	0.98 J	7.2 J	23 J	13 J	3.7 J	8.5 J	3.0 J	6.2 J
Total tetrachlorodibenzofuran (TCDF)	ng/kg	16 J	7.6 J	10 J	3700 J	150 J	110 J	25 J	8.2 J	13 J
Total tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	3.5 J	1.6 J	1.9 J	810 J	36 J	27 J	7.9 J	3.8 J	4.8 J
Total WHO Dioxin TEQ(Human/Mammal)(ND=0)	ng/kg	9.45	1.66	3.48	1000	41.7	34.1	10.4	1.55	3.46
Total WHO Dioxin TEQ(Human/Mammal)(ND=0.5)	ng/kg	9.45	1.67	3.51	1000	41.1	34.1	10.4	1.71	3.74

Notes:
- ng/kg - nanograms per kilogram
- U - Not detected at the associated reporting limit.
- J - Estimated concentration.

Table 4

Second Phase Pre-Design Investigation Analytical Results - Southern Impoundment
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Sample Location: Sample Identification: Sample Date: Sample Depth: Sample Type:	Units	SJSB060 11187072-100819-BN-SJSB060-S (6-8) 10/8/2019 (6-8) ft bgs	SJSB060 11187072-100819-BN-SJSB060-S (8-10) 10/8/2019 (8-10) ft bgs	SJSB060-C1 11187072-100819-BN-SJSB060-C1-S (0-2) 10/8/2019 (0-2) ft bgs	SJSB060-C1 11187072-100819-BN-SJSB060-C1-S (2-4) 10/8/2019 (2-4) ft bgs	SJSB060-C1 11187072-100819-BN-SJSB060-C1-S (4-6) 10/8/2019 (4-6) ft bgs	SJSB060-C1 11187072-100819-BN-SJSB060-C1-S (6-8) 10/8/2019 (6-8) ft bgs	SJSB060-C1 11187072-100819-BN-SJSB060-C1-S (8-10) 10/8/2019 (8-10) ft bgs	SJSB060-C2 11187072-112419-NG-Dup 1 11/24/2019 (0-2) ft bgs Duplicate	SJSB060-C2 11187072-112419-NG-SJSB060-C2(0-2) 11/24/2019 (0-2) ft bgs
Dioxins/Furans										
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	ng/kg	2400	13000 J	14	4.2 U	110	910	13000	40	65
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD	ng/kg	22000	6700	2200	350	2600	6600	9300	1500	2900
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	ng/kg	1900	330	6.5	1.1 J	51	480	340	18	32
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD	ng/kg	1900	490	42	17	270	560	640	110	130
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	ng/kg	580	31	0.62 J	0.090 U	6.3 J	140 J	36 J	1.2 J	1.5 J
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	6400	69 J	1.2 J	0.082 U	8.2	1100	100	2.5 J	3.4 J
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	14 J	6.9 J	0.54 J	0.24 J	1.9 J	8.8 J	7.6 J	1.5 J	1.6 J
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	1600 J	17	0.59 J	0.082 U	4.8 J	340 J	26 J	2.2 J	2.2 J
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	75 J	29	0.95 J	0.87 J	9.7	36 J	34 J	3.8 J	4.4 J
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	ng/kg	110 J	0.50 U	0.098 U	0.10 U	0.62 U	26 J	0.59 U	0.20 U	0.21 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	28 J	19	1.9 J	1.4 J	6.0 J	26 J	18 J	3.5 J	4.4 J
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	4600	34	0.14 J	0.11 U	2.4 J	770	56	1.3 J	1.2 J
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	410	8.9 J	0.38 U	0.33 U	1.3 J	110 J	13 J	0.51 J	0.68 J
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	210 J	8.1 J	0.40 J	0.12 J	1.5 J	48 J	9.3 J	1.0 J	1.5 J
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	3100	30	0.23 J	0.10 U	1.8 J	540	44	0.98 J	1.2 J
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	ng/kg	150000 J	1300	0.78 U	0.99 U	19	27000 J	1600	8.8	16
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	30000 J	540	0.26 J	0.13 J	3.6	9500	760	2.0	3.6
Total heptachlorodibenzofuran (HpCDF)	ng/kg	3400 J	700 J	13 J	2.6 J	170 J	1100 J	820 J	45 J	75 J
Total heptachlorodibenzo-p-dioxin (HpCDD)	pg/g	4200 J	1100 J	120 J	50 J	550 J	1200 J	1500 J	270 J	320 J
Total hexachlorodibenzofuran (HxCDF)	pg/g	9800 J	320 J	8.3 J	2.0 J	96 J	2100 J	420 J	26 J	40 J
Total hexachlorodibenzo-p-dioxin (HxCDD)	pg/g	970 J	290 J	17 J	18 J	150 J	380 J	310 J	36 J	41 J
Total pentachlorodibenzofuran (PeCDF)	ng/kg	13000 J	330 J	3.2 J	0.11 U	40 J	2400 J	370 J	13 J	23 J
Total pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	610 J	83 J	2.6 J	6.1 J	29 J	230 J	94 J	1.9 J	5.1 J
Total tetrachlorodibenzofuran (TCDF)	ng/kg	260000 J	3500 J	2.5 J	2.6 J	59 J	45000 J	5100 J	11 J	24 J
Total tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	33000 J	620 J	1.2 J	3.0 J	15 J	11000 J	860 J	3.3 J	5.9 J
Total WHO Dioxin TEQ(Human/Mammal)(ND=0)	ng/kg	47400	718	2.05	0.679	14.7	12700	984	6.93	10.6
Total WHO Dioxin TEQ(Human/Mammal)(ND=0.5)	ng/kg	47400	718	2.28	0.924	14.7	12700	984	6.94	10.6

Notes:
ng/kg - nanograms per kilogram
U - Not detected at the associated reporting limit.
J - Estimated concentration.

Table 4

Second Phase Pre-Design Investigation Analytical Results - Southern Impoundment
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Sample Location: Sample Identification: Sample Date: Sample Depth: Sample Type:	Units	SJSB060-C2 11187072-112419-NG-SJSB060-C2(2-4) 11/24/2019 (2-4) ft bgs	SJSB060-C2 11187072-112419-NG-SJSB060-C2(4-6) 11/24/2019 (4-6) ft bgs	SJSB060-C2 11187072-112419-NG-SJSB060-C2(6-8) 11/24/2019 (6-8) ft bgs	SJSB060-C2 11187072-112419-NG-SJSB060-C2(8-10) 11/24/2019 (8-10) ft bgs	SJSB060-C3 11187072-112419-NG-Dup 2 11/24/2019 (0-2) ft bgs Duplicate	SJSB060-C3 11187072-112419-NG-SJSB060-C3(0-2) 11/24/2019 (0-2) ft bgs	SJSB060-C3 11187072-112419-NG-SJSB060-C3(2-4) 11/24/2019 (2-4) ft bgs	SJSB060-C3 11187072-112419-NG-SJSB060-C3(4-6) 11/24/2019 (4-6) ft bgs	SJSB060-C3 11187072-112419-NG-SJSB060-C3(6-8) 11/24/2019 (6-8) ft bgs
Dioxins/Furans										
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	ng/kg	47	7.6 J	1.8 J	4.0 J	94 J	24 J	35	0.81 U	2.7 J
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD	ng/kg	4400	500	190	170	3800 J	740 J	2200	94	880
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	ng/kg	37	3.4 J	0.73 J	1.4 J	46 J	10 J	19	0.33 U	0.70 J
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD	ng/kg	120	18	8.1	9.1	190 J	60 J	97	5.4 J	27
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	ng/kg	1.6 J	0.47 U	0.20 U	0.17 U	2.0 J	0.76 J	0.89 J	0.066 U	0.17 U
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	5.2 J	2.5 J	0.60 J	0.43 J	5.5 J	1.2 J	2.3 J	0.10 U	0.17 J
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	1.2 J	0.48 U	0.32 U	0.35 U	2.1 J	0.90 U	0.81 U	0.33 U	0.73 U
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	3.8 J	1.0 J	0.27 J	0.089 U	2.7 J	0.94 J	1.0 J	0.096 U	0.096 J
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	4.0 J	0.47 J	0.33 J	0.35 J	5.9 J	2.6 J	2.2 J	0.28 J	0.71 J
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.23 U	0.10 U	0.29 U	0.20 U	0.32 U	0.12 U	0.23 U	0.21 U	0.19 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	3.7 J	1.0 J	0.67 J	0.74 J	5.8 J	2.0 J	1.8 J	0.50 J	1.7 J
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	2.9 J	1.8 J	0.63 U	0.40 U	1.7 J	0.60 U	1.0 U	0.25 U	0.27 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	0.89 J	0.39 J	0.19 J	0.080 U	0.72 J	0.34 J	0.45 J	0.089 U	0.13 U
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	1.6 J	0.26 J	0.12 J	0.057 U	1.8 J	0.62 J	0.54 J	0.069 U	0.054 U
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	2.2 J	1.1 J	0.33 J	0.23 J	1.5 J	0.48 J	0.73 J	0.095 J	0.066 U
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	ng/kg	50	42	11	5.9	16 J	2.9 J	15	0.52 U	0.46 U
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	18	16	4.1	2.3	3.4 J	0.75 J	4.5	0.53 J	0.18 J
Total heptachlorodibenzofuran (HpCDF)	ng/kg	97 J	8.3 J	1.7 J	4.0 J	110 J	23 J	53 J	0.73 J	1.6 J
Total heptachlorodibenzo-p-dioxin (HpCDD)	pg/g	270 J	54 J	28 J	29 J	440 J	140 J	220 J	20 J	89 J
Total hexachlorodibenzofuran (HxCDF)	pg/g	51 J	6.0 J	1.7 J	1.2 J	52 J	13 J	20 J	0.37 J	0.73 J
Total hexachlorodibenzo-p-dioxin (HxCDD)	pg/g	39 J	13 J	10 J	11 J	51 J	20 J	25 J	6.7 J	20 J
Total pentachlorodibenzofuran (PeCDF)	ng/kg	36 J	4.7 J	1.3 J	0.82 J	22 J	6.3 J	6.1 J	0.58 J	0.85 J
Total pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	5.6 J	2.0 J	2.4 J	1.6 J	2.9 J	1.2 J	3.5 J	1.1 J	5.0 J
Total tetrachlorodibenzofuran (TCDF)	ng/kg	66 J	49 J	17 J	8.2 J	23 J	3.7 J	21 J	0.77 J	1.7 J
Total tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	21 J	19 J	6.4 J	3.7 J	5.2 J	1.2 J	7.6 J	1.6 J	3.6 J
Total WHO Dioxin TEQ(Human/Mammal)(ND=0)	ng/kg	29.5	21.9	5.83	3.27	12.1	3.20	9.29	0.719	0.989
Total WHO Dioxin TEQ(Human/Mammal)(ND=0.5)	ng/kg	29.5	21.9	5.87	3.35	12.2	3.26	9.36	0.835	1.14

Notes:

ng/kg - nanograms per kilogram

U - Not detected at the associated reporting limit.

J - Estimated concentration.

Table 4

Second Phase Pre-Design Investigation Analytical Results - Southern Impoundment
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Sample Location: Sample Identification: Sample Date: Sample Depth: Sample Type:	Units	SJSB060-C3 11187072-112419-NG-SJSB060-C3(8-10) 11/24/2019 (8-10) ft bgs	SJSB061 11187072-091619-BN-SJSB061-S (0-2) 9/16/2019 (0-2) ft bgs	SJSB061 11187072-091619-BN-SJSB061-S (2-4) 9/16/2019 (2-4) ft bgs	SJSB061 11187072-091619-BN-SJSB061-S (4-6) 9/16/2019 (4-6) ft bgs	SJSB061 11187072-091619-BN-SJSB061-S (6-8) 9/16/2019 (6-8) ft bgs	SJSB061 11187072-091619-BN-DUP3 9/16/2019 (8-10) ft bgs Duplicate	SJSB061 11187072-091619-BN-SJSB061-S (8-10) 9/16/2019 (8-10) ft bgs	SJSB061-C1 11187072-091619-BN-SJSB061-C1-S (0-2) 9/16/2019 (0-2) ft bgs	SJSB061-C1 11187072-091619-BN-SJSB061-C1-S (2-4) 9/16/2019 (2-4) ft bgs
Dioxins/Furans										
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	ng/kg	0.80 U	15	16	64	180 J	5.4 J	22	48	150
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	ng/kg	150	720	300	2900	1500	72	81	1000	2400
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	ng/kg	0.25 U	5.6	3.6 J	22	91 J	0.59 J	3.0 J	17	51
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	ng/kg	5.0 J	40	26	160	140 J	3.5 J	5.6 J	71	230
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	ng/kg	0.086 U	0.53 J	0.50 J	4.3 J	24 J	0.29 U	0.68 J	2.3 J	6.3
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.091 U	0.75 J	1.3 J	19	300 J	0.95 J	7.1	7.8	19
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	0.26 U	0.29 J	0.37 J	1.4 J	3.9 U	0.096 J	0.13 J	1.2 J	1.9 J
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.085 U	0.49 J	0.61 J	4.7 J	63 J	0.25 J	1.6 J	2.7 J	5.8 J
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	0.21 J	0.99 J	1.1 J	5.7 J	3.8 U	0.10 J	0.16 J	3.3	8.1
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.20 U	0.11 U	0.17 U	0.44 J	8.0 U	0.075 U	0.12 U	0.30 U	0.69 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	0.36 J	0.86 J	1.1 J	4.5 J	3.6 U	0.22 J	0.30 J	3.6	5.7
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	0.18 U	0.36 J	0.51 J	10	140 J	0.51 J	3.1 J	2.8 J	10
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	0.097 U	0.22 J	0.39 J	1.7 J	13 J	0.10 J	0.35 J	0.29 U	2.0 J
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.060 U	0.25 J	0.13 U	1.5 J	6.4 U	0.060 U	0.32 J	1.8 J	1.7 J
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	0.055 U	0.45 J	0.55 J	6.5	78 J	0.27 J	1.8 J	2.4 J	6.7
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	ng/kg	0.23 U	3.5	19	220	3500	12 J	74 J	69	250
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	0.12 J	0.92 J	5.1	83	1300	4.2 J	25 J	24	77
Total heptachlorodibenzofuran (HpCDF)	ng/kg	0.61 J	15 J	14 J	90 J	170 J	1.2 J	5.6 J	49 J	180 J
Total heptachlorodibenzo-p-dioxin (HpCDD)	pg/g	17 J	91 J	82 J	580 J	290 J	12 J	14 J	190 J	730 J
Total hexachlorodibenzofuran (HxCDF)	pg/g	0.20 J	8.7 J	10 J	73 J	410 J	1.4 J	11 J	41 J	100 J
Total hexachlorodibenzo-p-dioxin (HxCDD)	pg/g	5.7 J	13 J	15 J	81 J	32 J	4.0 J	4.7 J	47 J	89 J
Total pentachlorodibenzofuran (PeCDF)	ng/kg	0.18 J	7.9 J	6.7 J	47 J	340 J	1.2 J	8.6 J	25 J	56 J
Total pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	1.0 J	1.2 J	1.3 J	8.7 J	13 J	0.72 J	0.97 J	4.9 J	7.7 J
Total tetrachlorodibenzofuran (TCDF)	ng/kg	0.36 J	10 J	38 J	460 J	6800 J	25 J	150 J	130 J	430 J
Total tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	1.2 J	1.6 J	6.7 J	99 J	1400 J	5.4 J	28 J	33 J	92 J
Total WHO Dioxin TEQ(Human/Mammal)(ND=0)	ng/kg	0.272	2.68	8.41	115	1730	5.82	34.5	35.0	114
Total WHO Dioxin TEQ(Human/Mammal)(ND=0.5)	ng/kg	0.380	2.69	8.43	115	1730	5.83	34.5	35.1	114

Notes:

ng/kg - nanograms per kilogram

U - Not detected at the associated reporting limit.

J - Estimated concentration.

Table 4

Second Phase Pre-Design Investigation Analytical Results - Southern Impoundment
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Sample Location: Sample Identification: Sample Date: Sample Depth: Sample Type:	Units	SJSB061-C1 11187072-091619-BN-SJSB061-C1-S (4-6) 9/16/2019 (4-6) ft bgs	SJSB061-C1 11187072-091619-BN-SJSB061-C1-S (6-8) 9/16/2019 (6-8) ft bgs	SJSB061-C1 11187072-091619-BN-SJSB061-C1-S (8-10) 9/16/2019 (8-10) ft bgs	SJSB061-C2 11187072-112319-SS-DUP-1 11/25/2019 (0-2) ft bgs Duplicate	SJSB061-C2 11187072-112519-SS-SJSB061-C2(0-2) 11/25/2019 (0-2) ft bgs	SJSB061-C2 11187072-112519-SS-SJSB061-C2(2-4) 11/25/2019 (2-4) ft bgs	SJSB061-C2 11187072-112619-SS-SJSB061-C2(4-6) 11/26/2019 (4-6) ft bgs	SJSB061-C2 11187072-112619-SS-SJSB061-C2(6-8) 11/26/2019 (6-8) ft bgs	SJSB061-C2 11187072-112619-SS-SJSB061-C2(8-10) 11/26/2019 (8-10) ft bgs
Dioxins/Furans										
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	ng/kg	42	3600	32	4.3 U	15	12	73	130	93
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD	ng/kg	760	5900	130	950	350	620	3000	4800	6300
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	ng/kg	11	340	1.9 J	1.5 J	4.0 J	3.6 J	28	21	25
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD	ng/kg	71	550	7.5	15	25	26	170	160	160
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	ng/kg	1.6 J	82	0.50 J	0.63 J	0.43 J	0.29 U	1.0 J	1.6 J	2.3 J
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	6.9	820	3.6	0.59 J	0.13 U	0.43 J	2.7 J	0.29 U	3.4 J
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	1.0 J	6.7 J	0.095 J	0.71 J	0.38 U	0.51 U	2.2 J	1.1 J	1.9 J
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	1.9 J	190 J	0.93 J	0.50 J	0.12 U	0.25 J	1.7 J	1.0 J	1.9 J
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	2.9 J	25 J	0.24 J	0.83 J	0.85 J	0.92 J	9.2	3.6 J	4.6 J
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.24 U	15 J	0.091 J	0.59 J	0.21 J	0.071 U	0.13 U	0.18 U	0.74 J
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	3.2	16 J	0.48 J	1.5 J	0.72 J	1.1 J	6.1 J	2.9 J	4.1 J
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	4.7	530	2.4 J	0.40 J	0.16 J	0.16 J	0.89 J	0.11 U	1.3 J
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	0.95 J	55 J	0.40 J	0.47 J	0.090 U	0.24 J	0.98 J	0.31 J	0.81 J
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.47 J	28 J	0.18 J	0.43 J	0.23 J	0.22 J	1.0 J	0.61 J	1.4 J
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	2.6 J	330	1.6 J	0.34 J	0.12 J	0.16 J	0.86 J	0.50 J	1.1 J
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	ng/kg	99	4400	55	1.2	0.41 J	3.4	12	0.71 J	1.8
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	37	4200	21	0.54 J	0.075 U	1.1 J	4.0	0.30 J	0.37 J
Total heptachlorodibenzofuran (HpCDF)	ng/kg	43 J	680 J	3.9 J	3.8 J	12 J	10 J	63 J	100 J	95 J
Total heptachlorodibenzo-p-dioxin (HpCDD)	pg/g	240 J	1200 J	22 J	41 J	48 J	74 J	430 J	330 J	490 J
Total hexachlorodibenzofuran (HxCDF)	pg/g	32 J	1300 J	6.7 J	3.1 J	3.9 J	3.8 J	32 J	20 J	43 J
Total hexachlorodibenzo-p-dioxin (HxCDD)	pg/g	58 J	320 J	7.6 J	8.0 J	5.7 J	10 J	77 J	40 J	62 J
Total pentachlorodibenzofuran (PeCDF)	ng/kg	22 J	1600 J	7.4 J	1.4 J	1.6 J	1.3 J	16 J	8.9 J	25 J
Total pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	8.3 J	110 J	1.9 J	0.60 J	0.38 J	0.50 J	8.6 J	5.5 J	10 J
Total tetrachlorodibenzofuran (TCDF)	ng/kg	170 J	30000 J	130 J	2.0 J	0.84 J	3.9 J	20 J	5.3 J	18 J
Total tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	52 J	4700 J	24 J	0.54 J	0.075 U	1.3 J	6.0 J	2.6 J	6.3 J
Total WHO Dioxin TEQ(Human/Mammal)(ND=0)	ng/kg	51.5	4930	28.2	2.22	0.687	2.51	11.7	5.06	7.32
Total WHO Dioxin TEQ(Human/Mammal)(ND=0.5)	ng/kg	51.5	4930	28.2	2.22	0.801	2.54	11.7	5.08	7.32

Notes:

ng/kg - nanograms per kilogram

U - Not detected at the associated reporting limit.

