EXHIBIT 4

DRAFT STATEMENT OF WORK

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY

SAN JACINTO RIVER WASTE PITS SUPERFUND SITE

HARRIS COUNTY, TEXAS

9298187

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DRAFT STATEMENT OF WORK (SOW)
REMEDIAL INVESTIGATION AND FEASIBILITY STUDY

SAN JACINTO RIVER WASTE PITS SUPERFUND SITE
HARRIS COUNTY, TEXAS

I. INTRODUCTION

1. This Statement of Work (SOW) provides an overview of work that will be carried out by Respondents as they implement a Remedial Investigation and Feasibility Study (RI/FS) for the San Jacinto River Waste Pits Superfund Site (Site). This RI/FS SOW is attached to the Administrative Order on Consent (AOC) for the Site and is a supporting document for the AOC. Technical work described in the SOW is intended to provide more information to Respondents for purposes of implementing the AOC and is not intended to change the meaning of any AOC language. This SOW is also consistent with both the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) and the National Contingency Plan (NCP). Any discrepancies between the AOC and SOW are unintended, and whenever necessary, the AOC will control in any interpretive disputes.

2. The purpose of the RI/FS is to investigate the nature and extent of contamination for the Site, to assess the risk to human health and the environment, and to develop and evaluate potential remedial alternatives. The RI and FS are interactive and will be conducted concurrently, to the extent practicable, in a manner that allows information and data collected during the RI to influence the development of remedial alternatives during the FS, which in turn affect additional information and data needs and the scope of any necessary treatability studies and risk assessments.

3. Respondents will conduct the RI/FS and will produce draft RI and FS reports that are in accordance with the AOC. The RI/FS will be consistent with the Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (U.S. EPA, Office of Emergency and Remedial Response, October 1988), Guidance for the Data Quality Objectives Process (EPA QA/G-4, August 2000), Ecological Risk Assessment Guidance for Superfund: Process for Designing & Conducting Ecological Risk Assessments (U.S. EPA, OSWER Directive, No. 9285.7-25, February 1997), and other guidance that EPA uses in conducting an RI/FS (a list of the primary guidance is attached). EPA is aware that not all guidance used for the RI/FS purposes may be applicable to the Site. EPA Project Managers for sites have the authority under the NCP to determine when application of any guidance would be inappropriate. Respondents may raise such guidance issues they consider appropriate during the implementation of the AOC. EPA's decisions regarding guidance applicability will be incorporated into

document approval correspondence or in other written correspondence as appropriate.

4. The RI/FS Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA describes the report format and the required report content for the draft RI and FS reports. Respondents will furnish all necessary personnel, materials, and services needed for, or incidental to, performing the RI/FS, except as otherwise specified in the AOC.

5. At the completion of the RI/FS, EPA will be responsible for the selection of a site remedy and will document this selection in one or more Records of Decision (ROD). The remedial action alternatives selected by EPA will meet the cleanup standards specified in Section 121 of CERCLA, 42 U.S.C. § 9621; the selected remedy will be protective of human health and the environment, will be in compliance with, or include a waiver of, applicable or relevant and appropriate requirements (ARARs), will be cost-effective, will utilize permanent solutions and alternative treatment technologies or resource recovery technologies, to the maximum extent practicable, and will address the statutory preference for treatment as a principal element, as appropriate under the NCP. The final RI/FS report, as approved by EPA, will, with the administrative record, form the basis for the selection of the Site's remedy and will provide the information necessary to support development of one or more RODs.

6. As specified in Section 104(a)(1) of CERCLA, 42 U.S.C. § 9604(a)(1), EPA will provide oversight of Respondents' activities throughout implementation of the AOC. Respondents will support EPA's initiation and conduct of activities related to implementation of oversight activities.

Purpose of the Statement of Work

7. This SOW sets forth certain requirements of the AOC for implementation of the Work pertaining to a RI/FS for the Site. The Respondents shall undertake the RI/FS according to the AOC, including, but not limited to, this SOW.