J - Estimated concentration.

Table 4

Second Phase Pre-Design Investigation Analytical Results - Southern Impoundment
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Sample Location: Sample Identification: Sample Date: Sample Depth: Sample Type:	Units	SJSB062 11187072-091619-BN-SJSB062-S (0-2) 9/16/2019 (0-2) ft bgs	SJSB062 11187072-091619-BN-SJSB062-S (2-4) 9/16/2019 (2-4) ft bgs	SJSB062 11187072-091619-BN-SJSB062-S (4-6) 9/16/2019 (4-6) ft bgs	SJSB062 11187072-091619-BN-SJSB062-S (6-8) 9/16/2019 (6-8) ft bgs	SJSB062 11187072-091619-BN-SJSB062-S (8-10) 9/16/2019 (8-10) ft bgs	SJSB063 11187072-091619-BN-SJSB063-S (0-2) 9/16/2019 (0-2) ft bgs	SJSB063 11187072-091619-BN-SJSB063-S (2-4) 9/16/2019 (2-4) ft bgs	SJSB063 11187072-091619-BN-SJSB063-S (4-6) 9/16/2019 (4-6) ft bgs	SJSB063 11187072-091619-BN-SJSB063-S (6-8) 9/16/2019 (6-8) ft bgs
Dioxins/Furans										
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	ng/kg	54	24	0.90 U	0.15 U	0.14 U	78	120	83	43
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD	ng/kg	760	620	210	150	100	1600	6900 J	6200	7200 J
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	ng/kg	13	8.6	0.45 J	0.14 U	0.11 U	23	51	39	21
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD	ng/kg	58	50	11	7.9	6.1 J	140	600	590	1200
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	ng/kg	1.8 J	1.0 J	0.071 U	0.034 U	0.042 U	2.0 J	5.0 J	3.8 J	3.0 J
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	6.1	3.4 J	0.96 J	0.14 J	0.39 J	3.9 J	13	3.6 J	2.4 J
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	0.57 U	0.64 J	0.049 U	0.064 U	0.046 U	0.37 U	2.1 J	1.7 J	0.32 U
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	2.5 J	1.3 J	0.24 J	0.037 U	0.12 J	2.4 J	6.0 J	2.3 J	1.6 J
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	3.3 J	2.0 J	0.37 J	0.063 U	0.048 U	4.0 J	11	12	39
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.29 U	0.22 U	0.10 U	0.049 U	0.050 U	0.52 U	0.66 U	0.27 U	0.27 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	2.7 J	2.5 J	0.86 J	0.64 J	0.58 J	3.0 J	6.7	6.0 J	15
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	2.7 J	1.5 J	0.42 J	0.086 J	0.39 J	1.4 J	4.9 J	0.93 J	0.62 J
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	0.14 U	1.1 U	0.090 U	0.22 J	0.22 J	1.8 U	0.14 U	0.69 U	1.0 J
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.54 J	0.78 J	0.086 U	0.042 U	0.041 U	1.2 J	2.4 J	1.1 J	0.63 J
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	1.9 J	1.5 J	0.21 J	0.026 U	0.16 J	1.7 J	4.3 J	1.2 J	0.73 J
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	ng/kg	45	27	7.4	2.1 J	6.0	17	37	8.6	4.1
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	12	8.1	2.4	1.0 J	1.9	6.0	13	2.3	0.50 J
Total heptachlorodibenzofuran (HpCDF)	ng/kg	32 J	26 J	1.1 J	0.22 J	0.31 J	71 J	170 J	130 J	81 J
Total heptachlorodibenzo-p-dioxin (HpCDD)	pg/g	120 J	130 J	40 J	39 J	33 J	320 J	1200 J	1100 J	2000 J
Total hexachlorodibenzofuran (HxCDF)	pg/g	34 J	22 J	2.6 J	0.14 J	0.50 J	55 J	110 J	52 J	39 J
Total hexachlorodibenzo-p-dioxin (HxCDD)	pg/g	25 J	30 J	36 J	34 J	31 J	45 J	93 J	87 J	260 J
Total pentachlorodibenzofuran (PeCDF)	ng/kg	31 J	16 J	1.6 J	0.086 J	0.91 J	41 J	61 J	21 J	16 J
Total pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	2.4 J	1.1 U	3.2 J	4.9 J	9.1 J	2.2 J	3.9 J	1.8 J	11 J
Total tetrachlorodibenzofuran (TCDF)	ng/kg	100 J	58 J	15 J	3.7 J	13 J	66 J	110 J	38 J	22 J
Total tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	17 J	13 J	18 J	27 J	28 J	14 J	21 J	7.7 J	3.1 J
Total WHO Dioxin TEQ(Human/Mammal)(ND=0)	ng/kg	19.7	13.2	3.64	1.63	2.98	11.9	30.9	14.4	22.4
Total WHO Dioxin TEQ(Human/Mammal)(ND=0.5)	ng/kg	19.8	13.7	3.69	1.65	2.99	12.8	31.0	14.8	22.5

Notes:

ng/kg - nanograms per kilogram

U - Not detected at the associated reporting limit.

J - Estimated concentration.

Table 4

Second Phase Pre-Design Investigation Analytical Results - Southern Impoundment
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Sample Location: Sample Identification: Sample Date: Sample Depth: Sample Type:	Units	SJSB063 11187072-091619-BN-DUP2 9/16/2019 (8-10) ft bgs Duplicate	SJSB063 11187072-091619-BN-SJSB063-S (8-10) 9/16/2019 (8-10) ft bgs	SJSB064 11187072-100719-BN-SJSB064-S(0-2) 10/7/2019 (0-2) ft bgs	SJSB064 11187072-100719-BN-SJSB064-S(2-4) 10/7/2019 (2-4) ft bgs	SJSB064 11187072-100719-BN-SJSB064-S(4-6) 10/7/2019 (4-6) ft bgs	SJSB064 11187072-100719-BN-SJSB064-S(6-8) 10/7/2019 (6-8) ft bgs	SJSB064 11187072-100719-BN-DUP2A 10/7/2019 (8-10) ft bgs Duplicate	SJSB064 11187072-100719-BN-SJSB064-S(8-10) 10/7/2019 (8-10) ft bgs	SJSB065 11187072-091219-BN-SJSB065-S(0-2) 9/12/2019 (0-2) ft bgs
Dioxins/Furans										
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	ng/kg	3.1 J	15 J	38	23	140	250	5.2 J	160 J	150 J
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD	ng/kg	1800	1500	330	800	12000	27000	280 J	7300 J	8600
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	ng/kg	0.68 J	7.2 J	18	7.0	59	120	1.1 J	56 J	57 J
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD	ng/kg	56	110	28	48	590	1800	18 J	590 J	350
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	ng/kg	0.17 U	0.89 J	0.46 J	0.82 J	4.3 J	7.4 J	0.71 J	3.8 J	4.5 J
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.084 U	0.90 J	1.1 J	1.5 J	3.4 J	9.1 J	0.27 J	4.9 J	30 J
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	0.078 U	0.61 J	0.43 U	0.63 U	2.0 J	4.4 U	0.57 U	3.6 J	5.3 J
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.082 U	0.91 J	0.62 J	0.87 J	5.7 J	4.6 J	0.24 J	3.2 J	10 J
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	1.3 J	2.9 J	1.8 J	1.5 J	12	100	0.74 J	17 J	10 J
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.11 U	0.16 U	0.21 J	0.14 J	0.65 J	0.99 U	0.32 J	0.27 J	2.4 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	2.8 J	2.0 J	0.93 J	1.2 J	5.3 J	36 J	1.0 J	9.9	10 U
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	0.16 J	0.32 J	0.52 J	1.2 J	1.3 J	8.4 J	0.12 J	2.2 J	18 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	0.51 J	0.26 U	0.24 J	0.27 J	1.0 J	4.7 J	0.20 J	2.5 J	4.1 U
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.091 U	0.32 J	0.53 J	0.74 J	1.6 J	3.0 J	0.27 J	2.0 J	2.6 U
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	0.094 U	0.50 J	0.54 J	1.6 J	1.0 J	8.8 J	0.074 U	2.4 J	12 J
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	ng/kg	1.9	4.3 J	14	6.6	9.5	740	0.49 J	35 J	450
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	1.0 J	1.3 J	3.9	0.40 J	2.7	200	0.20 J	8.1 J	130
Total heptachlorodibenzofuran (HpCDF)	ng/kg	1.4 J	25 J	32 J	21 J	200 J	390 J	3.3 J	210 J	180 J
Total heptachlorodibenzo-p-dioxin (HpCDD)	pg/g	170 J	220 J	73 J	99 J	1200 J	4300 J	55 J	1100 J	760 J
Total hexachlorodibenzofuran (HxCDF)	pg/g	0.37 J	15 J	12 J	12 J	81 J	220 J	1.8 J	80 J	88 J
Total hexachlorodibenzo-p-dioxin (HxCDD)	pg/g	41 J	28 J	15 J	12 J	94 J	920 J	19 J	180 J	100 J
Total pentachlorodibenzofuran (PeCDF)	ng/kg	0.56 J	11 J	4.9 J	13 J	21 J	95 J	0.29 J	34 J	65 J
Total pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	9.0 J	1.7 J	1.7 J	1.8 J	8.9 J	89 J	4.0 J	32 J	4.1 U
Total tetrachlorodibenzofuran (TCDF)	ng/kg	8.0 J	23 J	24 J	20 J	24 J	1100 J	1.1 J	77 J	680 J
Total tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	6.1 J	3.8 J	4.8 J	0.40 J	3.7 J	240 J	4.0 J	18 J	150 J
Total WHO Dioxin TEQ(Human/Mammal)(ND=0)	ng/kg	3.22	4.29	6.81	3.25	18.2	324	1.02	27.7	191
Total WHO Dioxin TEQ(Human/Mammal)(ND=0.5)	ng/kg	3.26	4.43	6.83	3.28	18.2	325	1.06	27.7	194

Notes:
ng/kg - nanograms per kilogram
U - Not detected at the associated reporting limit.
J - Estimated concentration.

Table 4

Second Phase Pre-Design Investigation Analytical Results - Southern Impoundment
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Sample Location: Sample Identification: Sample Date: Sample Depth: Sample Type:	Units	SJSB065 11187072-091219-BN-SJSB065-S(2-4) 9/12/2019 (2-4) ft bgs	SJSB065 11187072-091219-BN-SJSB065-S(4-6) 9/12/2019 (4-6) ft bgs	SJSB065 11187072-091219-BN-SJSB065-S(6-8) 9/12/2019 (6-8) ft bgs	SJSB065 11187072-091219-BN-DUP1 9/12/2019 (8-10) ft bgs Duplicate	SJSB065 11187072-091219-BN-SJSB065-S(8-10) 9/12/2019 (8-10) ft bgs	SJSB065-C1 11187072-100919-BN-SJSB065-C1-5(0-2) 10/9/2019 (0-2) ft bgs	SJSB065-C1 11187072-100919-BN-SJSB065-C1-5(2-4) 10/9/2019 (2-4) ft bgs	SJSB065-C1 11187072-100919-BN-SJSB065-C1-5(4-6) 10/9/2019 (4-6) ft bgs	SJSB065-C1 11187072-100919-BN-SJSB065-C1-5(6-8) 10/9/2019 (6-8) ft bgs
Dioxins/Furans										
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	ng/kg	58	39	4.8 J	0.60 J	0.31 U	14	41	28	9.2 J
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD	ng/kg	2500	2200	120	79	84	640	1200	710	540
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	ng/kg	110	65	1.0 J	0.15 U	0.20 U	21	82	34	16
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD	ng/kg	150	100	4.8 J	3.7 J	3.7 J	39	88	55	38
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	ng/kg	38	24	0.29 U	0.18 U	0.20 U	7.4	34	14	7.3
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	400	260	1.2 J	0.13 U	0.13 U	74	280	160	97
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	1.4 U	0.66 J	0.21 U	0.21 U	0.19 U	0.48 U	0.65 U	0.52 U	0.49 U
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	110	64	0.31 J	0.13 U	0.13 U	18	66	39	24
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	4.2 J	2.9 J	0.22 U	0.21 U	0.21 U	1.1 J	2.3 J	1.6 J	1.2 J
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	ng/kg	7.0 J	5.2 J	0.37 U	0.42 U	0.083 U	1.4 J	4.7 J	2.8 J	2.1 J
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	1.4 U	1.3 J	0.45 U	0.19 U	0.19 U	2.0 J	1.4 J	1.1 J	1.6 J
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	370	250	0.26 U	0.22 U	0.24 U	51	180	130	130
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	26	21	0.36 U	0.32 U	0.34 U	3.9 J	14	9.0	6.5
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	12	6.8	0.12 U	0.098 U	0.098 U	1.9 J	6.3	4.1 J	3.4 J
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	220	160	0.28 U	0.24 U	0.27 U	28	100	70	66
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	ng/kg	10000 J	8200 J	19	0.91 U	1.0 U	2000	5300	4000	2900
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	3900 J	3200 J	8.2	0.51 J	0.43 J	600	2000	1500	1000
Total heptachlorodibenzofuran (HpCDF)	ng/kg	190 J	120 J	1.0 J	0.18 U	0.20 U	36 J	150 J	67 J	32 J
Total heptachlorodibenzo-p-dioxin (HpCDD)	pg/g	290 J	200 J	18 J	13 J	13 J	97 J	180 J	130 J	94 J
Total hexachlorodibenzofuran (HxCDF)	pg/g	610 J	390 J	1.9 J	0.42 J	0.13 U	110 J	410 J	240 J	150 J
Total hexachlorodibenzo-p-dioxin (HxCDD)	pg/g	39 J	25 J	8.9 J	3.8 J	4.5 J	41 J	27 J	26 J	24 J
Total pentachlorodibenzofuran (PeCDF)	ng/kg	940 J	670 J	0.68 J	0.24 U	0.27 U	130 J	460 J	310 J	310 J
Total pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	33 J	28 J	1.1 J	0.42 J	0.34 U	15 J	23 J	16 J	13 J
Total tetrachlorodibenzofuran (TCDF)	ng/kg	24000 J	19000 J	37 J	1.2 J	3.3 J	3300 J	11000 J	7600 J	5100 J
Total tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	4300 J	3500 J	9.6 J	1.3 J	1.7 J	650 J	2200 J	1700 J	1100 J
Total WHO Dioxin TEQ(Human/Mammal)(ND=0)	ng/kg	5060	4130	10.3	0.571	0.492	825	2620	1960	1330
Total WHO Dioxin TEQ(Human/Mammal)(ND=0.5)	ng/kg	5060	4130	10.6	0.887	0.810	825	2620	1960	1330

Notes:
ng/kg - nanograms per kilogram
U - Not detected at the associated reporting limit.
J - Estimated concentration.

Table 4

Second Phase Pre-Design Investigation Analytical Results - Southern Impoundment
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Sample Location: Sample Identification: Sample Date: Sample Depth: Sample Type:	Units	SJSB065-C1 11187072-100919-BN-SJSB065-C1-5(8-10) 10/9/2019 (8-10) ft bgs	SJSB066 11187072-100819-BN-SJSB066-S (0-2) 10/8/2019 (0-2) ft bgs	SJSB066 11187072-100819-BN-SJSB066-S (2-4) 10/8/2019 (2-4) ft bgs	SJSB066 11187072-100819-BN-SJSB066-S (4-6) 10/8/2019 (4-6) ft bgs	SJSB066 11187072-100819-BN-SJSB066-S (6-8) 10/8/2019 (6-8) ft bgs	SJSB066 11187072-100819-BN-SJSB066-S (8-10) 10/8/2019 (8-10) ft bgs	SJSB066-C1 11187072-091219-BN-SJSB066-CI-S(0-2) 9/12/2019 (0-2) ft bgs	SJSB066-C1 11187072-091219-BN-SJSB066-CI-S(2-4) 9/12/2019 (2-4) ft bgs	SJSB066-C1 11187072-091219-BN-SJSB066-CI-S(4-6) 9/12/2019 (4-6) ft bgs
Dioxins/Furans										
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	ng/kg	0.93 U	31	1700	5100	270	23	110	29	13
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD	ng/kg	72	380	20000	3800	460	230	1400	380	380
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	ng/kg	0.18 U	13	4600	160	9.2	1.0 J	23	9.7	1.8 J
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD	ng/kg	3.1 J	29	1600	250	27	13	120	35	14
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	ng/kg	0.14 J	4.2 J	1800	14	1.1 J	0.15 U	2.2 J	1.9 J	0.28 U
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.29 J	36	20000	36 J	2.5 J	0.58 J	8.9	12	1.6 J
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	0.28 U	0.29 J	7.1 J	3.3 J	0.49 J	0.061 U	1.8 J	0.76 J	0.32 U
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.13 J	9.2 J	4700	9.3	1.0 J	0.14 J	3.9 J	3.9 J	0.51 J
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	0.19 J	0.95 J	52 J	14	1.2 J	0.063 U	4.2 J	2.3 J	0.33 U
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.17 J	0.65 J	340	0.98 J	0.10 U	0.085 U	0.25 U	0.24 U	0.16 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	0.32 J	0.039 U	17 J	9.4	2.3 J	1.3 J	3.8 J	1.9 J	0.92 J
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	0.32 J	21	10000	17	1.4 J	0.29 J	4.5 J	7.5	2.0 J
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	0.10 U	2.3 J	520	3.8 J	0.45 U	0.16 U	0.69 J	1.0 J	0.26 U
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.058 U	1.2 J	500	4.1 J	0.33 J	0.070 U	0.96 J	0.58 J	0.19 U
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	0.092 U	14	4800	13	1.1 J	0.27 J	2.6 J	4.7 J	0.88 J
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	ng/kg	7.7	490	210000 J	580	52	6.4	140	240	30
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	2.1	200	38000 J	210	16	1.9	38	81	10
Total heptachlorodibenzofuran (HpCDF)	ng/kg	0.33 J	25 J	7700 J	320 J	19 J	2.2 J	58 J	17 J	2.9 J
Total heptachlorodibenzo-p-dioxin (HpCDD)	pg/g	11 J	62 J	3000 J	650 J	93 J	45 J	220 J	72 J	49 J
Total hexachlorodibenzofuran (HxCDF)	pg/g	0.59 J	57 J	28000 J	170 J	12 J	1.1 J	29 J	24 J	2.1 J
Total hexachlorodibenzo-p-dioxin (HxCDD)	pg/g	3.7 J	13 J	390 J	140 J	55 J	15 J	37 J	20 J	12 J
Total pentachlorodibenzofuran (PeCDF)	ng/kg	0.32 J	60 J	25000 J	170 J	16 J	1.9 J	15 J	24 J	3.9 J
Total pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	0.25 J	5.5 J	690 J	38 J	12 J	3.1 J	3.8 J	4.1 J	1.7 J
Total tetrachlorodibenzofuran (TCDF)	ng/kg	14 J	1200 J	360000 J	1400 J	120 J	14 J	230 J	430 J	53 J
Total tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	2.9 J	220 J	42000 J	250 J	29 J	5.4 J	43 J	92 J	12 J
Total WHO Dioxin TEQ(Human/Mammal)(ND=0)	ng/kg	3.04	262	63900	291	22.9	3.05	57.9	110	13.9
Total WHO Dioxin TEQ(Human/Mammal)(ND=0.5)	ng/kg	3.13	262	63900	291	23.2	3.14	57.9	110	14.1

Notes:

ng/kg - nanograms per kilogram

U - Not detected at the associated reporting limit.

J - Estimated concentration.

Table 4

Second Phase Pre-Design Investigation Analytical Results - Southern Impoundment
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Sample Location: Sample Identification: Sample Date: Sample Depth: Sample Type:	Units	SJSB066-C1 11187072-091219-BN-SJSB066-CI-S(6-8) 9/12/2019 (6-8) ft bgs	SJSB066-C1 11187072-091219-BN-SJSB066-CI-S(8-10) 9/12/2019 (8-10) ft bgs	SJSB067 11187072-091219-BN-SJSB067-S(0-2) 9/12/2019 (0-2) ft bgs	SJSB067 11187072-091219-BN-SJSB067-S(2-4) 9/12/2019 (2-4) ft bgs	SJSB067 11187072-091219-BN-SJSB067-S(4-6) 9/12/2019 (4-6) ft bgs	SJSB067 11187072-091219-BN-SJSB067-S(6-8) 9/12/2019 (6-8) ft bgs	SJSB067 11187072-091219-BN-SJSB067-S(8-10) 9/12/2019 (8-10) ft bgs	SJSB067-C1 11187072-091219-BN-SJSB067-CI-S(0-2) 9/12/2019 (0-2) ft bgs	SJSB067-C1 11187072-091219-BN-SJSB067-CI-S(2-4) 9/12/2019 (2-4) ft bgs
Dioxins/Furans										
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	ng/kg	0.32 U	0.25 U	5.4 J	27	0.26 U	0.54 J	0.24 U	22	0.53 U
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	ng/kg	120	2900	4500	990	160	110	88	2900	150
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	ng/kg	0.21 U	0.21 U	1.6 J	40	0.26 U	0.21 U	0.18 U	17	0.21 U
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	ng/kg	5.8 J	64	35	73	10	7.9	6.1 J	61	7.6
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	ng/kg	0.22 U	0.23 U	0.27 U	15	0.25 U	0.25 U	0.20 U	5.1 J	0.051 U
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.17 U	0.21 U	0.62 J	160	0.16 U	0.18 U	0.15 U	45	0.28 J
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	0.25 U	1.1 J	0.58 J	0.59 J	0.56 J	0.57 J	0.42 J	0.63 U	0.28 U
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.19 U	0.24 U	0.42 J	40	0.16 U	0.19 U	0.16 J	11	0.11 J
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	0.25 U	1.3 J	0.70 J	1.9 J	0.39 J	0.63 J	0.30 J	1.7 J	0.27 J
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.11 U	0.23 J	0.70 U	2.6 J	0.67 U	0.56 U	0.44 U	0.94 J	0.15 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	0.71 J	2.9 J	1.0 U	1.7 J	1.4 J	1.2 U	0.86 U	1.3 J	0.73 J
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	0.15 U	0.39 J	0.28 U	140	1.2 U	1.3 U	1.8 U	25	0.18 J
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	0.25 U	0.32 U	0.31 U	10	0.35 U	0.38 U	0.31 U	1.9 J	0.17 J
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.12 U	0.15 U	0.18 J	4.6 J	0.12 U	0.14 U	0.11 U	1.7 J	0.041 U
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	0.16 U	0.21 U	0.27 U	84	0.28 U	0.68 J	0.83 J	11	0.15 J
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	ng/kg	0.88 J	0.44 J	5.4	5100 J	6.3	2.6	5.8	550	2.5
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	0.19 U	0.19 U	1.5	1600 J	2.0	0.34 J	0.50 J	120	0.90 J
Total heptachlorodibenzofuran (HpCDF)	ng/kg	0.22 U	0.23 U	4.3 J	75 J	0.26 U	0.25 U	0.20 U	35 J	0.34 J
Total heptachlorodibenzo-p-dioxin (HpCDD)	pg/g	20 J	190 J	91 J	140 J	32 J	25 J	20 J	130 J	28 J
Total hexachlorodibenzofuran (HxCDF)	pg/g	0.19 U	0.23 J	3.5 J	240 J	0.67 J	0.56 J	0.61 J	71 J	0.54 J
Total hexachlorodibenzo-p-dioxin (HxCDD)	pg/g	6.9 J	41 J	13 J	31 J	13 J	10 J	8.0 J	18 J	11 J
Total pentachlorodibenzofuran (PeCDF)	ng/kg	0.16 U	1.3 J	0.37 J	360 J	3.4 J	3.8 J	6.5 J	60 J	0.33 J
Total pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	0.81 J	6.3 J	0.34 J	16 J	3.0 J	1.9 J	3.0 J	5.5 J	2.4 J
Total tetrachlorodibenzofuran (TCDF)	ng/kg	3.7 J	3.5 J	8.0 J	8600 J	32 J	21 J	54 J	910 J	14 J
Total tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	2.1 J	5.1 J	1.6 J	1700 J	9.4 J	4.3 J	7.3 J	140 J	4.5 J
Total WHO Dioxin TEQ(Human/Mammal)(ND=0)	ng/kg	0.253	2.12	4.01	2170	3.01	1.04	1.50	189	1.63
Total WHO Dioxin TEQ(Human/Mammal)(ND=0.5)	ng/kg	0.558	2.44	4.29	2170	3.31	1.36	1.77	189	1.66

Notes:
ng/kg - nanograms per kilogram
U - Not detected at the associated reporting limit.
J - Estimated concentration.

Table 4

Second Phase Pre-Design Investigation Analytical Results - Southern Impoundment
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Sample Location: Sample Identification: Sample Date: Sample Depth: Sample Type:	Units	SJSB067-C1 11187072-091219-BN-SJSB067-CI-S(4-6) 9/12/2019 (4-6) ft bgs	SJSB067-C1 11187072-091219-BN-SJSB067-CI-S(6-8) 9/12/2019 (6-8) ft bgs	SJSB067-C1 11187072-091219-BN-SJSB067-CI-S(8-10) 9/12/2019 (8-10) ft bgs	SJSB068 11187072-100819-BN-SJSB068-S (0-2) 10/8/2019 (0-2) ft bgs	SJSB068 11187072-100819-BN-SJSB068-S (2-4) 10/8/2019 (2-4) ft bgs	SJSB068 11187072-100819-BN-SJSB068-S (4-6) 10/8/2019 (4-6) ft bgs	SJSB068 11187072-100819-BN-SJSB068-S (6-8) 10/8/2019 (6-8) ft bgs	SJSB068 11187072-100819-BN-SJSB068-S (8-10) 10/8/2019 (8-10) ft bgs	SJSB068-C1 11187072-100819-BN-SJSB068-C1-S (0-2) 10/8/2019 (0-2) ft bgs
Dioxins/Furans										
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	ng/kg	0.38 U	0.35 U	0.27 U	93	2.1 U	0.92 U	0.42 U	0.39 U	10 J
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD	ng/kg	100	100	100	890	240	330	400	180	1200
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	ng/kg	0.087 U	0.11 U	0.10 U	37	0.47 J	0.27 U	0.28 U	0.26 U	1.5 J
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD	ng/kg	5.8 J	5.2 J	5.4 J	53	16	17	25	11	26
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	ng/kg	0.088 U	0.040 U	0.093 U	15	0.18 U	0.041 U	0.036 U	0.027 U	0.18 J
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.11 J	0.040 U	0.039 U	140	0.88 J	0.18 J	0.075 U	0.19 J	0.58 J
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	0.36 U	0.31 U	0.24 U	0.099 U	0.054 U	0.13 U	0.12 U	0.067 U	0.45 J
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.10 J	0.057 J	0.057 J	30	0.23 J	0.044 U	0.071 U	0.045 U	0.28 J
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	0.35 J	0.23 J	0.26 J	1.6 J	0.057 U	0.14 U	0.13 U	0.069 U	0.57 J
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.24 U	0.12 U	0.11 U	3.0 J	0.16 J	0.13 J	0.088 U	0.057 U	0.071 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	0.70 J	0.68 J	0.68 J	2.3 J	2.0 J	0.13 U	0.12 U	1.3 J	1.5 J
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	0.19 J	0.053 U	0.042 U	60	0.37 J	0.20 J	0.24 J	0.32 J	0.36 J
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	0.25 J	0.087 U	0.15 J	3.5 J	0.37 U	0.31 U	0.46 U	0.24 U	0.41 J
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.041 U	0.041 U	0.032 U	3.1 J	0.056 U	0.043 U	0.071 U	0.047 U	0.058 U
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	0.064 U	0.055 U	0.045 U	25	0.16 J	0.051 U	0.037 U	0.20 J	0.39 J
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	ng/kg	0.50 J	0.14 U	0.14 U	650	2.2	1.1 J	0.73 J	0.88 J	8.3
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	0.17 J	0.11 J	0.059 U	230	0.80 J	0.12 U	0.10 U	0.081 J	3.4
Total heptachlorodibenzofuran (HpCDF)	ng/kg	0.18 J	0.11 J	0.19 J	77 J	0.87 J	0.35 J	0.28 J	0.26 J	4.4 J
Total heptachlorodibenzo-p-dioxin (HpCDD)	pg/g	20 J	18 J	23 J	140 J	58 J	66 J	85 J	38 J	94 J
Total hexachlorodibenzofuran (HxCDF)	pg/g	0.45 J	0.21 J	0.17 J	210 J	1.3 J	0.31 J	0.088 U	0.31 J	2.9 J
Total hexachlorodibenzo-p-dioxin (HxCDD)	pg/g	6.5 J	6.4 J	12 J	33 J	24 J	40 J	30 J	14 J	36 J
Total pentachlorodibenzofuran (PeCDF)	ng/kg	0.19 J	0.064 U	0.053 U	130 J	1.0 J	0.90 J	1.2 J	1.1 J	3.8 J
Total pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	1.1 J	1.6 J	4.0 J	9.9 J	5.9 J	10 J	7.6 J	3.2 J	6.7 J
Total tetrachlorodibenzofuran (TCDF)	ng/kg	3.2 J	0.69 J	0.35 J	1300 J	9.3 J	6.8 J	5.9 J	5.9 J	21 J
Total tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	1.8 J	2.3 J	8.7 J	270 J	6.7 J	28 J	5.8 J	3.0 J	11 J
Total WHO Dioxin TEQ(Human/Mammal)(ND=0)	ng/kg	0.690	0.289	0.334	327	1.64	0.416	0.450	0.552	5.75
Total WHO Dioxin TEQ(Human/Mammal)(ND=0.5)	ng/kg	0.732	0.375	0.400	327	1.84	0.665	0.771	0.687	5.75

Notes:
ng/kg - nanograms per kilogram
U - Not detected at the associated reporting limit.
J - Estimated concentration.

Table 4

Second Phase Pre-Design Investigation Analytical Results - Southern Impoundment
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Sample Location: Sample Identification: Sample Date: Sample Depth: Sample Type:	Units	SJSB068-C1 11187072-100819-BN-SJSB068-C1-S (2-4) 10/8/2019 (2-4) ft bgs	SJSB068-C1 11187072-100819-BN-SJSB068-C1-S (4-6) 10/8/2019 (4-6) ft bgs	SJSB068-C1 11187072-100819-BN-SJSB068-C1-S (6-8) 10/8/2019 (6-8) ft bgs	SJSB068-C1 11187072-100819-BN-SJSB068-C1-S (8-10) 10/8/2019 (8-10) ft bgs	SJSB069 11187072-100819-BN-SJSB069-S (0-2) 10/8/2019 (0-2) ft bgs	SJSB069 11187072-100819-BN-SJSB069-S (2-4) 10/8/2019 (2-4) ft bgs	SJSB069 11187072-100819-BN-SJSB069-S (4-6) 10/8/2019 (4-6) ft bgs	SJSB069 11187072-100819-BN-SJSB069-S (6-8) 10/8/2019 (6-8) ft bgs	SJSB069 11187072-100819-BN-SJSB069-S (8-10) 10/8/2019 (8-10) ft bgs
Dioxins/Furans										
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	ng/kg	680	10 J	13000 J	270	99	2.4 U	1.4 U	0.59 U	0.34 U
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD	ng/kg	1100	20000 J	9000 J	700	2200	260	300	350	180
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	ng/kg	21	2.5 J	310	7.5	43	0.69 J	0.35 U	0.19 U	0.22 U
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD	ng/kg	52	100	550	32	200	18	17	25	9.7
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	ng/kg	3.2 J	0.23 J	36	0.56 J	5.5 J	0.13 U	0.079 U	0.078 U	0.046 U
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	4.4 J	0.28 J	57	1.6 J	24	0.42 J	0.14 J	0.29 J	0.049 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	0.75 J	0.90 J	7.5	0.63 J	2.4 J	0.10 U	0.96 U	0.62 U	0.078 U
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	1.6 J	0.070 U	18 J	0.67 J	7.7 J	0.20 J	0.14 J	0.24 J	0.052 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	2.2 J	1.3 J	28	1.3 J	5.7 J	0.11 U	1.1 U	0.99 J	0.086 U
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.15 U	0.097 U	1.5 U	0.12 U	0.46 J	0.063 U	0.10 J	0.20 J	0.064 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	2.5 J	1.6 J	20	2.6 J	6.9	0.10 U	1.9 J	2.7 J	1.0 J
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	2.3 J	0.11 U	31	0.96 J	8.4	0.29 J	0.28 J	1.0 J	0.040 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	0.84 J	0.47 J	10 J	0.56 J	1.9 J	0.32 U	0.37 J	0.58 J	0.20 U
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.50 J	0.082 U	6.4 J	0.10 U	2.7 J	0.052 U	0.041 U	0.045 U	0.054 U
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	ng/kg	2.1 J	0.10 U	28	0.61 J	6.5	0.19 J	0.046 U	0.40 J	0.037 U
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	ng/kg	100	0.81 J	1100	37	170	7.5	1.0 U	1.6 J	0.29 U
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	32	0.36 J	480	11	50	1.9 J	0.17 J	0.21 J	0.089 U
Total heptachlorodibenzofuran (HpCDF)	ng/kg	46 J	6.4 J	660 J	16 J	95 J	1.7 J	0.59 J	0.19 J	0.22 J
Total heptachlorodibenzo-p-dioxin (HpCDD)	pg/g	150 J	240 J	1300 J	110 J	660 J	70 J	54 J	82 J	71 J
Total hexachlorodibenzofuran (HxCDF)	pg/g	28 J	2.7 J	320 J	10 J	80 J	1.0 J	0.38 J	0.92 J	0.064 U
Total hexachlorodibenzo-p-dioxin (HxCDD)	pg/g	43 J	25 J	300 J	39 J	94 J	26 J	18 J	29 J	35 J
Total pentachlorodibenzofuran (PeCDF)	ng/kg	44 J	0.85 J	410 J	18 J	49 J	0.75 J	1.6 J	8.7 J	0.040 U
Total pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	8.8 J	4.6 J	76 J	7.3 J	12 J	6.7 J	4.1 J	6.4 J	7.5 J
Total tetrachlorodibenzofuran (TCDF)	ng/kg	220 J	2.4 J	3000 J	77 J	320 J	15 J	8.8 J	22 J	0.88 J
Total tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	42 J	3.1 J	570 J	21 J	62 J	11 J	5.5 J	7.7 J	8.7 J
Total WHO Dioxin TEQ(Human/Mammal)(ND=0)	ng/kg	46	8.35	638	16.8	79.3	3.04	1.04	1.90	0.251
Total WHO Dioxin TEQ(Human/Mammal)(ND=0.5)	ng/kg	46	8.38	639	16.9	79.3	3.22	1.20	1.93	0.437

Notes:

ng/kg - nanograms per kilogram

U - Not detected at the associated reporting limit.

J - Estimated concentration.

Table 5

Sample Interval Results
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Sample Location	Sample Depth	Total WHO Dioxin TEQ (Human/Mammal) (ND=0.5) (ng/kg)		Weighting		
Remedial Investigation						
SJSB001	(0-0.5) ft bgs	1.59	●	5%	37.17	●
	(0.5-1) ft bgs	3.53	●	5%		
	(1-2) ft bgs	5.32	●	10%		
	(2-4) ft bgs	1.16	●	20%		
	(4-6) ft bgs	5.15	●	20%		
	(6-8) ft bgs	11.5	●	20%		
	(8-10) ft bgs	164.1	●	20%		
SJSB002	(0-0.5) ft bgs	7.29	●	5%	14.77	●
	(0.5-1) ft bgs	3.4	●	5%		
	(1-2) ft bgs	2.74	●	10%		
	(2-4) ft bgs	2.81	●	20%		
	(4-6) ft bgs	49.5	●	20%		
	(6-8) ft bgs	16.7	●	20%		
	(8-10) ft bgs	0.819	●	20%		
SJSB003	(0-0.5) ft bgs	16.6	●	6.25%	21.84	●
	(0.5-1) ft bgs	8.55	●	6.25%		
	(1-2) ft bgs	7.58	●	12.5%		
	(2-4) ft bgs	0.244	●	25%		
	(6-8) ft bgs	4.13	●	25%		
	(8-10) ft bgs	72.9	●	25%		
SJSB004	(0-0.5) ft bgs	3.25	●	5%	16.11	●
	(0.5-1) ft bgs	4.84	●	5%		
	(1-2) ft bgs	1.57	●	10%		
	(2-4) ft bgs	6.4	●	20%		
	(4-6) ft bgs	1.26	●	20%		
	(6-8) ft bgs	28.2	●	20%		
	(8-10) ft bgs	41.9	●	20%		
SJSB005	(0-0.5) ft bgs	3.91	●	5%	12.06	●
	(0.5-1) ft bgs	9.38	●	5%		
	(1-2) ft bgs	3.59	●	10%		
	(2-4) ft bgs	35.1	●	20%		
	(4-6) ft bgs	9.4	●	20%		
	(6-8) ft bgs	6.14	●	20%		
	(8-10) ft bgs	4.54	●	20%		
SJSB006	(0-0.5) ft bgs	23.7	●	5%	136.95	●
	(0.5-1) ft bgs	38.8	●	5%		
	(1-2) ft bgs	15	●	10%		
	(2-4) ft bgs	59.3	●	20%		
	(4-6) ft bgs	21.5	●	20%		
	(6-8) ft bgs	513.1	●	20%		
	(8-10) ft bgs	67.7	●	20%		
SJSB007	(0-0.5) ft bgs	6.59	●	6.25%	22.80	●
	(0.5-1) ft bgs	2.16	●	6.25%		
	(1-2) ft bgs	2.86	●	12.5%		
	(2-4) ft bgs	38.5	●	25%		
	(4-6) ft bgs	35.8	●	25%		
	(6-8) ft bgs	13.3	●	25%		

Table 5

Sample Interval Results
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Sample Location	Sample Depth	Total WHO Dioxin TEQ (Human/Mammal) (ND=0.5) (ng/kg)		Weighting		
SJSB008	(0-2) ft bgs	3.26		20%	402.81	
	(2-4) ft bgs	32.1		20%		
	(4-6) ft bgs	13.6		20%		
	(6-8) ft bgs	1880.2		20%		
	(8-10) ft bgs	84.9		20%		
SJSB009	(0-2) ft bgs	11.1		20%	199.52	
	(2-4) ft bgs	26.8		20%		
	(4-6) ft bgs	26.2		20%		
	(6-8) ft bgs	514.9		20%		
	(8-10) ft bgs	418.6		20%		
SJSB012	(0.5-1) ft bgs	12.6		5.26%	2544.46	
	(1-2) ft bgs	0.1338		10.53%		
	(2-4) ft bgs	5.77		21.05%		
	(4-6) ft bgs	6528.3		21.05%		
	(6-8) ft bgs	4991.6		21.05%		
	(8-10) ft bgs	557.3		21.05%		
SJSB013	(0.5-1) ft bgs	12.8		5.26%	226.08	
	(1-2) ft bgs	12.6		10.53%		
	(2-4) ft bgs	13		21.05%		
	(4-6) ft bgs	300		21.05%		
	(6-8) ft bgs	489.1		21.05%		
	(8-10) ft bgs	262.3		21.05%		
SJSB014	(0-0.5) ft bgs	31.7		6.25%	24.29	
	(0.5-1) ft bgs	26.8		6.25%		
	(1-2) ft bgs	6.99		12.5%		
	(2-4) ft bgs	9.08		25%		
	(4-5) ft bgs	15.2		12.5%		
	(7-8) ft bgs	33.7		12.5%		
	(8-10) ft bgs	45.5		25%		
SJSB015	(0-0.5) ft bgs	15.6		5%	39.82	
	(0.5-1) ft bgs	4.64		5%		
	(1-2) ft bgs	2.91		10%		
	(2-4) ft bgs	15.5		20%		
	(4-6) ft bgs	78.4		20%		
	(6-8) ft bgs	44.6		20%		
	(8-10) ft bgs	54.1		20%		
SJSB016	(0-0.5) ft bgs	6.22		8.33%	81.83	
	(0.5-1) ft bgs	8.77		8.33%		
	(1-2) ft bgs	0.674		16.67%		
	(2-3) ft bgs	13.4		16.67%		
	(7-8) ft bgs	50.2		16.67%		
	(8-10) ft bgs	209.6		33.33%		
SJSB017	(0.5-1) ft bgs	19.3		8.33%	20.79	
	(1-2) ft bgs	15.7		16.67%		
	(2-4) ft bgs	27		33.33%		
	(4-6) ft bgs	20.2		33.33%		
	(6-6.5) ft bgs	9.99		8.33%		