Objectives of the Remedial Investigation/Feasibility Study

8. The objectives of the RI/FS are to investigate the nature and extent of contamination at the Site and to develop and evaluate potential remedial alternatives, in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA, 42 U.S.C. § 9601, et seq.), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (National Contingency Plan). Specifically, these objectives are to determine the presence or absence, types, and quantities (concentrations) of contaminants; mechanism of contaminant release to

pathway(s); direction of pathway(s) transport; boundaries of source(s) and pathway(s); and risk to environmental/public health receptors.

Scope of the Remedial Investigation and Feasibility Study

9. The general scope of the RI/FS shall be to address all contamination at the Site resulting from the hazardous substances present at the Site.

Description of the Site

10. The Site is in Harris County in the State of Texas. The Site itself has no specific street address. The Site is comprised of an area of land and an area of the San Jacinto River bottom, i.e., river sediment that is contaminated with certain hazardous materials from released waste paper mill sludge. The Site is located in an area where the Interstate Highway 10 Bridge crosses over the San Jacinto River. The Site is located east of the City of Houston between two unincorporated areas known as Channelview and Highlands.

11. The northern part of the Site includes an abandoned 20-acre tract of land (Tract). Currently, the tract of land is owned by Virgil C. McGinnes Trustee and is bounded on the south by Interstate Highway 10, on the east by the San Jacinto River main channel, and on the north and west by shallow water off the River's main channel. Virgil C. McGinnis is deceased.

12. The primary hazardous substances documented at the Site are polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans. Dioxin concentrations as high as 41,300 parts per trillion have been found in soil and sediment samples collected from the Tract's disposal pit areas and from river sediments near the Tract. Sediments contaminated with high levels of dioxin have been found in the San Jacinto River both up-river and down-river from the Tract.

13. The Site was proposed for listing on the National Priorities List (NPL) on September 19, 2007 (72 FR 53509), and was placed on the NPL effective March 19, 2008 (73 FR 14719).

II. PERFORMANCE STANDARDS

14. The Performance Standards for this RI/FS shall include substantive requirements, criteria, or limitations which are specified in the AOC, including, but not limited to, this SOW. Submissions approved by the EPA are an enforceable part of the AOC; consequently, cleanup goals and other substantive requirements, criteria, or limitations which are specified in EPA-approved submissions are Performance Standards. The EPA will use

the Performance Standards to determine if the work, including, but not limited to, the RI/FS, has been completed. The Respondents shall ensure that the RI/FS is consistent with the EPA's "Interim Final Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA" (EPA 1988b, hereinafter "the RI/FS Guidance") and other EPA guidance cited herein. If the EPA approves a schedule for any work pursuant to the AOC, the schedule shall supersede any timing requirements established in the RI/FS guidance or other guidance. Likewise, if the EPA, pursuant to the AOC, requires the Respondents to perform certain work at a point in time which is not consistent with the RI/FS guidance or other guidance, the Respondents shall perform the work as specified by the AOC. For example, on page B-2, the RI/FS guidance says that the Field Investigation is complete when the contractors or subcontractors are demobilized from the field; however, if the EPA, pursuant to the AOC, requires the Respondents to perform additional field investigation activities once the contractors or subcontractors have demobilized, the Respondents shall remobilize the contractors or subcontractors and perform the additional work. Except where it is inconsistent with this AOC, as determined by the EPA, the RI/FS guidance and the other EPA guidance cited herein are Performance Standards.

III. ROLE OF THE EPA

15. The EPA's approval of deliverables, including, but not limited to, submissions, is administrative in nature and allows the Respondents to proceed to the next steps in implementing the work of the RI/FS. The EPA's approval does not imply any warranty of performance, that the RI/FS, when completed, will meet Performance Standards, or that the RI/FS will function properly and be ultimately accepted by the EPA. The EPA retains the right to disapprove submissions during the RI/FS. The EPA may disapprove deliverables including, but not limited to, submissions concerning such matters as the contractor selection, plans and specifications, work plans, processes, sampling, analysis and any other deliverables within the context of the AOC. If a submission is unacceptable to the EPA, the EPA may require the Respondents to make modifications in the submission, and the EPA may require the Respondents to do additional work to support those modifications. That is, if a submission reports certain work that is unacceptable to the EPA, the EPA may require the Respondents to modify the submission text and to perform the work until it is acceptable to the EPA. The Respondents shall modify the submission and perform the work as required by the EPA.