Table 5

Sample Interval Results
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Sample Location	Sample Depth	Total WHO Dioxin TEQ (Human/Mammal) (ND=0.5) (ng/kg)		Weighting		
SJSB018	(0-0.5) ft bgs	14.2		8.33%	31.85	
	(0.5-1) ft bgs	29.6		8.33%		
	(1-2) ft bgs	62.4		16.67%		
	(2-4) ft bgs	22.2		33.33%		
	(6-8) ft bgs	31.2		33.33%		
SJSB019	(0.5-1) ft bgs	12.8		6.41%	11573.63	
	(1-2) ft bgs	12.6		12.82%		
	(2-4) ft bgs	13		25.64%		
	(4-6) ft bgs	13.4		25.64%		
	(6-6.5) ft bgs	26.7		6.41%		
	(8.2-10) ft bgs	50105.1		23.08%		
SJSB020	(0.5-1) ft bgs	24.9		7.14%	6.90	
	(1-2) ft bgs	11.6		14.29%		
	(2-4) ft bgs	0.9579		28.57%		
	(4-5) ft bgs	8.29		14.29%		
	(7.5-8) ft bgs	6.79		7.14%		
	(8-10) ft bgs	5.32		28.57%		
SJSB021	(0.5-1) ft bgs	9.28		5.26%	9.33	
	(1-2) ft bgs	3.49		10.53%		
	(2-4) ft bgs	1.12		21.05%		
	(4-6) ft bgs	3.45		21.05%		
	(6-8) ft bgs	8.99		21.05%		
	(8-10) ft bgs	26.7		21.05%		
SJSB022	(0.5-1) ft bgs	4.58		5.26%	5.87	
	(1-2) ft bgs	6.64		10.53%		
	(2-4) ft bgs	11.6		21.05%		
	(4-6) ft bgs	8.58		21.05%		
	(6-8) ft bgs	2.08		21.05%		
	(8-10) ft bgs	1.14		21.05%		
SJSB023	(0-0.5) ft bgs	36.9		5%	7760.39	
	(0.5-1) ft bgs	36.8		5%		
	(1-2) ft bgs	303.2		10%		
	(2-4) ft bgs	2381		20%		
	(4-6) ft bgs	35465.9		20%		
	(6-8) ft bgs	331.5		20%		
	(8-10) ft bgs	453.5		20%		
SJSB024	(0.5-1) ft bgs	14.1		5.26%	89.07	
	(1-2) ft bgs	3		10.53%		
	(2-4) ft bgs	79.4		21.05%		
	(4-6) ft bgs	272.3		21.05%		
	(6-8) ft bgs	64.4		21.05%		
	(8-10) ft bgs	1.96		21.05%		
SJSB025	(0.5-1) ft bgs	6.74		5.26%	597.49	
	(1-2) ft bgs	2.1		10.53%		
	(2-4) ft bgs	717.4		21.05%		
	(4-6) ft bgs	2052		21.05%		
	(6-8) ft bgs	65.4		21.05%		
	(8-10) ft bgs	0.5517		21.05%		

Table 5

Sample Interval Results
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Sample Location	Sample Depth	Total WHO Dioxin TEQ (Human/Mammal) (ND=0.5) (ng/kg)		Weighting		
SJSB026	(0-0.5) ft bgs	11.2	● (green)	5.56%	108.32	● (green)
	(0.5-1) ft bgs	21.1	● (green)	5.56%		
	(1-2) ft bgs	23.5	● (green)	11.11%		
	(2-4) ft bgs	22	● (green)	22.22%		
	(4-5) ft bgs	194.6	● (green)	11.11%		
	(6-8) ft bgs	324.8	● (yellow)	22.22%		
	(8-10) ft bgs	23.5	● (green)	22.22%		
SJSB027	(0-0.5) ft bgs	20.8	● (green)	6.25%	5.70	● (green)
	(0.5-1) ft bgs	14.9	● (green)	6.25%		
	(1-2) ft bgs	9.05	● (green)	12.50%		
	(2-4) ft bgs	4.43	● (green)	25.00%		
	(4-5) ft bgs	0.524	● (green)	12.50%		
	(7-8) ft bgs	4.37	● (green)	12.50%		
	(8-10) ft bgs	2.47	● (green)	25.00%		
First Phase Pre-Design Investigation						
SJSB008-E1[a]	(0-10) ft bgs	83.2	● (green)	100%	83.20	● (green)
SJSB008-N1[a]	(0-10) ft bgs	9.47	● (green)	100%	9.47	● (green)
SJSB008-S1	(0-2) ft bgs	35.3	● (green)	20%	5236.74	● (orange)
	(2-4) ft bgs	12.4	● (green)	20%		
	(4-6) ft bgs	115	● (green)	20%		
	(6-8) ft bgs	25300	● (orange)	20%		
	(8-10) ft bgs	721	● (yellow)	20%		
SJSB008-S2	(0-2) ft bgs	18.1	● (green)	20%	9821.70	● (orange)
	(2-4) ft bgs	17	● (green)	20%		
	(4-6) ft bgs	33.8	● (green)	20%		
	(6-8) ft bgs	39.6	● (green)	20%		
	(8-10) ft bgs	49000	● (orange)	20%		
SJSB008-W1[a]	(0-10) ft bgs	62.7	● (green)	100%	62.70	● (green)
SJSB012-E1[a]	(0-10) ft bgs	123	● (green)	100%	123.00	● (green)
SJSB012-N1	(0-2) ft bgs	27.3	● (green)	20%	236.35	● (green)
	(2-4) ft bgs	6.24	● (green)	20%		
	(4-6) ft bgs	36.2	● (green)	20%		
	(6-8) ft bgs	707	● (yellow)	20%		
	(8-10) ft bgs	405	● (yellow)	20%		
SJSB012-N2	(0-2) ft bgs	13.8	● (green)	20%	5589.57	● (orange)
	(2-4) ft bgs	8.43	● (green)	20%		
	(4-6) ft bgs	25.6	● (green)	20%		
	(6-8) ft bgs	15700	● (orange)	20%		
	(8-10) ft bgs	12200	● (orange)	20%		
SJSB012-S1[a]	(0-10) ft bgs	6.85	● (green)	100%	6.85	● (green)
SJSB012-W1	(0-2) ft bgs	22.7	● (green)	25%	2223.65	● (orange)
	(4-6) ft bgs	4410	● (orange)	25%		
	(6-8) ft bgs	4460	● (orange)	25%		
	(8-10) ft bgs	1.88	● (green)	25%		

Table 5

Sample Interval Results
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Sample Location	Sample Depth	Total WHO Dioxin TEQ (Human/Mammal) (ND=0.5) (ng/kg)		Weighting		
SJSB012-W2	(0-2) ft bgs	14.5		20%	3607.91	
	(2-4) ft bgs	3.06		20%		
	(4-6) ft bgs	18000		20%		
	(6-8) ft bgs	15.8		20%		
	(8-10) ft bgs	6.21		20%		
SJSB019-E1	(0-2) ft bgs	7.31		20%	44892.92	
	(2-4) ft bgs	609		20%		
	(4-6) ft bgs	48.3		20%		
	(6-8) ft bgs	206000		20%		
	(8-10) ft bgs	17800		20%		
SJSB019-E2	(0-2) ft bgs	25.8		20%	1021.62	
	(2-4) ft bgs	47.3		20%		
	(4-6) ft bgs	5010		20%		
	(6-8) ft bgs	16.7		20%		
	(8-10) ft bgs	8.31		20%		
SJSB019-N1	(0-2) ft bgs	14.6		20%	9884.36	
	(2-4) ft bgs	48.7		20%		
	(4-6) ft bgs	5720		20%		
	(6-8) ft bgs	43600		20%		
	(8-10) ft bgs	38.5		20%		
SJSB019-N2	(0-2) ft bgs	10.6		20%	42258.70	
	(2-4) ft bgs	220		20%		
	(4-6) ft bgs	199000		20%		
	(6-8) ft bgs	12000		20%		
	(8-10) ft bgs	62.9		20%		
SJSB019-S1	(0-2) ft bgs	16.1		20%	37711.42	
	(2-4) ft bgs	471		20%		
	(4-6) ft bgs	187000		20%		
	(6-8) ft bgs	678		20%		
	(8-10) ft bgs	392		20%		
SJSB019-S2	(0-2) ft bgs	393		20%	126.98	
	(2-4) ft bgs	14.6		20%		
	(4-6) ft bgs	9.48		20%		
	(6-8) ft bgs	198		20%		
	(8-10) ft bgs	19.8		20%		
SJSB019-W1	(0-2) ft bgs	58		20%	27407.12	
	(2-4) ft bgs	20800		20%		
	(4-6) ft bgs	115000		20%		
	(6-8) ft bgs	1160		20%		
	(8-10) ft bgs	17.6		20%		
SJSB019-W2	(0-2) ft bgs	65.8		20%	17.15	
	(2-4) ft bgs	14.5		20%		
	(4-6) ft bgs	1.83		20%		
	(6-8) ft bgs	1.74		20%		
	(8-10) ft bgs	1.89		20%		

Table 5

Sample Interval Results
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Sample Location	Sample Depth	Total WHO Dioxin TEQ (Human/Mammal) (ND=0.5) (ng/kg)		Weighting		
SJSB023-E1	(0-2) ft bgs	130		20%	415.08	
	(2-4) ft bgs	481		20%		
	(4-6) ft bgs	1250		20%		
	(6-8) ft bgs	203		20%		
	(8-10) ft bgs	11.4		20%		
SJSB023-E2	(0-2) ft bgs	111		20%	79.55	
	(2-4) ft bgs	260		20%		
	(4-6) ft bgs	9.6		20%		
	(6-8) ft bgs	6.94		20%		
	(8-10) ft bgs	10.2		20%		
SJSB023-N1	(0-2) ft bgs	46.7		20%	18594.18	
	(2-4) ft bgs	3880		20%		
	(4-6) ft bgs	88300		20%		
	(6-8) ft bgs	709		20%		
	(8-10) ft bgs	35.2		20%		
SJSB023-N2	(0-2) ft bgs	28.6		20%	36.27	
	(2-4) ft bgs	141		20%		
	(4-6) ft bgs	4.43		20%		
	(6-8) ft bgs	3.7		20%		
	(8-10) ft bgs	3.64		20%		
SJSB023-S1	(0-2) ft bgs	1570		20%	17098.00	
	(2-4) ft bgs	47800		20%		
	(4-6) ft bgs	35800		20%		
	(6-8) ft bgs	139		20%		
	(8-10) ft bgs	181		20%		
SJSB023-S2	(0-2) ft bgs	13700		20%	12338.24	
	(2-4) ft bgs	47700		20%		
	(4-6) ft bgs	212		20%		
	(6-8) ft bgs	46.6		20%		
	(8-10) ft bgs	32.6		20%		
SJSB023-W1	(0-2) ft bgs	8110		22.22%	24713.11	
	(2-4) ft bgs	71300		22.22%		
	(5-6) ft bgs	63500		11.11%		
	(6-8) ft bgs	26.2		22.22%		
	(8-10) ft bgs	22.8		22.22%		
SJSB023-W2	(0-2) ft bgs	8600		20%	5344.17	
	(2-4) ft bgs	16900		20%		
	(4-6) ft bgs	1200		20%		
	(6-8) ft bgs	18.3		20%		
	(8-10) ft bgs	2.54		20%		
SJSB025-E2[a]	(0-10) ft bgs	14		100%	14.00	
SJSB025-N1	(0-2) ft bgs	198		20%	5056.52	
	(2-4) ft bgs	16100		20%		
	(4-6) ft bgs	6930		20%		
	(6-8) ft bgs	1970		20%		
	(8-10) ft bgs	84.6		20%		

Table 5

Sample Interval Results
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Sample Location	Sample Depth	Total WHO Dioxin TEQ (Human/Mammal) (ND=0.5) (ng/kg)		Weighting		
SJSB025-N2	(0-2) ft bgs	25.7	green	20%	3049.82	orange
	(2-4) ft bgs	3770	orange	20%		
	(4-6) ft bgs	10100	orange	20%		
	(6-8) ft bgs	1320	orange	20%		
	(8-10) ft bgs	33.4	green	20%		
SJSB025-S1	(0-2) ft bgs	145	green	22.22%	3112.10	orange
	(2-4) ft bgs	13500	orange	22.22%		
	(5-6) ft bgs	84.3	green	11.11%		
	(6-8) ft bgs	316	yellow	22.22%		
	(8-10) ft bgs	1.3	green	22.22%		
SJSB025-S2	(4-6) ft bgs	94.9	green	33.33%	32.34	green
	(6-8) ft bgs	1.32	green	33.33%		
	(8-10) ft bgs	0.795	green	33.33%		
SJSB025-W1[a]	(0-10) ft bgs	186	green	100%	186.00	green
SJSB039	(0-2) ft bgs	17.1	green	20%	1620.96	orange
	(2-4) ft bgs	21.4	green	20%		
	(4-6) ft bgs	866	yellow	20%		
	(6-8) ft bgs	7190	orange	20%		
	(8-10) ft bgs	10.3	green	20%		
SJSB040	(0-2) ft bgs	23.4	green	20%	418.48	orange
	(2-4) ft bgs	33.3	green	20%		
	(4-6) ft bgs	59.5	green	20%		
	(6-8) ft bgs	76.2	green	20%		
	(8-10) ft bgs	1900	orange	20%		
SJSB041	(0-2) ft bgs	20.9	green	20%	4797.70	orange
	(2-4) ft bgs	19500	orange	20%		
	(4-6) ft bgs	4320	orange	20%		
	(6-8) ft bgs	61.1	green	20%		
	(8-10) ft bgs	86.5	green	20%		
SJSB042[a]	(0-10) ft bgs	16.7	green	100%	16.70	green
SJSB043[a]	(0-10) ft bgs	13.5	green	100%	13.50	green
SJSB044[a]	(0-9) ft bgs	24	green	100%	24.00	green
Second Phase Pre-Design Investigation						
SJSB059	(0-2) ft bgs	9.45	green	20%	211.15	green
	(2-4) ft bgs	1.67	green	20%		
	(4-6) ft bgs	3.51	green	20%		
	(6-8) ft bgs	1000	yellow	20%		
	(8-10) ft bgs	41.1	green	20%		
SJSB060	(0-2) ft bgs	34.1	green	20%	9633.25	orange
	(2-4) ft bgs	10.4	green	20%		
	(4-6) ft bgs	3.74	green	20%		
	(6-8) ft bgs	47400	orange	20%		
	(8-10) ft bgs	718	yellow	20%		
SJSB060-C1	(0-2) ft bgs	2.28	green	20%	2740.38	orange
	(2-4) ft bgs	0.924	green	20%		
	(4-6) ft bgs	14.7	green	20%		
	(6-8) ft bgs	12700	orange	20%		
	(8-10) ft bgs	984	yellow	20%		

Table 5

Sample Interval Results
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Sample Location	Sample Depth	Total WHO Dioxin TEQ (Human/Mammal) (ND=0.5) (ng/kg)		Weighting		
SJSB060-C2	(0-2) ft bgs	10.6		20%	14.24	
	(2-4) ft bgs	29.5		20%		
	(4-6) ft bgs	21.9		20%		
	(6-8) ft bgs	5.87		20%		
	(8-10) ft bgs	3.35		20%		
SJSB060-C3	(0-2) ft bgs	12.2		20%	4.78	
	(2-4) ft bgs	9.36		20%		
	(4-6) ft bgs	0.835		20%		
	(6-8) ft bgs	1.14		20%		
	(8-10) ft bgs	0.38		20%		
SJSB061	(0-2) ft bgs	2.69		20%	378.12	
	(2-4) ft bgs	8.43		20%		
	(4-6) ft bgs	115		20%		
	(6-8) ft bgs	1730		20%		
	(8-10) ft bgs	34.5		20%		
SJSB061-C1	(0-2) ft bgs	35.1		20%	1031.76	
	(2-4) ft bgs	114		20%		
	(4-6) ft bgs	51.5		20%		
	(6-8) ft bgs	4930		20%		
	(8-10) ft bgs	28.2		20%		
SJSB061-C2	(0-2) ft bgs	2.22		20%	5.77	
	(2-4) ft bgs	2.54		20%		
	(4-6) ft bgs	11.7		20%		
	(6-8) ft bgs	5.08		20%		
	(8-10) ft bgs	7.32		20%		
SJSB062	(0-2) ft bgs	19.8		20%	8.37	
	(2-4) ft bgs	13.7		20%		
	(4-6) ft bgs	3.69		20%		
	(6-8) ft bgs	1.65		20%		
	(8-10) ft bgs	2.99		20%		
SJSB063	(0-2) ft bgs	12.8		20%	17.11	
	(2-4) ft bgs	31		20%		
	(4-6) ft bgs	14.8		20%		
	(6-8) ft bgs	22.5		20%		
	(8-10) ft bgs	4.43		20%		
SJSB064	(0-2) ft bgs	6.83		20%	76.20	
	(2-4) ft bgs	3.28		20%		
	(4-6) ft bgs	18.2		20%		
	(6-8) ft bgs	325		20%		
	(8-10) ft bgs	27.7		20%		
SJSB065	(0-2) ft bgs	194		20%	1879.10	
	(2-4) ft bgs	5060		20%		
	(4-6) ft bgs	4130		20%		
	(6-8) ft bgs	10.6		20%		
	(8-10) ft bgs	0.887		20%		

Table 5

Sample Interval Results
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Sample Location	Sample Depth	Total WHO Dioxin TEQ (Human/Mammal) (ND=0.5) (ng/kg)		Weighting		
SJSB065-C1	(0-2) ft bgs	825	🟠	20%	1347.63	🟠
	(2-4) ft bgs	2620	🟠	20%		
	(4-6) ft bgs	1960	🟠	20%		
	(6-8) ft bgs	1330	🟠	20%		
	(8-10) ft bgs	3.13	🟢	20%		
SJSB066	(0-2) ft bgs	262	🟠	20%	12895.87	🟠
	(2-4) ft bgs	63900	🟠	20%		
	(4-6) ft bgs	291	🟡	20%		
	(6-8) ft bgs	23.2	🟢	20%		
	(8-10) ft bgs	3.14	🟢	20%		
SJSB066-C1	(0-2) ft bgs	57.9	🟢	20%	37.00	🟢
	(2-4) ft bgs	110	🟢	20%		
	(4-6) ft bgs	14.1	🟢	20%		
	(6-8) ft bgs	0.558	🟢	20%		
	(8-10) ft bgs	2.44	🟢	20%		
SJSB067	(0-2) ft bgs	4.29	🟢	20%	436.15	🟠
	(2-4) ft bgs	2170	🟠	20%		
	(4-6) ft bgs	3.31	🟢	20%		
	(6-8) ft bgs	1.36	🟢	20%		
	(8-10) ft bgs	1.77	🟢	20%		
SJSB067-C1	(0-2) ft bgs	189	🟢	20%	38.43	🟢
	(2-4) ft bgs	1.66	🟢	20%		
	(4-6) ft bgs	0.732	🟢	20%		
	(6-8) ft bgs	0.375	🟢	20%		
	(8-10) ft bgs	0.4	🟢	20%		
SJSB068	(0-2) ft bgs	327	🟠	20%	66.19	🟢
	(2-4) ft bgs	1.84	🟢	20%		
	(4-6) ft bgs	0.665	🟢	20%		
	(6-8) ft bgs	0.771	🟢	20%		
	(8-10) ft bgs	0.687	🟢	20%		
SJSB068-C1	(0-2) ft bgs	5.75	🟢	20%	143.21	🟢
	(2-4) ft bgs	46	🟢	20%		
	(4-6) ft bgs	8.38	🟢	20%		
	(6-8) ft bgs	639	🟡	20%		
	(8-10) ft bgs	16.9	🟢	20%		
SJSB069	(0-2) ft bgs	79.3	🟢	20%	17.22	🟢
	(2-4) ft bgs	3.22	🟢	20%		
	(4-6) ft bgs	1.2	🟢	20%		
	(6-8) ft bgs	1.93	🟢	20%		
	(8-10) ft bgs	0.437	🟢	20%		

Notes:
ft bgs - feet below ground surface
DWA - Depth Weighted Average
ng/kg - nanograms per kilogram
[a] - These samples did not have a composite sample result greater than 240 ng/kg $TEQ_{DF,M}$; therefore, no co-located archived two-foot interval samples were analyzed.

🟢	- Value is less than 240 ng/kg
🟠	- Value is equal to or greater than 240 ng/kg
🟡	- Value is equal to or greater than 240 ng/kg but does not require removal because the DWA does not exceed 240 ng/kg (or will not exceed 240 ng/kg after removal of other contaminated intervals)

Table 6

Treatability Soil Characterization
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Sample Location: Sample Identification: Sample Date:	Units	SITS-01 1187072-SITS-01 10/17/2019	SITS-02 1187072-SITS-02 10/17/2019	SITS-03 1187072-SITS-03 10/17/2019	SITS-01 1187072-SITS-01 07/30/2020	SITS-02 1187072-SITS-02 07/30/2020	SITS-03 1187072-SITS-03 07/30/2020
Parameters							
TCLP-Dioxins/Furans							
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	pg/L	7.7 U	17 J	9.5 J	-	-	-
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	pg/L	33 U	58 U	30 U	-	-	-
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	pg/L	6.0 U	5.5 J	1.8 J	-	-	-
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	pg/L	3.4 U	6.6 J	5.0 J	-	-	-
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	pg/L	7.6 U	5.8 J	1.7 U	-	-	-
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	pg/L	3.1 U	3.2 J	1.6 U	-	-	-
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	pg/L	16 U	11 U	7.4 U	-	-	-
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	pg/L	3.2 U	1.9 U	1.5 U	-	-	-
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	pg/L	4.6 U	4.0 J	1.3 U	-	-	-
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	pg/L	2.3 U	5.6 J	1.0 U	-	-	-
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	pg/L	4.2 U	3.3 J	1.2 U	-	-	-
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	pg/L	5.3 U	1.4 U	1.2 U	-	-	-
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	pg/L	8.3 U	1.8 U	1.7 U	-	-	-
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	pg/L	2.5 U	4.9 J	1.0 U	-	-	-
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	pg/L	5.6 U	1.5 U	1.2 U	-	-	-
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	pg/L	3.1 U	6.8 J	5.9 J	-	-	-
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	pg/L	3.4 U	2.0 U	1.9 U	-	-	-
Total heptachlorodibenzofuran (HpCDF)	pg/L	7.6 U	11 J	1.8 J	-	-	-
Total heptachlorodibenzo-p-dioxin (HpCDD)	pg/L	11 U	10 J	5.0 J	-	-	-
Total hexachlorodibenzofuran (HxCDF)	pg/L	3.2 U	14 J	1.6 U	-	-	-
Total hexachlorodibenzo-p-dioxin (HxCDD)	pg/L	30 J	18 J	7.4 U	-	-	-
Total pentachlorodibenzofuran (PeCDF)	pg/L	6.0 U	1.5 U	1.5 U	-	-	-
Total pentachlorodibenzo-p-dioxin (PeCDD)	pg/L	8.3 U	1.8 U	1.7 U	-	-	-
Total tetrachlorodibenzofuran (TCDF)	pg/L	3.1 U	11 J	9.0 J	-	-	-
Total tetrachlorodibenzo-p-dioxin (TCDD)	pg/L	4.4 J	2.0 U	1.9 U	-	-	-
Total WHO Dioxin TEQ(Human/Mammal)(ND=0)	pg/L	0	2.96	0.661	-	-	-
Total WHO Dioxin TEQ(Human/Mammal)(ND=0.5)	pg/L	8.81	5.77	3.42	-	-	-
TCLP-Herbicides							
2,4,5-TP (Silvex)	mg/L	0.0030 U	0.0030 U	0.0030 U	-	-	-
2,4-Dichlorophenoxyacetic acid (2,4-D)	mg/L	0.020 U	0.020 U	0.020 U	-	-	-
Dinoseb	mg/L	0.038 U	0.038 U	0.038 U	-	-	-
TCLP-Metals							
Arsenic	mg/L	0.041 U	0.041 U	0.041 U	-	-	-
Barium	mg/L	0.64 J	0.35 J	1.2 J	-	-	-
Cadmium	mg/L	0.0028 U	0.0028 U	0.0028 U	-	-	-
Chromium	mg/L	0.0078 U	0.0078 U	0.0078 U	-	-	-
Lead	mg/L	0.029 UJ	0.029 UJ	0.029 UJ	-	-	-
Mercury	mg/L	0.00010 U	0.00010 U	0.00010 U	-	-	-
Selenium	mg/L	0.058 J	0.036 U	0.036 U	-	-	-
Silver	mg/L	0.0085 UJ	0.0085 UJ	0.0085 UJ	-	-	-
TCLP- Polychlorinated biphenyls (PCBs)							
Aroclor-1016 (PCB-1016)	mg/L	0.00019 U	0.00019 U	0.00019 U	-	-	-
Aroclor-1221 (PCB-1221)	mg/L	0.00022 U	0.00023 U	0.00022 U	-	-	-
Aroclor-1232 (PCB-1232)	mg/L	0.00020 U	0.00021 U	0.00020 U	-	-	-
Aroclor-1242 (PCB-1242)	mg/L	0.00036 U	0.00036 U	0.00036 U	-	-	-
Aroclor-1248 (PCB-1248)	mg/L	0.00012 U	0.00012 U	0.00012 U	-	-	-
Aroclor-1254 (PCB-1254)	mg/L	0.00037 U	0.00038 U	0.00037 U	-	-	-
Aroclor-1260 (PCB-1260)	mg/L	0.00015 U	0.00016 U	0.00015 U	-	-	-
TCLP-Pesticides							
4,4'-DDD	mg/L	0.00021 U	0.00021 U	0.00021 U	-	-	-
4,4'-DDE	mg/L	0.00012 U	0.00012 U	0.00012 U	-	-	-
4,4'-DDT	mg/L	0.00012 U	0.00012 U	0.00012 U	-	-	-
Chlordane	mg/L	0.0029 U	0.0029 U	0.0029 U	-	-	-
Dieldrin	mg/L	0.00011 U	0.00011 U	0.00011 U	-	-	-
Endosulfan I	mg/L	0.00027 U	0.00027 U	0.00027 U	-	-	-
Endosulfan II	mg/L	0.00013 U	0.00013 U	0.00013 U	-	-	-
Endosulfan sulfate	mg/L	0.00026 U	0.00026 U	0.00026 U	-	-	-
Endrin	mg/L	0.000091 U	0.000091 U	0.000091 U	-	-	-
gamma-BHC (lindane)	mg/L	0.00012 U	0.00012 U	0.00012 U	-	-	-
Heptachlor	mg/L	0.00018 U	0.00018 U	0.00018 U	-	-	-
Heptachlor epoxide	mg/L	0.00014 U	0.00014 U	0.00014 U	-	-	-
Methoxychlor	mg/L	0.00031 U	0.00031 U	0.00031 U	-	-	-
Mirex	mg/L	0.000084 U	0.000084 U	0.000084 U	-	-	-
Toxaphene	mg/L	0.020 U	0.020 U	0.020 U	-	-	-
Glycols							
2-Ethoxyethanol	mg/L	2.5 U	2.5 U	2.5 U	-	-	-
Ethylene glycol	mg/L	1.9 U	1.9 U	1.9 U	-	-	-
Ethylene glycol monomethyl ether (2-methyoxyethanol)	mg/L	2.4 U	2.4 U	2.4 U	-	-	-

Table 6

Treatability Soil Characterization
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Sample Location: Sample Identification: Sample Date:	Units	SITS-01 1187072-SITS-01 10/17/2019	SITS-02 1187072-SITS-02 10/17/2019	SITS-03 1187072-SITS-03 10/17/2019	SITS-01 1187072-SITS-01 07/30/2020	SITS-02 1187072-SITS-02 07/30/2020	SITS-03 1187072-SITS-03 07/30/2020
Parameters							
TCLP-Semi-Volatile Organic Compounds (SVOCs)							
1,4-Dichlorobenzene	mg/L	0.0045 U	0.0045 U	0.0045 U	-	-	-
2,4,5-Trichlorophenol	mg/L	0.0079 U	0.0079 U	0.0079 U	-	-	-
2,4,6-Trichlorophenol	mg/L	0.0095 U	0.0095 U	0.0095 U	-	-	-
2,4-Dinitrotoluene	mg/L	0.0079 U	0.0079 U	0.0079 U	-	-	-
2-Methylphenol	mg/L	0.0040 U	0.0040 U	0.0040 U	-	-	-
3&4-Methylphenol	mg/L	0.0079 U	0.0079 U	0.0079 U	-	-	-
Hexachlorobenzene	mg/L	0.0055 U	0.0055 U	0.0055 U	-	-	-
Hexachlorobutadiene	mg/L	0.0084 U	0.0084 U	0.0084 U	-	-	-
Hexachloroethane	mg/L	0.0040 U	0.0040 U	0.0040 U	-	-	-
Nitrobenzene	mg/L	0.012 U	0.012 U	0.012 U	-	-	-
Pentachlorophenol	mg/L	0.0075 U	0.0075 U	0.0075 U	-	-	-
Pyridine	mg/L	0.0082 U	0.0082 U	0.0082 U	-	-	-
TCLP-Volatile Organic Compounds (VOCs)							
1,1,1,2-Tetrachloroethane	mg/L	0.16 U	0.16 U	0.16 U	-	-	-
1,1,1-Trichloroethane	mg/L	0.10 U	0.10 U	0.10 U	-	-	-
1,1,2,2-Tetrachloroethane	mg/L	0.12 U	0.12 U	0.12 U	-	-	-
1,1,2-Trichloroethane	mg/L	0.096 U	0.096 U	0.096 U	-	-	-
1,1-Dichloroethene	mg/L	0.11 U	0.11 U	0.11 U	-	-	-
1,2,3-Trichloropropane	mg/L	0.11 U	0.11 U	0.11 U	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	mg/L	0.11 U	0.11 U	0.11 U	-	-	-
1,2-Dichloroethane	mg/L	0.058 U	0.058 U	0.058 U	-	-	-
1,3-Dichloropropene	mg/L	0.13 U	0.13 U	0.13 U	-	-	-
1,4-Dichlorobenzene	mg/L	0.041 U	0.041 U	0.041 U	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	mg/L	0.12 U	0.12 U	0.12 U	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	mg/L	0.074 U	0.074 U	0.074 U	-	-	-
Acetone	mg/L	0.13 U	0.13 U	0.13 U	-	-	-
Acetonitrile	mg/L	2.0 U	2.0 U	2.0 U	-	-	-
Acrylonitrile	mg/L	1.3 U	1.3 U	1.3 U	-	-	-
Benzene	mg/L	0.079 U	0.079 U	0.079 U	-	-	-
Bromodichloromethane	mg/L	0.094 U	0.094 U	0.094 U	-	-	-
Bromoform	mg/L	0.10 U	0.10 U	0.10 U	-	-	-
Bromomethane (Methyl bromide)	mg/L	0.18 U	0.18 U	0.18 U	-	-	-
Carbon disulfide	mg/L	0.12 U	0.12 U	0.12 U	-	-	-
Carbon tetrachloride	mg/L	0.13 U	0.13 U	0.13 U	-	-	-
Chlorobenzene	mg/L	0.063 U	0.063 U	0.063 U	-	-	-
Chloroform (Trichloromethane)	mg/L	0.085 U	0.085 U	0.085 U	-	-	-
Dichlorodifluoromethane (CFC-12)	mg/L	0.12 U	0.12 U	0.12 U	-	-	-
Ethylbenzene	mg/L	0.086 U	0.086 U	0.086 U	-	-	-
Hexachlorobutadiene	mg/L	0.073 U	0.073 U	0.073 U	-	-	-
Isobutanol (isobutyl alcohol)	mg/L	3.6 U	3.6 U	3.6 U	-	-	-
Methyl acrylonitrile	mg/L	1.6 U	1.6 U	1.6 U	-	-	-
Methylene chloride	mg/L	0.15 U	0.15 U	0.15 U	-	-	-
Styrene	mg/L	0.053 U	0.053 U	0.053 U	-	-	-
Tetrachloroethene	mg/L	0.080 U	0.080 U	0.080 U	-	-	-
Toluene	mg/L	0.067 U	0.067 U	0.067 U	-	-	-
trans-1,3-Dichloropropene	mg/L	0.069 U	0.069 U	0.069 U	-	-	-
Trichloroethene	mg/L	0.060 U	0.060 U	0.060 U	-	-	-
Trichlorofluoromethane (CFC-11)	mg/L	0.058 U	0.058 U	0.058 U	-	-	-
Vinyl chloride	mg/L	0.15 U	0.15 U	0.15 U	-	-	-
Xylenes (total)	mg/L	0.17 U	0.17 U	0.17 U	-	-	-
General Chemistry							
Cyanide (total)	mg/kg	1.2	1.2	0.35 U	-	-	-
Free liquid	none	CNF	CNF	CNF	-	-	-
Ignitability	Deg F	140	140	140	-	-	-
Percent solids	%	61.0	61.8	74.4	60.1	57.2	65.9
pH, lab	s.u.	9.6	10	7.9	-	-	-
Total Sulfide	mg/kg	1200	850	16 J	-	-	-
Reactive Sulfide	mg/kg	-	-	-	22 U	24 U	21 U

Notes:
- pg/L - picograms per Liter
- mg/L - milligrams per Liter
- mg/kg - milligrams per kilogram
- Deg F - Degrees in Fahrenheit
- s.u. - standard unit
- TCLP - Toxicity Characteristic Leaching Procedure
- CNF - Contains no free liquid
- U - Not detected at the associated reporting limit.
- J - Estimated concentration.
- UJ - Not detected; associated reporting limit is estimated.

Table 7

Treatability Water Characterization
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Sample Location:	Units	Estimated Discharge Criteria [1, 2]	EXC-1	INF3	INF 3	CEFF	FEFF	SI Contact - Initial
Sample Identification:			11187072-091319-LL-EXC-1	INF 3	INF 4	1. CEFF	FEFF 1	11187072-S.IMPD.CONTACT INITIAL
Sample Description:			North Impoundment Excavation See page	Contact Water (Tank 1)	Contact Water (Tank 2)	Clarified Effluent	Filtered Effluent	South Impoundment Borehole Water
Dioxins/Furans								
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	pg/L	100	5.8 U	590	370 J-	6.4 U	5.5 U	22000
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	pg/L	100	90 J	15000 J+	8800 J	44 U	44 U	310000
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	pg/L	50	6.9 U	880 J-	600 J-	2.9 U	1.9 U	2800
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	pg/L	50	4.1 U	840	540 J-	4.9 J	6.7 J	43000
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	pg/L	50	1.8 U	320	240 J-	1.4 U	1.3 U	130
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	pg/L	50	19 J	3100	2500 J-	3.9 J	1.6 J	260
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	pg/L	50	0.82 U	11 U	4.9 U	2.6 U	0.83 U	69
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	pg/L	50	5.6 J	790	650 J-	1.7 J	0.77 U	120
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	pg/L	50	0.83 U	30 J	20 J-	1.6 J	0.79 U	920
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	pg/L	50	0.68 U	53	40 J-	2.0 U	0.52 U	11 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	pg/L	50	0.74 U	18 J-	8.5 J-	1.4 U	0.73 U	300
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	pg/L	50	11 J	2100	1900	2.5 J	1.5 J	100
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	pg/L	50	1.1 U	160	130	0.94 U	0.99 U	32 J
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	pg/L	50	0.73 U	93	73 J-	1.2 U	0.52 U	38 J
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	pg/L	50	6.2 J	1200	1100	0.65 U	0.63 U	73
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	pg/L	10	220	50000	46000	37	7.1 J	3800
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	pg/L	10	61	18000	15000	13	3.2 J	1000
Total heptachlorodibenzofuran (HpCDF)	pg/L	50	11 J	1600 J	1100 J	4.3 J	1.9 J	10000 J
Total heptachlorodibenzo-p-dioxin (HpCDD)	pg/L	50	10 J	2000 J	1300 J	8.2 J	13 J	88000 J
Total hexachlorodibenzofuran (HxCDF)	pg/L	50	25 J	4600 J	3800 J	8.8 J	1.6 J	2900 J
Total hexachlorodibenzo-p-dioxin (HxCDD)	pg/L	50	0.83 U	260 J	180 J	5.6 J	0.83 U	7400 J
Total pentachlorodibenzofuran (PeCDF)	pg/L	50	26 J	5000 J	4600 J	2.5 J	1.5 J	860 J
Total pentachlorodibenzo-p-dioxin (PeCDD)	pg/L	50	1.1 U	190 J	160 J	0.94 U	0.99 U	430 J
Total tetrachlorodibenzofuran (TCDF)	pg/L	10	390 J	100000 J	100000 J	68 J	11 J	6000 J
Total tetrachlorodibenzo-p-dioxin (TCDD)	pg/L	10	66 J	20000 J	16000 J	13 J	3.2 J	1200 J
Total WHO Dioxin TEQ(Human/Mammal)(ND=0)	pg/L		87.7	24000	20500	17.5	4.18	2170
Total WHO Dioxin TEQ(Human/Mammal)(ND=0.5)	pg/L		88.5	24000	20500	18.5	5.00	2170
Dioxins/Furans (dissolved)								
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF) (dissolved)	pg/L	100	2.1 U	*170*	*11 U*	13 J	22 J	--
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD) (dissolved)	pg/L	100	17 UJ	*5400 J+*	*280 J+*	21 U	29 U	--
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF) (dissolved)	pg/L	50	3.6 J	*240*	*12 J*	2.5 J	6.0 J	--
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD) (dissolved)	pg/L	50	1.1 U	*250*	*27 J*	2.4 J	6.4 J	--
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF) (dissolved)	pg/L	50	2.8 U	*88*	*4.9 U*	1.1 U	4.9 J	--
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF) (dissolved)	pg/L	50	7.6 J	*750*	*31 J*	0.91 U	3.1 J	--
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD) (dissolved)	pg/L	50	1.2 U	*4.6 U*	*3.1 U*	2.9 J	4.9 J	--
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF) (dissolved)	pg/L	50	2.7 J	*190*	*9.8 J*	0.89 U	3.5 J	--
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD) (dissolved)	pg/L	50	1.2 U	*6.7 J*	*2.1 J*	1.1 U	4.4 J	--
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF) (dissolved)	pg/L	50	2.0 U	*14 J*	*4.8 U*	1.9 J	3.8 J	--
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD) (dissolved)	pg/L	50	1.1 U	*5.7 J*	*1.7 U*	0.97 U	4.8 J	--
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF) (dissolved)	pg/L	50	3.4 U	*450*	*20 J*	1.2 U	3.2 J	--
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD) (dissolved)	pg/L	50	1.6 U	*40 J*	*3.0 J*	3.1 J	4.6 J	--
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF) (dissolved)	pg/L	50	0.71 U	*23 J*	*2.8 U*	1.5 J	3.0 J	--
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF) (dissolved)	pg/L	50	1.7 U	*250*	*11 J*	1.2 U	1.3 U	--
2,3,7,8-Tetrachlorodibenzofuran (TCDF) (dissolved)	pg/L	10	21	*11000*	*540 J*	2.7 J	1.1 U	--
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) (dissolved)	pg/L	10	7.1 J	*3800*	*150 J*	1.1 U	1.6 U	--
Total heptachlorodibenzofuran (HpCDF) (dissolved)	pg/L	50	6.4 J	*430 J*	*20 J*	2.5 J	11 J	--
Total heptachlorodibenzo-p-dioxin (HpCDD) (dissolved)	pg/L	50	1.1 U	*630 J*	*51 J*	2.4 J	6.4 J	--
Total hexachlorodibenzofuran (HxCDF) (dissolved)	pg/L	50	12 J	*1100 J*	*48 J*	3.4 J	13 J	--
Total hexachlorodibenzo-p-dioxin (HxCDD) (dissolved)	pg/L	50	1.2 U	*74 J*	*6.9 J*	2.9 J	14 J	--
Total pentachlorodibenzofuran (PeCDF) (dissolved)	pg/L	50	3.4 J	*1100 J*	*44 J*	1.3 U	3.2 J	--
Total pentachlorodibenzo-p-dioxin (PeCDD) (dissolved)	pg/L	50	1.6 U	*51 J*	*3.0 J*	4.4 J	4.6 J	--
Total tetrachlorodibenzofuran (TCDF) (dissolved)	pg/L	10	39 J	*21000 J*	*920 J*	2.7 J	1.1 U	--
Total tetrachlorodibenzo-p-dioxin (TCDD) (dissolved)	pg/L	10	7.1 J	*4000 J*	*170 J*	1.1 U	1.6 U	--
Herbicides								
2,4,5-TP (Silvex)	ug/L	NL	0.020 U	--	--	--	--	--
2,4-Dichlorophenoxyacetic acid (2,4-D)	ug/L	NL	0.040 U	--	--	--	--	--
Metals								
Aluminum	mg/L	NL	--	--	--	--	--	320
Antimony	mg/L	25.623	0.0039 U	0.0039 U	0.0039 U	0.0039 U	0.0039 U	0.049 J
Arsenic	mg/L	0.164	0.089	0.026	0.023	0.0029 U	0.0029 U	0.16
Barium	mg/L	N/A	2.1	1.1	0.96	0.29	0.28	2.8
Beryllium	mg/L	NL	0.00042 U	0.0074	0.0062	0.00042 U	0.00042 U	0.0098
Boron	mg/L	NL	1.1	0.26	0.25	0.21	0.20	--
Cadmium	mg/L	0.0439	0.00080 J	0.0028 J	0.0025 J	0.00040 J	0.00028 U	0.019
Calcium	mg/L	NL	250	130	120	55	53	1500
Chromium	mg/L	0.389	0.0017 J	0.12	0.11	0.0016 U	0.0016 U	0.90 J
Cobalt	mg/L	NL	0.0066 J	0.051	0.043	0.00040 J	0.00031 U	0.094
Copper	mg/L	0.0167	0.0081 U	0.11	0.093	0.0081 U	0.0081 U	1.2
Iron	mg/L	NL	13	110	88	0.29 J	0.13 J	590
Lead	mg/L	0.107	0.0022 U	0.12	0.098	0.0022 U	0.0022 U	3.4
Magnesium	mg/L	NL	250	58	54	33	31	70
Manganese	mg/L	NL	2.7	1.1	1.0	0.088	0.029	9.3
Mercury	mg/L	0.000598	--	--	--	--	--	0.011
Mercury	ng/L	598	--	28 J	6.3 J	18 J	2.5 J	--
Mercury	ug/L		0.10 U	--	--	--	--	--
Molybdenum	mg/L	NL	0.0068 J	0.0084 J	0.0090 J	0.010	0.010	0.14 J
Nickel	mg/L	0.103	0.0036 J	0.095	0.081	0.0021 J	0.0020 J	0.27 J
Phosphorus	mg/L	NL	--	--	--	--	--	7.8
Potassium	mg/L	NL	27	25	23	12	12	90
Selenium	mg/L	0.619	0.0029 U	0.0029 U	0.0029 U	0.0029 U	0.0029 U	0.018 J
Silver	mg/L	0.00493	0.0013 U	0.0013 U	0.0013 U	0.0013 U	0.0013 U	0.0046 J
Sodium	mg/L	NL	2400	340	350	350	360	150
Strontium	mg/L	NL	2.5	0.84	0.79	0.48	0.46	3.9
Thallium	mg/L	0.5	0.00014 U	0.0042 U	0.0042 U	0.0042 U	0.026 U	0.0090 UJ
Tin	mg/L	NL	0.00059 U	0.0048 J	0.0057 J	0.00059 U	0.00059 U	--
Titanium	mg/L	NL	0.0077 J	0.23	0.22	0.0011 J	0.00070 J	--
Vanadium	mg/L	NL	0.00047 U	0.20	0.17	0.0036 J	0.0028 J	0.51
Zinc	mg/L	0.165	0.031	0.40	0.36	0.045	0.036	9.7

Table 7

Treatability Water Characterization
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Sample Location:	Units	Estimated Discharge Criteria [1, 2]	EXC-1	INF3	INF 3	CEFF	FEFF	SI Contact - Initial
Sample Identification:			11187072-091319-LL-EXC-1	INF 3	INF 4	1. CEFF	FEFF 1	11187072-S.IMPD.CONTACT INITIAL
Sample Description:			North Impoundment Excavation See page	Contact Water (Tank 1)	Contact Water (Tank 2)	Clarified Effluent	Filtered Effluent	South Impoundment Borehole Water
Metals (dissolved)								
Aluminum (dissolved)	mg/L	NL	--	--	--	0.048 U	0.048 U	0.22
Antimony (dissolved)	mg/L	25.623	0.0039 U	0.0039 U	0.0039 U	0.0098 U	0.0098 U	0.015 J
Arsenic (dissolved)	mg/L	0.164	0.037	0.014	0.0041 J	0.012 U	0.012 U	0.012 U
Barium (dissolved)	mg/L	N/A	1.9	0.55	0.30	0.30	0.32	0.12
Beryllium (dissolved)	mg/L	NL	0.00042 U	0.0026 J	0.00042 U	0.00030 U	0.00030 U	0.00030 U
Boron (dissolved)	mg/L	NL	1.1	0.22	0.20	--	--	--
Cadmium (dissolved)	mg/L	0.0439	0.00080 J	0.0013 J	0.00040 J	0.00050 U	0.00050 U	0.00050 U
Calcium (dissolved)	mg/L	NL	240	67	55	59	57	79 J
Chromium (dissolved)	mg/L	0.389	0.0016 U	0.048	0.0039 J	0.0012 U	0.0012 U	0.0012 U
Cobalt (dissolved)	mg/L	NL	0.0064 J	0.017	0.0012 J	0.0030 U	0.0030 U	0.0030 U
Copper (dissolved)	mg/L	0.0167	0.0081 U	0.036	0.0081 U	0.0072 J	0.0053 J	0.013
Iron (dissolved)	mg/L	NL	0.12 J	40	2.9	0.056 J	0.020 U	0.20
Lead (dissolved)	mg/L	0.107	0.0022 U	0.037	0.0022 U	0.0025 U	0.0025 U	0.0047 J
Magnesium (dissolved)	mg/L	NL	250	42	32	32	31	24
Manganese (dissolved)	mg/L	NL	2.6	0.34	0.035	0.064	0.028	0.0047 J
Mercury (dissolved)	mg/L	0.000598	--	--	--	--	--	0.00010 U
Mercury (dissolved)	ng/L	598	--	--	22 J	1.7	1.7	--
Mercury (dissolved)	ug/L	0.598	0.10 U	--	--	--	--	--
Molybdenum (dissolved)	mg/L	NL	0.011	0.0084 J	0.010	0.010 J	0.0096 J	0.052
Nickel (dissolved)	mg/L	0.103	0.0050 J	0.033	0.0030 J	0.0024 U	0.0024 U	0.0062
Phosphorus (dissolved)	mg/L	NL	--	--	--	0.050 U	0.050 U	0.091 J
Potassium (dissolved)	mg/L	NL	27	17	13	14	13	43
Selenium (dissolved)	mg/L	0.619	0.0029 U	0.0029 U	0.0029 U	0.013 U	0.013 U	0.013 UJ
Silver (dissolved)	mg/L	0.00493	0.0013 U	0.0013 U	0.0013 U	0.00084 U	0.00084 U	0.00084 U
Sodium (dissolved)	mg/L	NL	2400	340	350	330	330	140
Strontium (dissolved)	mg/L	NL	2.4	0.57	0.47	0.51	0.49	0.53
Thallium (dissolved)	mg/L	0.5	0.00014 U	0.0042 U	0.0042 U	0.0090 U	0.0090 U	0.0090 U
Tin (dissolved)	mg/L	NL	0.0014 J	0.0012 J	0.00059 U	--	--	--
Titanium (dissolved)	mg/L	NL	0.0022 J	0.17	0.025	--	--	--
Vanadium (dissolved)	mg/L	NL	0.00047 U	0.086	0.012	0.0038 J	0.0035 J	0.0019 U
Zinc (dissolved)	mg/L	0.165	0.015 U	0.15	0.026 J	0.012	0.014	0.14
General Chemistry								
Alkalinity (as CaCO3 pH=4.5)	mg/L	NL	--	--	--	--	--	--
Alkalinity, bicarbonate	mg/L	NL	1000	190 J	170 J	160 J	140	--
Alkalinity, carbonate	mg/L	NL	20 U	20 UJ	20 UJ	20 UJ	20 U	--
Alkalinity, total (as CaCO3)	mg/L	NL	1000	190 J	170 J	160 J	140	--
Ammonia-N	mg/L	NL	7.1	0.073 J	0.23	0.067 U	0.067 U	2.6
Biochemical oxygen demand (BOD)	mg/L	NL	10 U	--	--	--	--	--
Bromide	mg/L	NL	9.9	0.12 J	0.15 J	0.20 J	0.30 J	--
Chemical oxygen demand (COD)	mg/L	NL	82	170	310	27	16	93
Chloride	mg/L	NL	4200	540	500	480	820	--
Cyanide (total)	ug/L	NL	3.1 U	--	--	--	--	--
Ferrous iron	mg/L	NL	0.016 UJ	--	--	--	--	--
Fluoride	mg/L	NL	--	1.2 U	0.26 J	0.34	0.060 UJ	--
Hydrogen sulfide	mg/L	NL	0.048 U	--	--	--	--	--
Nitrate (as N)	mg/L	NL	0.025 U	R	R	R	R	--
Nitrite (as N)	mg/L	NL	0.030 U	R	R	R	R	--
Oil and grease (HEM), total	mg/L	NL	--	2.0 J	2.1 J	--	--	--
Oil and grease (SGT HEM), non-polar material	mg/L	NL	--	1.0 U	1.0 U	--	--	--
pH, lab	s.u.	NL	6.9 J	8.2 J	7.9 J	7.7 J	7.8 J	7.7 J
Phosphorus	mg/L	NL	0.031 J	1.1	0.25	0.066	0.095	--
Phosphorus, total (as PO4)	mg/L	NL	0.095 J	3.3	0.77	0.20	0.29	--
Sulfate	mg/L	NL	6.5	37	36	1.9 U	62	--
Sulfide	mg/L	NL	0.045 U	0.57	0.061	0.0090 U	0.0090 U	--
TOC average duplicates	mg/L	NL	--	--	--	--	--	36
Total dissolved solids (TDS)	mg/L	NL	8800	980	1100	1300	1300	50 U
Total organic carbon (TOC)	mg/L	NL	24	17 J	9.2 J	5.0 J	4.3 J	--
Total suspended solids (TSS)	mg/L	30	240	3500	4600	11	2.2	--
Polychlorinated biphenyl (PCBs)								
Aroclor-1016 (PCB-1016)	ug/L	NL	0.56 U	--	--	--	--	0.19 U
Aroclor-1221 (PCB-1221)	ug/L	NL	0.46 U	--	--	--	--	0.23 U
Aroclor-1232 (PCB-1232)	ug/L	NL	0.13 U	--	--	--	--	0.21 U
Aroclor-1242 (PCB-1242)	ug/L	NL	0.17 U	--	--	--	--	0.37 U
Aroclor-1248 (PCB-1248)	ug/L	NL	0.21 U	--	--	--	--	0.12 U
Aroclor-1254 (PCB-1254)	ug/L	NL	0.15 U	--	--	--	--	0.38 U
Aroclor-1260 (PCB-1260)	ug/L	NL	0.35 U	--	--	--	--	0.16 U
Polychlorinated biphenyl (PCBs) (dissolved)								
Aroclor-1016 (PCB-1016) (dissolved)	ug/L	NL	0.64 U	--	--	--	--	--
Aroclor-1221 (PCB-1221) (dissolved)	ug/L	NL	0.52 U	--	--	--	--	--
Aroclor-1232 (PCB-1232) (dissolved)	ug/L	NL	0.14 U	--	--	--	--	--
Aroclor-1242 (PCB-1242) (dissolved)	ug/L	NL	0.19 U	--	--	--	--	--
Aroclor-1248 (PCB-1248) (dissolved)	ug/L	NL	0.24 U	--	--	--	--	--
Aroclor-1254 (PCB-1254) (dissolved)	ug/L	NL	0.17 U	--	--	--	--	--
Aroclor-1260 (PCB-1260) (dissolved)	ug/L	NL	0.40 U	--	--	--	--	--
Pesticides								
alpha-Chlordane	ug/L	NL	0.10 U	--	--	--	--	--
Chlordane	ug/L	NL	0.13 U	--	--	--	--	--
Endrin	ug/L	NL	0.015 U	--	--	--	--	--
gamma-BHC (lindane)	ug/L	NL	0.013 U	--	--	--	--	--
gamma-Chlordane	ug/L	NL	0.015 U	--	--	--	--	--
Heptachlor	ug/L	NL	0.013 U	--	--	--	--	--
Heptachlor epoxide	ug/L	NL	0.015 U	--	--	--	--	--
Hexachlorobenzene	ug/L	NL	--	--	--	--	--	--
Methoxychlor	ug/L	NL	0.019 U	--	--	--	--	--
Toxaphene	ug/L	NL	5.1 U	--	--	--	--	--

Table 7

Treatability Water Characterization
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Sample Location: / Sample Identification: / Sample Description:	Units	Estimated Discharge Criteria [1, 2]	EXC-1 / 11187072-091319-LL-EXC-1 / North Impoundment Excavation See page	INF3 / INF 3 / Contact Water (Tank 1)	INF 3 / INF 4 / Contact Water (Tank 2)	CEFF / 1. CEFF / Clarified Effluent	FEFF / FEFF 1 / Filtered Effluent	SI Contact - Initial / 11187072-S.IMPD.CONTACT INITIAL / South Impoundment Borehole Water
Semi-Volatile Organic Compounds (SVOCs)								
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	ug/L	NL	--	--	--	--	--	0.58 U
2,4,5-Trichlorophenol	ug/L	NL	4.4 U	--	--	--	--	0.61 U
2,4,6-Trichlorophenol	ug/L	NL	3.5 U	--	--	--	--	0.68 U
2,4-Dichlorophenol	ug/L	NL	--	--	--	--	--	0.51 U
2,4-Dimethylphenol	ug/L	NL	--	--	--	--	--	0.41 U
2,4-Dinitrophenol	ug/L	NL	--	--	--	--	--	15 U
2,4-Dinitrotoluene	ug/L	NL	2.2 U	--	--	--	--	0.51 U
2,6-Dinitrotoluene	ug/L	NL	2.9 U	--	--	--	--	0.60 U
2-Chloronaphthalene	ug/L	NL	--	--	--	--	--	0.59 U
2-Chlorophenol	ug/L	NL	--	--	--	--	--	0.64 U
2-Methylnaphthalene	ug/L	NL	--	--	--	--	--	0.62 U
2-Methylphenol	ug/L	NL	1.5 U	--	--	--	--	3.0 U
2-Nitroaniline	ug/L	NL	--	--	--	--	--	5.5 U
2-Nitrophenol	ug/L	NL	--	--	--	--	--	0.61 U
3&4-Methylphenol	ug/L	NL	1.4 U	--	--	--	--	3.7 U
3,3'-Dichlorobenzidine	ug/L	NL	--	--	--	--	--	5.8 U
3-Nitroaniline	ug/L	NL	--	--	--	--	--	0.67 U
4,6-Dinitro-2-methylphenol	ug/L	NL	--	--	--	--	--	15 U
4-Bromophenyl phenyl ether	ug/L	NL	--	--	--	--	--	0.63 U
4-Chloro-3-methylphenol	ug/L	NL	--	--	--	--	--	0.61 U
4-Chloroaniline	ug/L	NL	--	--	--	--	--	0.44 U
4-Chlorophenyl phenyl ether	ug/L	NL	--	--	--	--	--	0.61 U
4-Nitroaniline	ug/L	NL	--	--	--	--	--	0.58 U
4-Nitrophenol	ug/L	NL	--	--	--	--	--	1.4 U
Acenaphthene	ug/L	NL	--	--	--	--	--	0.65 U
Acenaphthylene	ug/L	NL	--	--	--	--	--	0.65 U
Acetophenone	ug/L	NL	--	--	--	--	--	0.62 U
Anthracene	ug/L	NL	--	--	--	--	--	0.49 U
Atrazine	ug/L	NL	--	--	--	--	--	6.3 U
Benzaldehyde	ug/L	NL	--	--	--	--	--	1.1 U
Benzo(a)anthracene	ug/L	NL	--	--	--	--	--	0.75 U
Benzo(a)pyrene	ug/L	NL	--	--	--	--	--	0.53 U
Benzo(b)fluoranthene	ug/L	NL	--	--	--	--	--	0.97 U
Benzo(g,h,i)perylene	ug/L	NL	--	--	--	--	--	0.69 U
Benzo(k)fluoranthene	ug/L	NL	--	--	--	--	--	0.88 U
Biphenyl (1,1-Biphenyl)	ug/L	NL	--	--	--	--	--	0.59 U
bis(2-Chloroethoxy)methane	ug/L	NL	--	--	--	--	--	0.67 U
bis(2-Chloroethyl)ether	ug/L	NL	--	--	--	--	--	0.40 U
bis(2-Ethylhexyl)phthalate (DEHP)	ug/L	NL	--	--	--	--	--	62 U
Butyl benzylphthalate (BBP)	ug/L	NL	--	--	--	--	--	4.6 U
Caprolactam	ug/L	NL	--	--	--	--	--	4.7 U
Carbazole	ug/L	NL	--	--	--	--	--	0.51 U
Chrysene	ug/L	NL	--	--	--	--	--	0.81 U
Dibenz(a,h)anthracene	ug/L	NL	--	--	--	--	--	0.72 U
Dibenzofuran	ug/L	NL	--	--	--	--	--	0.73 U
Diethyl phthalate	ug/L	NL	--	--	--	--	--	5.7 U
Dimethyl phthalate	ug/L	NL	--	--	--	--	--	0.56 U
Di-n-butylphthalate (DBP)	ug/L	NL	--	--	--	--	--	7.4 U
Di-n-octyl phthalate (DnOP)	ug/L	NL	--	--	--	--	--	6.9 U
Fluoranthene	ug/L	NL	--	--	--	--	--	0.60 U
Fluorene	ug/L	NL	--	--	--	--	--	0.69 U
Hexachlorobenzene	ug/L	NL	3.4 U	--	--	--	--	0.56 U
Hexachlorobutadiene	ug/L	NL	2.7 U	--	--	--	--	0.69 U
Hexachlorocyclopentadiene	ug/L	NL	--	--	--	--	--	5.0 U
Hexachloroethane	ug/L	NL	3.4 U	--	--	--	--	0.62 U
Indeno(1,2,3-cd)pyrene	ug/L	NL	--	--	--	--	--	0.85 U
Isophorone	ug/L	NL	--	--	--	--	--	0.54 U
Naphthalene	ug/L	NL	--	--	--	--	--	0.59 U
Nitrobenzene	ug/L	NL	2.7 U	--	--	--	--	5.0 U
N-Nitrosodi-n-propylamine	ug/L	NL	--	--	--	--	--	0.71 U
N-Nitrosodiphenylamine	ug/L	NL	--	--	--	--	--	1.2 U
Pentachlorophenol	ug/L	NL	3.3 U	--	--	--	--	8.5 U
Phenanthrene	ug/L	NL	--	--	--	--	--	0.55 U
Phenol	ug/L	NL	--	--	--	--	--	4.9 U
Pyrene	ug/L	NL	--	--	--	--	--	0.54 U
Pyridine	ug/L	NL	2.3 U	--	--	--	--	5.4 U

Table 7

Treatability Water Characterization
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Sample Location:	Units	Estimated Discharge Criteria [1, 2]	EXC-1	INF3	INF 3	CEFF	FEFF	SI Contact - Initial
Sample Identification:			11187072-091319-LL-EXC-1	INF 3	INF 4	1. CEFF	FEFF 1	11187072-S.IMPD.CONTACT INITIAL
Sample Description:			North Impoundment Excavation See page	Contact Water (Tank 1)	Contact Water (Tank 2)	Clarified Effluent	Filtered Effluent	South Impoundment Borehole Water
Volatile Organic Compounds (VOCs)								
1,1,1-Trichloroethane	ug/L	NL	--	--	--	--	--	2.5 U
1,1,2-Trichloroethane	ug/L	NL	--	--	--	--	--	2.4 U
1,1-Dichloroethane	ug/L	NL	--	--	--	--	--	1.8 U
1,1-Dichloroethene	ug/L	NL	0.76 U	--	--	--	--	2.9 U
1,2,4-Trichlorobenzene	ug/L	NL	--	--	--	--	--	3.7 U
1,2-Dichlorobenzene	ug/L	NL	--	--	--	--	--	2.0 U
1,2-Dichloroethane	ug/L	NL	1.0 U	--	--	--	--	1.5 U
1,2-Dichloropropane	ug/L	NL	--	--	--	--	--	2.5 U
1,3-Dichlorobenzene	ug/L	NL	--	--	--	--	--	1.6 U
1,4-Dichlorobenzene	ug/L	NL	0.91 U	--	--	--	--	1.0 U
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	NL	1.6 U	--	--	--	--	2.9 U
Benzene	ug/L	NL	0.56 U	--	--	--	--	2.0 U
Bromodichloromethane	ug/L	NL	--	--	--	--	--	2.4 U
Bromoform	ug/L	NL	--	--	--	--	--	2.6 U
Carbon disulfide	ug/L	NL	1.7 U	--	--	--	--	--
Carbon tetrachloride	ug/L	NL	0.92 U	--	--	--	--	3.3 U
Chlorobenzene	ug/L	NL	0.82 U	--	--	--	--	1.6 U
Chloroethane	ug/L	NL	--	--	--	--	--	2.6 U
Chloroform (Trichloromethane)	ug/L	NL	0.82 U	--	--	--	--	2.1 U
cis-1,2-Dichloroethene	ug/L	NL	--	--	--	--	--	1.6 U
cis-1,3-Dichloropropene	ug/L	NL	--	--	--	--	--	1.6 U
Ethylbenzene	ug/L	NL	--	--	--	--	--	2.2 U
Hexachlorobutadiene	ug/L	NL	1.2 U	--	--	--	--	--
m&p-Xylenes	ug/L	NL	1.3 U	--	--	--	--	1.9 U
o-Xylene	ug/L	NL	0.93 U	--	--	--	--	2.4 U
Tetrachloroethene	ug/L	NL	1.2 U	--	--	--	--	2.0 U
Toluene	ug/L	NL	--	--	--	--	--	1.7 U
trans-1,2-Dichloroethene	ug/L	NL	--	--	--	--	--	2.5 U
trans-1,3-Dichloropropene	ug/L	NL	--	--	--	--	--	1.7 U
Trichloroethene	ug/L	NL	1.6 U	--	--	--	--	1.5 U
Vinyl chloride	ug/L	NL	0.85 U	--	--	--	--	3.7 U
Xylenes (total)	ug/L	NL	2.0 U	--	--	--	--	4.3 U

Notes:
-- Data not available
NL - No discharge limit expected
[1] Per an EPA email dated February 18, 2020, compliance with the Texas Surface Water Quality Standards will be determined using the minimum level of the EPA approved method (1613B), cited in 40 CFR Part 136, in sampling of dioxin concentrations for surface water discharges during the site remedial action.
[2] Estimated discharge criteria were calculated for all parameters except dioxins and furans utilizing the TCEQ model, TEXTOX MENU # 5 for bays or wide tidal rivers.
Samples shown in italics were not filtered with 0.45 micron filter and are not directly comparable to other filtered results.
pg/L - picograms per Liter
mg/L - milligrams per Liter
ug/L - micrograms per Liter
s.u. - standard unit
U - Not detected at the associated reporting limit.
J - Estimated concentration.
UJ - Not detected; associated reporting limit is estimated.
R - Rejected.
J- - Estimated concentration, result may be biased low
J+ - Estimated concentration, result may be biased high.

Table 8

Treatability Particle Size Analysis by Filtration
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris County, Texas

Filter Size: / Sample Identification:	Units	Minimum Level of EPA Method 1613B[1]	100 µm / 11187072-Filter Test-1	10 µm / 11187072-Filter Test-3	1 µm / 11187072-Filter Test-4	0.45 µm / 11187072-Filter Test-5	0.1 µm / 11187072-Filter Test-6
Dioxins/Furans							
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	pg/L	10	800	270	3.6 J	<0.76	<0.65
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	pg/L	10	2500	820	8.7 J	1.6 J	0.93 J
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	pg/L	50	9.4 J	4.2 J	<0.92	<1	<1.2
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	pg/L	50	100	39 J	<0.53	<0.6	<0.64
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	pg/L	50	59	22 J	<0.56	<0.57	<0.66
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	pg/L	50	<2.7	<1.7	<2	<1.9	<1.9
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	pg/L	50	<2.7	<0.84	<0.45	<0.62	<1.3
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	pg/L	50	<2.3	<0.60	<0.71	<0.57	<1.5
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	pg/L	50	210	74	<1.1	<0.6	<1.2
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	pg/L	50	53	20 J	<0.44	<1.2	<0.86
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	pg/L	50	<4.5	<2.1	<0.67	<0.75	<1.1
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	pg/L	50	7.0 J	<2.8	<0.36	<0.94	<0.47
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	pg/L	50	75	30 J	<1.7	<0.53	<1.4
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	pg/L	50	84	30 J	<0.75	<1.1	<1.2
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	pg/L	50	28 J	11 J	<0.87	<0.47	<0.47
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	pg/L	100	1900	850	<12	<4	<4.6
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	pg/L	100	61 J	<24	<0.9	<1.9	<1.8
Total tetrachlorodibenzo-p-dioxin (TCDD)	pg/L	-	860 J	290 J	5 J	<0.76	<0.65
Total tetrachlorodibenzofuran (TCDF)	pg/L	-	4200 J	1400 J	13 J	1.6 J	0.93 J
Total pentachlorodibenzo-p-dioxin (PeCDD)	pg/L	-	9.4 J	4.2 J	<0.92	<1	<1.2
Total pentachlorodibenzofuran (PeCDF)	pg/L	-	250 J	91 J	<0.56	<0.69	<0.66
Total hexachlorodibenzo-p-dioxin (HxCDD)	pg/L	-	27 J	7.5 J	2.7 J	2.5 J	4.6 J
Total hexachlorodibenzofuran (HxCDF)	pg/L	-	310 J	110 J	1.8 J	2.9 J	3.2 J
Total heptachlorodibenzo-p-dioxin (HpCDD)	pg/L	-	190 J	78 J	3.9 J	<0.53	2.3 J
Total heptachlorodibenzofuran (HpCDF)	pg/L	-	140 J	52 J	1.6 J	1.1 J	1.2 J
Total WHO Dioxin TEQ(Human/Mammal)(ND=0)*	pg/L	-	1109.56	374.34	0	0	0
General Chemistry							
Amount of Solids Removed By Filtering	mg/L	-	9.53	4099	342	3.27	0.05

Notes:

[1] Per an EPA e-mail dated February 18, 2020, compliance with the Texas Surface Water Quality Standards will be determined using the minimum level of the EPA approved method (1613B), cited in 40 CFR Part 136, in sampling of dioxin concentrations for surface water discharges during the site remedial action.

*The reported value of zero (0) is based on the following conditions: 1) the analytical method used had a method detection level as sensitive as the ML and 2) the analytical results contained no detectable levels above the specified ML. This methodology is consistent with current Texas Pollutant Discharge Elimination System permit requirements.

< indicates that the result is less than the associated value.
µm - micrometers
J - Estimated concentration.
pg/L - picograms per Liter
mg/L - milligrams per Liter

Table 9

ARAR Requirements
Final 100% Remedial Design - Southern Impoundment (Amended April 2021)
San Jacinto River Waste Pits Site
Harris, County, Texas

Media/Topic	Status, Regulations, Standards, or Requirements	Citations or References	Description	Comment
Surface Water	Clean Water Act (CWA): Criteria and standards for imposing technology- based treatment requirements under § 402	33 U.S.C. § 1342; 40 CFR Part 125 Subpart A	Both on-Site and off-Site discharges from CERCLA sites to surface waters are required to meet the substantive CWA (National Pollutant Discharge Elimination System) NPDES requirements (USEPA 1988).	On-Site discharges to surface water must comply with the substantive technical requirements of the CWA but do not require a permit (USEPA 1988). Off-Site discharges to a Publicly Owned Treatment Work (POTW) would be regulated under the conditions of a NPDES permit (USEPA 1988). Water that is generated during removal activities in the Southern Impoundment will be treated and discharged to the San Jacinto River (Segment 1005), unless a determination is made later in the design process to connect to a POTW. The discharge location will be on-Site, so only the substantive requirements of an NPDES permit, but not an NPDES permit, will be required. Water quality-based effluent limitations using TexTox menu # 5 for bay or wide tidal river were calculated and considered for the water treatment design. Development of the treatment system discharge limits are discussed further below.
Surface Water	CWA: Sections 303 and 304: Federal Water Quality Criteria	33 U.S.C. §1313 and 1314 (304(a) list at date of ROD)	Under §303 (33 U.S.C. §1313), individual states have established water quality standards to protect existing and attainable uses (USEPA 1988). CWA §301(b)(1)(C) requires that pollutants contained in direct discharges be controlled beyond BCT/BAT equivalents (USEPA 1988).CERCLA §121(d)(2)(B)(i) establishes conditions under which water quality criteria, which were developed by USEPA as guidance for states to establish location-specific water quality standards, are to be considered relevant and appropriate. Two kinds of water quality criteria have been developed under CWA §304 (33 U.S.C. §1314): one for protection of human health, and another for protection of aquatic life. These requirements include establishment of total maximum daily loads (TMDL).	Per the 2020 Texas Integrated Report - Texas 303(d) list, San Jacinto River Segment 1005 is classified as impaired body of water for dioxin and PCBs in edible tissues as category 5; therefore it is suitable for development of a TMDL. A TMDL for dioxin and PCBs in edible tissues for San Jacinto River Segment 1005 has not been developed yet.The Texas Surface Water Quality Standard (TSWQS) for dioxins is applicable for surface water discharge from the Southern Impoundment, in accordance with EPA's February 18, 2020, email which states that: *"EPA has determined that compliance with the TSWQS ARAR will be attained as follows:* *- The state surface water quality standard for Dioxins/Furans is 7.97 x 10-8 µg/L [0.0797 pg/L] (as TCDD equivalents);* *- Compliance with the TSWQS will be determined by using minimum level of the EPA approved method (1613B), cited in 40 CFR Part 136 (GUIDELINES ESTABLISHING TEST PROCEDURES FOR THE ANALYSIS OF POLLUTANTS), in sampling of surface water discharges during the site remedial action.* *- If an effluent sample analyzed for dioxin is below the minimum level using the EPA approved method, the sample result would be identified as non-detect and the discharge would be determined to be in compliance with the ARAR.* *This approach is consistent with the state's guidance and other permits issued by TCEQ. EPA's determination is contingent on the water treatment facility using a 1 micron final filtration step in the water treatment process."*
Surface Water	Clean Water Act (CWA): Section 307(b): Pretreatment standards	33 U.S.C. §1317(b)	CERCLA §121(e) states that no federal, state, or local permit for direct discharges is required for the portion of any removal or remedial action conducted entirely on-Site (the aerial extent of contamination and all suitable areas in close proximity to the contamination necessary for implementation of the response action) (USEPA 1988).	If off-Site discharges from a CERCLA response activity were to enter receiving waters directly or indirectly, through treatment at a POTW, they must comply with applicable federal, state, and local substantive requirements and formal administrative permitting requirements (USEPA 1988).If a determination is made to discharge to a POTW, the off-Site discharges to a POTW will need to comply with pretreatment effluent standards and will require a pretreatment permit.
Surface Water	Clean Water Act (CWA)	Section 401: Water Quality Certification 33 U.S.C. §1341 30 TAC Chapter 279	Requires applicants to apply for federal permits for projects that involve a discharge into navigable waters of the U.S. to obtain certification from state or regional regulatory agencies that the proposed discharge will comply with CWA Sections 301, 302, 303, 306, and 307.	Water Quality Certification is a requirement of projects that involve discharge of dredge/fill or would impact waters of the U.S. or wetland. The bulkhead to be installed in the Southern Impoundment is considered "fill material"; therefore, Section 401 would apply to the project. The project will comply with substantive requirements of Section 401.
Surface Water	Clean Water Act (CWA)	CWA Section 404 and 404(b)(1): Dredge and Fill; 33 U.S.C. §1344 (b)(1); 33 CFR 320 and 330; 40 CFR 230)	Section 404 of the Clean Water Act (CWA) establishes a program to regulate the discharge of dredged or fill material into waters of the United States, including wetlands. Activities in waters of the United States regulated under this program include fill for development, water resource projects (such as dams and levees), infrastructure development (such as highways and airports) and mining projects.	The work must comply with substantive requirements of the Section 404. Under Section 404, "Fill material" is identified as any material used to create any structure in waters of the U.S. The bulkhead to be installed in the Southern Impoundment is considered "fill material"; therefore, Section 404 would apply to the project. The work will follow the substantive requirements of a Nationwide Permit 38 for Cleanup of Hazardous and Toxic Waste.

Table 9

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Media/Topic	Status, Regulations, Standards, or Requirements	Citations or References	Description	Comment
Surface Water	Storm Water Discharge from Construction Activities	40 CFR 450; 30 TAC Chapter 205	Requires new construction project that will disturb 5 or more acres to request coverage under a Texas Commission on Environmental Quality (TCEQ) construction general permit (TX15000) and develop a storm water pollution prevention plan (SWPPP) to control discharges of storm water associated with construction activities in accordance with the NPDES program.	The work must comply with the substantive technical requirements of these regulations. A Storm Water Pollution Prevention Plan (SWPPP) will be developed and implemented using best management practices (BMPs) to minimize erosion and entrainment of sediments in storm water runoff.
Surface Water	Texas Surface Water Quality Standards	30 TAC §307.4-7, 10	These state regulations provide: • General narrative criteria, • Anti-degradation Policy • Numerical criteria for pollutants • Numerical and narrative criteria for water-quality related uses (e.g., human use) • Site specific criteria for San Jacinto basin	The Texas Surface Water Quality Standard (TSWQS) for dioxins is applicable for surface water discharge from the Southern Impoundment and the EPA's February 18, 2020 email states as follows: *"EPA has determined that compliance with the TSWQS ARAR will be attained as follows:* *- The state surface water quality standard for Dioxins/Furans is 7.97 x 10-8 µg/L [0.0797 pg/L] (as TCDD equivalents);* *- Compliance with the TSWQS will be determined by using minimum level of the EPA approved method (1613B), cited in 40 CFR Part 136 (GUIDELINES ESTABLISHING TEST PROCEDURES FOR THE ANALYSIS OF POLLUTANTS), in sampling of surface water discharges during the site remedial action."* *- If an effluent sample analyzed for dioxin is below the minimum level using the EPA approved method, the sample result would be identified as non-detect and the discharge would be determined to be in compliance with the ARAR.* *This approach is consistent with the state's guidance and other permits issued by TCEQ. EPA's determination is contingent on the water treatment facility using a 1 micron final filtration step in the water treatment process."*
Surface Water	Texas Water Quality: Pollutant Discharge Elimination System (TPDES)	30 TAC §279.10	These state regulations require storm water discharge permits for either industrial discharge or construction-related discharge. The State of Texas was authorized by USEPA to administer the NPDES program in Texas on September 14, 1998 (Texas Commission on Environmental Quality 2009).	No permit is required for on-Site activities. A SWPPP will be developed and implemented using BMPs to minimize erosion and entrainment of sediments in storm water runoff.
Surface Water	Texas Water Quality: Water Quality Certification	30 TAC §279.10	These state regulations establish procedures and criteria for applying for, processing, and reviewing state certifications under CWA, §401. It is the purpose of this chapter, consistent with the Texas Water Code and the federal CWA, to maintain the chemical, physical, and biological integrity of the state's waters.	Water Quality Certification is a requirement of projects that involve discharge of dredge/fill or would impact waters of the U.S. or wetland. The bulkhead to be installed in the Southern Impoundment is considered "fill material"; therefore, Section 401 would apply to the project. The project will comply with substantive requirements of Section 401.
Waste	Resource Conservation And Recovery Act (RCRA): Hazardous Waste Management	42 U.S.C. §6921 et seq.; 40 CFR Parts 260 – 268	RCRA Subtitle C and its implementing regulations contain the federal requirements for the management of hazardous wastes.	This requirement would apply to certain activities if the waste materials or affected soils contain RCRA listed hazardous waste or exhibit a hazardous waste characteristic The waste management in the Southern Impoundment will be required to comply with these regulations. Based on the results of the pre-design investigation for the remedial design (PDI), the Southern Impoundment waste/soils sampled to date are not listed hazardous waste, do not contain listed hazardous waste above RCRA-thresholds, and are not classified as characteristic hazardous waste. If hazardous waste, as defined in 40 CFR part 261, is identified, it will be managed and disposed of in accordance with RCRA regulations.
Waste	Toxic Substances Control Act (TSCA)	15 USC §2601 et. seq.; 40 CFR 761.61 (c)	40 CFR 761.61 provides TSCA cleanup and disposal options for PCB remediation waste, which includes PCB- contaminated soil, sediment, sewage or industrial sludge, and building material. 761.61(c) is the risk- based option for PCB remediation waste.	Total PCB concentrations in the Southern Impoundment are below the regulatory threshold of 50 mg/kg, calculated as specified in 40 CFR 761 that could require management of any waste/soils as a TSCA waste.
Waste	RCRA: General Requirements for Solid Waste Management	42 U.S.C. §6941 et seq.; 40 CFR 258)	Requirements for construction for municipal solid waste landfills that receive RCRA Subtitle D wastes, including industrial solid waste. Requirements for run- on/run-off control systems, groundwater monitoring systems, surface water requirements, etc.	The Southern Impoundment remedial activities do not involve the construction of a municipal landfill; therefore, this regulation does not apply.

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Waste	30 Texas Administrative Code (TAC) Part 1: Industrial Solid Waste and Municipal Hazardous Waste General Terms	30 TAC §335.1 – 335.15	Substantive requirements for the transportation of industrial solid and hazardous wastes; requirements for the location, design, construction, operation, and closure of solid waste management facilities.	Guidelines to promote the proper collection, handling, storage, processing, and disposal of industrial solid waste or municipal hazardous waste in a manner consistent with the purposes of Texas Health and Safety Code, Chapter 361. These regulations also define the classification of the Industrial Solid Waste from the site. They are applicable and will be followed for waste/soils from the Southern Impoundment that are transported to off-Site landfills.
Waste	30 TAC Part 1: Industrial Solid Waste and Municipal Hazardous Waste: Notification	30 TAC Chapter 335 Subchapter P	Requires placement of warning signs in contaminated and hazardous areas if a determination is made by the executive director of the Texas Water Commission a potential hazard to public health and safety exists which will be eliminated or reduced by placing a warning sign on the contaminated property.	It is not expected that warning signs will be necessary based on this regulation. The Southern Impoundment will be protected with appropriate signage and other site controls per Health and Safety Plan.
Waste	30 TAC Part 1: Industrial Solid Waste and Municipal Hazardous Waste: Generators	30 TAC Chapter 335, Subchapter C	Standards for hazardous waste generators either disposing of waste on-Site or shipping off-Site with the exception of conditionally exempt small quantity generators. The definition of hazardous involves state and federal standards.	The waste management activities for the Southern Impoundment will be required to comply with these regulations. Based on the results of the PDI, the Southern Impoundment waste/soils sampled to date are not listed hazardous waste, do not contain listed hazardous waste above RCRA-thresholds, and are not classified as characteristic hazardous waste. If hazardous waste was identified as defined in 40 CFR part 261, the disposal of any hazardous material would be in managed in accordance with RCRA regulations.
Waste	Hazardous Materials Transportation Act	49 U.S.C. §1801 et seq.; 49 CFR Subchapter C	Establishes standards for packaging, documenting, and transporting hazardous materials.	These requirements will apply to all hazardous material transported to and from the Southern Impoundment work site. Based on the results of the PDI, it is not expected that the waste/soils transported off-Site will be classified as hazardous material and these requirements will not apply to them. If hazardous waste was identified as defined in 40 CFR part 261, the disposal of any hazardous material would be in managed in accordance with RCRA regulations.
Air	Clean Air Act (CAA)	42 U.S.C. §7401 et seq.	Authorization of potential emissions of dust, VOCs, and/or HAP resulting from the excavation and solidification and stabilization of the soil in the Southern Impoundment.	Any air discharges must comply with the substantive technical requirements of the CAA and the work will be required to comply with any applicable TCEQ requirements regarding such emissions.
Air	Texas Air Quality Rules	30 TAC Chapter 116	Authorization of potential emissions of dust, VOCs, and/or HAP resulting from the excavation and solidification and stabilization of the soil in the Southern Impoundment. Authorization is not required for remedial action, but project should comply with regulation.	TCEQ is the designated regulatory authority in Texas. Emissions generated from equipment used to extract, handle, process, condition, reclaim or destroy contaminants for the purpose of remediation are covered by a TCEQ's permit by rule (PBR) as long as emissions are limited to 5 ton per year or 1 pound per hour for the site activities (30 TAC 106.533). Prior to commencing construction, emission calculations would be performed with respect to compliance with the PBR.
Dredging/Floodplain	Rivers And Harbors Act of 1899: Obstruction of navigable waters (generally, wharves; piers, etc.); excavation and fill	33 U.S.C. §401	Controls the alteration of navigable waters (i.e., waters subject to ebb and flow of the tide shoreward to the mean high water mark). Activities controlled include construction of structures such as piers, berms, and installation of pilings as well as excavation and fill. Section 10 may be applicable for any action that may obstruct or alter a navigable waterway. No permit is required for on-Site activities. However, substantive requirements might limit in-water construction activities.	The bulkhead to be installed in the Southern Impoundment is considered "fill material"; therefore, Section 10 of the Rivers and Harbors Act of 1899 would apply to the project and will comply with substantive requirements of the Section 10.
Dredging/Floodplain	Coastal Zone Management Act	16 USC §1451 et seq.; 15 CFR 930	Federal activities must be consistent with, to the maximum extent practicable, state coastal zone management programs. Federal agencies must supply the state with a consistency determination (USEPA 1989).	The San Jacinto River lies within the Coastal Zone Boundary according to the Texas Coastal Management Plan (TCMP) prepared by the General Land Office (GLO). The EPA is required to determine whether the Southern Impoundment remedial activities will be consistent with the state's CZMP (USEPA 1989).
Dredging/Floodplain	FEMA (Federal Emergency Management Agency), Department of Homeland Security (Operating Regulations)	42 U.S.C. 4001 et seq.; 44 CFR Chapter 1	Prohibits alterations to river or floodplains that may increase potential for flooding.	The FEMA flood insurance rate map ID 48201C074M, effective on 1/6/2017, indicates that the Southern Impoundment is located within a designed coastal zone (Zone VE) and a special flood hazard area or 1% annual chance of flooding (Zone AE). The project is not expected to alter floodplain.

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Dredging/Floodplain	National Flood Insurance Program (NFIP) Regulations	42 U.S.C. Subchapter III, §4101 et seq.	Provides federal flood insurance to local authorities and requires that the local authorities not allow fill in the river that would cause an increase in water levels associated with floods.	Floodplain will not be altered during the implementation of the Southern Impoundment remedy.
Dredging/Floodplain	Floodplain Management and Wetlands Protection	Executive Orders (EO) 11988 and 11990	Requires federal agencies to conduct their activities to avoid, if possible, adverse impacts associated with the destruction or modification of wetlands and occupation or modification of floodplains. Executive Orders 11988 and 11990 require federal projects to avoid adverse effects and minimize potential harm to wetlands and within flood plains. The EO 11990 requires federal agencies to avoid to the extent possible the long and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative (USEPA 1994).	A wetlands survey has been performed and no wetlands have been identified within the Southern Impoundment. Also, floodplain is not expected to be altered during the implementation of the Southern Impoundment remedy.
Dredging/Floodplain	Texas Coastal Coordination Council Policies for Development in Critical Areas	31 TAC §501.23	Dredging in critical areas is prohibited if activities have adverse effects or degradation on shellfish and/or jeopardize the continued existence of endangered species or results in an adverse effect on a coastal natural resource area (CNRA); prohibit the location of facilities in coastal natural resource areas unless adverse effects are prevented and/or no practicable alternative. Specifies compensatory mitigation.	Dredging is not planned for the Southern Impoundment; therefore, this regulation does not apply
Dredging/Floodplain	Texas Coastal Management Plan (CMP) Consistency	31 TAC, §506.12	Specifies federal actions within the CMP boundary that may adversely affect CNRAs; specifically, selection of remedial actions.	The San Jacinto River lies within the Coastal Zone Boundary (GLO TCMP). During the RI/FS, an evaluation was made as to whether remedial alternatives may affect (adversely or not) the coastal zone and provides a technical basis for the lead agency to determine whether the activity will be consistent with the state's CMP. These requirements will be incorporated into the design as applicable.
Dredging/Floodplain	Texas State Code – obstructions to navigation	Natural Resources Code §51.302 Prohibition and Penalty	Prohibits construction or maintenance of any structure or facility on land owned by the state without an easement, lease, permit, or other instrument from the state.	Dredging is not planned for the Southern Impoundment; therefore, this regulation does not apply
Dredging/Floodplain	Floodplain Management of Harris County, Texas	Texas Code Section 240.901 and TTC Sections 251.001-251.059 and Sections 254.001-254.019	Establishes construction requirements along the segment of the San Jacinto River at or near the Southern Impoundment.	The FEMA flood insurance rate map ID 48201C074M, effective on 1/6/2017, indicates that the Southern Impoundment is located within a designated coastal zone (Zone VE) and a special flood hazard area or 1% annual chance of flooding (Zone AE). Harris County's Floodplain Management regulations requires finish floor for any structure on site would be about 16 feet above natural ground. Temporary offices such as trailers on wheels would not need to be elevated as long as they can be moved off-Site if needed. These regulations will also require that fuel tanks be engineered with anchoring to secure against flotation and lateral movement.
Wildlife Protection	Endangered Species Act	16 U.S.C. §1531 et seq.	Federal agencies must ensure that actions they authorize, fund, or carry out are not likely to adversely modify or destroy critical habitat of endangered or threatened species. Actions authorized, funded, or carried out by federal agencies may not jeopardize the continued existence of endangered or threatened species as well as adversely modify or destroy their critical habitats.	Based on a 2010 evaluation, as well as a desktop review of photographs and USFWS and NMFS species and habitat maps, no federally listed threatened or endangered (T&E) species or their critical habitat are present on the Southern Impoundment or utilize areas in the vicinity of the Southern Impoundment.
Wildlife Protection	Fish and Wildlife Coordination Act	16 U.S.C. §661 et seq. ; 16 U.S.C. §742a; 16 U.S.C. §2901	Requires adequate provision for protection of fish and wildlife resources. This title has been expanded to include requests for consultation with USFWS for water resources development projects (Mueller 1980). Any modifications to rivers and channels require consultation with the USFWS, Department of Interior, and state wildlife resources agency. Project-related losses (including discharge of pollutants to water bodies) may require mitigation or compensation.	The remedy for the Southern Impoundment will not alter any river or channel; therefore, mitigation or compensation would not be required.

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Media/Topic	Status, Regulations, Standards, or Requirements	Citations or References	Description	Comment
Wildlife Protection	Bald and Golden Eagle Protection Act	16 U.S.C. §668a-d	Makes it unlawful to take, import, export, possess, buy, sell, purchase, or barter any bald or golden eagle, nest, or egg. “Take” is defined as pursuing, hunting, shooting, poisoning, wounding, killing, capturing, trapping and collecting, molesting, or disturbing.	No readily available information suggests bald or golden eagles frequent the Southern Impoundment; however, If bald or golden eagles are identified prior to or during construction, activities will be designed to conserve the species and their habitat.
Wildlife Protection	Migratory Bird Treaty Act	16 U.S.C. §703-712; 50 CFR §10.12	Makes it unlawful to take, import, export, possess, buy, sell, purchase, or barter any migratory bird. “Take” is defined as pursuing, hunting, shooting, poisoning, wounding, killing, capturing, and trapping and collecting.	The Southern Impoundment remedy will be carried out in a manner to avoid adversely affecting migratory bird species, including individual birds or their nests.
Wildlife Protection	State of Texas Threatened and Endangered (T&E) Species Regulations	31 TAC 65.171 - 65.176	No person may take, possess, propagate, transport, export, sell or offer for sale, or ship any species of fish or wildlife listed as threatened or endangered.	Based on a 2010 evaluation, as well as a desktop review of photographs and USFWS and NMFS species and habitat maps, no state listed T&E species or their critical habitat are present on the Southern Impoundment or utilize areas in the vicinity of the Southern Impoundment.
Historic Preservation	National Historic Preservation Act	16 U.S.C. §470 et seq.; 36 CFR 800	Section 106 of this statute requires federal agencies to consider effects of their undertakings on historic properties. Historic properties may include any district, site, building, structure, or object included in or eligible for the National Register of Historic Places (NRHP), including artifacts, records, and material remains related to such a property.	According to the San Jacinto River Waste Pits Remedial Investigation/Feasibility Study (RI/FS) cultural resources assessment, “no NRHP-eligible properties are documented in the area of concern. Because of the extensive disturbance to the site and minimal ground disturbance that will likely occur for the project, it is not likely that NRHP eligible historic properties will be affected by RI/FS or eventual site remediation activities” (Anchor QEA 2009). This requirement is therefore not applicable.
Historic Preservation	Natural Resources Code, Antiquities Code of Texas	Texas Parks and Wildlife Commission Regulations 191.092-171	Requires that the Texas Historical Commission staff review any action that has the potential to disturb historic and archeological sites on public land. Actions that need review include any construction program that takes place on land owned or controlled by a state agency or a state political subdivision, such as a city or a county. Without local control, this requirement does not apply.	Assessment of historical resources during the RI/FS produced no known eligible properties and determined that disturbance of any archaeological or historic resources is unlikely within the Southern Impoundment. This requirement is therefore not expected to be applicable.
Historic Preservation	Practice and Procedure, Administrative Code of Texas	13 TAC Part 2, Chapter 26	Regulations implementing the Antiquities Code of Texas. Describes criteria for evaluating archaeological sites and permit requirements for archaeological excavation.	This requirement is only applicable if an archaeological site is found; based on evaluations during the RI/FS, it is unlikely that archaeological resources would be found on the Southern Impoundment. This requirement is therefore not expected to be applicable.
Noise	Noise Control Act	42 U.S.C. §4901 et seq.; 40 CFR Subchapter G §201 et seq.	Noise Control Act remains in effect but unfunded (USEPA 2010).	Noise is regulated at the state level.
Noise	Noise Regulations	Texas Penal Code Chapter 42, Section 42.01	The Texas Penal Code regulates any noise that exceeds 85 decibels after the noise is identified as a public nuisance.	A noise is presumed to be unreasonable if the noise exceeds a decibel level of 85 after the person making the noise receives notice from a magistrate or peace officer that the noise is a public nuisance. An offense under this section is a Class C misdemeanor. Most activities are likely to not exceed the 85 decibel level beyond the immediate work area. With the exception of pile driving for the bulkhead, the activities are not anticipated to constitute a public nuisance due to the isolation of the work, its location adjacent to a freeway with high volumes of traffic during normal working hours, and the industrial nature of activities on the Southern impoundment. Pile driving would be limited to normal working hours, to the extent possible, to minimize impacts.

Table 10

Site Specific Soil Parameters
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Soil Description Type	Elevation (ft., NAVD88)	Density (pcf)	Undrained Case		Drained Case	
			Cohesion (psf)	Friction Angle (degree)	Cohesion (psf)	Friction Angle (degree)
Fill (SC, CL, ML)	Ground to -7	115 - 117		30	-	30
Cohesive (CH & CL)	-7 to -16	95	700	-	-	23
Granular (SP, SC, SM)	-16 to -25	120		30	-	30
Granular (SP, SC)	-25 to -38	122		32	-	32
Cohesive (CH & CL)	-38 to -52	95	1750	-	-	23
Cohesive (CL)	-52 and below	112 - 120	4150	-	-	23
Backfill	NA	115	-	30	-	30

Notes:
pcf - Pounds per cubic foot
psf - Pounds per square foot

Table 11

Design Cases
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Case[1,2]	Soil Behavior	Water Surface Outside Containment (ft. NAVD88)	Water Surface Inside Containment (ft. NAVD88)	Factor of Safety on the Passive Resistance
1	Q-Case	+5	-6.5	1.5
2	Q-Case	0	0	1.5
3	S-Case	0	-6.5	1.5
4	S-Case	0	0	1.5
5	S-Case	0	+5	1.5

Notes:

[1] Ground surface on inside/outside based on proposed excavation depths.

[2] Ground surface slopes from -1 to -15 ft., NAVD88 outside the Containment. Analyses based on assumed mudline at -6 ft. NAVD88.

Table 12

Southern Impoundment Water Treatment Basis of Sizing
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Equipment/Process Description	Sizing/Selection Criteria Assumptions	Preliminary Design Value	Notes
Remediation Cell Dewatering Pump	Design Storm Event (100-yr)	Treatment flow of 600 gpm	Trash pump.
Holding Tanks	Containment of Maximum Daily Flow (Total Volume for 10 foot excavation)	260,000 gallons*	Provided up to thirteen* 20,000 gallons holding tanks with top entry mixers to accommodate contact water/return stream equalization. If provided without mixers, contractor must remove solids to maintain the design volume
Treatment Feed Pump	300 GPM base treatment flow	Up to 500 GPM to accommodate return streams	Pump will operate on VFD to adjust treatment rate, as required.
Rapid Mix Tank	Approximate retention time: 30 seconds	400 gallon capacity	Tank will include baffles to prevent vortexing. Tank will be mixed by top entry mixer with paddle-type blades to prevent shearing solids.
Flocculation Tank	Nominal retention time: 20 minutes	15,500 gallon capacity	Tank will include baffles to prevent vortexing. Tank will be mixed by top entry mixer(s) with paddle-type blades to prevent shearing solids. Mixer shall be variable speed.
Inclined Plate Clarifier	Hydraulic Loading rate: 0.25 GPM/ft^2	3,200 ft^2 of inclined plate separation area	Clarifier shall include integral sludge hopper to allow for chemical sludge withdrawal.
Filter Feed Tank	Nominal retention time of 20 minutes	6,000 gallon capacity	Tank will include baffles to prevent vortexing. Tank will be mixed by top entry mixer(s) with paddle-type blades to prevent shearing solids.
Filter Feed Pump	300 GPM base treatment flow	Up to 400 GPM	Pump will be positive displacement type and will operate on VFD.
Multimedia Filters	5 GPM/ft^2 Hydraulic Loading	60 ft^2 of active media filter area	Minimum two vessels configured in parallel; sand/anthracite media.
Nominal Rated Filters	Nominally Rated Filters @ 10 micron	Nominally rated 10 micron bag filters	Bag Filters configured in multiple bag pressure vessels.
Nominal Rated Filters	Nominally Rated Filters @ 1 micron	Nominally rated 1 micron bag filters	Bag Filters configured in multiple bag pressure vessels.
Absolute Rated Filters	Absolute rated @ 1 micron	Absolute rated 1 micron cartridge filters	Cartridge Filters configured in multiple cartridge pressure vessels.
Granular Activated Carbon	10 minute Empty Bed Contact Time (min) per stage 5 GPM/ft^2 Hydraulic Loading	400 ft^3 Bed Volume; 60 ft^2 of active bed area	GAC vessels will be configured in a lead-lag configuration providing a total contact time up to 20 minutes (total).
Treated Effluent Holding Tank	Sufficient volume for Multimedia filter backwash (10,000 US gallon minimum)	18,500 gallon holding tank	-

Table 12

Southern Impoundment Water Treatment Basis of Sizing
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Equipment/Process Description	Sizing/Selection Criteria Assumptions	Preliminary Design Value	Notes
Treated Effluent Discharge Pumps	300 GPM base treatment flow	Up to 500 GPM to accommodate process fluctuations	Pump will operate on VFD to adjust discharge rate, as required.
Clean Water Backwash Pumps	Backwashing of Multimedia filters; 12 GPM/ft^2	Up to 750 GPM	Pump will operate on VFD to adjust backwash rate, as required.
Sludge Wasting/Recycle Pump	Sludge Recycle Ratio of 0.75	Sludge Recycle Flow – Up to 400 GPM Sludge Wasting Flow – Up to 150 GPM Total Sludge Flow – up to 550 GPM	Sludge Wasting/Recycle pump will be positive displacement type; sludge wasting/recycle regulated by actuated waste.
Sludge Thickener	16 lbs/ft^2 day solids Loading	TBD by Contractor	Thickener shall allow for decanting operation and removal of thickened sludge.
Thickener Decant Return Pump	85% volume (liquid) removal in thickener	Up to 150 GPM Flow	Pump will operate on VFD to adjust decant return flow.
Thickened Sludge Wasting Pump	Assume 15% volume as Thickened sludge in Thickener	Up to 50 GPM	Thickened sludge pump will be positive displacement type; Pump will operate on VFD to adjust decant return flow.
Thickened Sludge Holding Tank	Sludge generated during 100-yr storm event	20,000 gallons (minimum)	-
Coagulant Feed Pumps	Flow paced at dosage of 50 ppm coagulant solution	Up to 2 GPH	Peristaltic type chemical metering pumps.
Organosulfide Feed Pumps	Flow paced at dose of 50 ppm organosulfide solution	Up to 2 GPH	Peristaltic type chemical metering pumps.
Acid/Caustic Feed Pumps	Flow paced based on measured pH of contact water	Up to 2 GPH	Chemical metering pumps.
Polymer Feed Pumps	Flow paced at dose of 500 ppm (neat polymer)	Up to 15 GPH (dilute polymer solution)	Peristaltic type chemical metering pumps; polymer activation/aging equipment will be provided, as needed.

Notes:

The 90% process flow diagram (drawing P-01) and piping and instrumentation diagrams (drawings P-02 and P-03) illustrate the major water treatment system equipment and components.
GPM - Gallons per minute
VFD - Variable frequency drive
ft^2 - Square feet
ft^3 - Cubic feet
ppm - Parts per million
GPH - Gallons per hour

* - The initial design value of the holding tank volume is the maximum anticipated daily volume based on a 10 foot excavation. This volume may be refined based on the results of the Pre-Construction field event.