IV. RESPONDENTS' KEY PERSONNEL

Respondents' Project Coordinator

16. When necessary, as determined by the EPA, the EPA will meet with the Respondents and discuss the performance and capabilities of the Respondents' Project Coordinator. When

the Project Coordinator's performance is not satisfactory, as determined by the EPA, the Respondents shall take action, as requested by the EPA, to correct the deficiency. If, at any time, the EPA determines that the Project Coordinator is unacceptable for any reason, the Respondents, at the EPA's request, shall bar the Project Coordinator from any work under the AOC and give notice of the Respondents' selected new Project Coordinator to the EPA.

V. TASKS TO BE PERFORMED AND DELIVERABLES

Conduct of the Remedial Investigation/Feasibility Study

17. This SOW specifies the Work to be performed and the deliverables which shall be produced by the Respondent. The Respondent shall conduct the RI/FS in accordance with this SOW, AOC, and all applicable guidance that the EPA uses in conducting RI/FS projects under CERCLA, as well as any additional requirements in the AOC. The Respondents shall furnish all personnel, materials, and services necessary for, and incidental to, performance of the RI/FS, except as otherwise specified in the AOC or SOW.

Submittal of Deliverables

18. All draft and final deliverables specified in this SOW shall be provided in hard copy, by the Respondents, to the EPA (three copies), EPA's RI/FS Oversight Contractor (one copy), Texas Commission on Environmental Quality (TCEQ, one copy), and the Natural Resource Trustees[1] (one copy each). Draft and Final deliverables shall be provided in electronic format (specifically, Microsoft Word® Version 2003 [or higher] for Windows™ and Adobe® PDF format [only final deliverables]) to the EPA. Final deliverables shall be provided in hard copy and electronic format (specifically, Adobe® PDF format) to the Information Repository(ies) established for the Site. Additionally, all deliverables specified in this SOW shall be submitted by the Respondent according to the requirements of this SOW and Appendix SOW-1 (Schedule of Deliverables/Meetings).

19. All deliverables shall be developed in accordance with the guidance documents listed in Appendix SOW-2[2] (Guidance Documents) to this SOW. If the EPA disapproves of or

[1]The Natural Resource Trustees for the Site have been preliminarily identified as the U.S. Fish and Wildlife Service on behalf of U.S. Department of the Interior, National Oceanic and Atmospheric Administration on behalf of U.S. Department of Commerce, Texas Commission on Environmental Quality, Texas Parks and Wildlife Department, and Texas General Land Office.

[2]Appendix SOW-2 of this SOW does not include all guidance documents that are applicable to the RI/FS for the Site. The Respondent should consult with EPA's Remedial Project Manager for additional guidance and to ensure that these guidance documents have not been superseded.

requires revisions to any of these deliverables, in whole or in part, the Respondents shall submit to the EPA revised plans which are responsive to such directions or comments.

Tasks to be Performed by the Respondents

20. The Respondents shall perform each of the following Tasks (Tasks 1-10) as specified in this SOW. These Tasks shall be developed in accordance with the guidance documents listed in Appendix SOW-2 (Guidance Documents) to this SOW and any additional guidance applicable to the RI/FS process.

Task 1: Project Planning

21. The purpose of Task 1 (Project Planning) is to determine how the RI/FS will be managed and controlled. The following activities shall be performed by the Respondents as part of Task 1:

a. Attend Scoping Phase Meeting - The Respondents shall contact the EPA's Remedial Project Manager after the Effective Date of the AOC to schedule a scoping phase meeting. The ***Scoping Phase Meeting*** shall occur within **fifteen (15) calendar days** after the Effective Date of the AOC. The scoping phase meeting may include, but not be limited to, a discussion of the following:

(i) The proposed scope of the project and the specific investigative and analytical activities that will be required;
(ii) Whether there is a need to conduct limited sampling to adequately scope the project and develop project plans;
(iii) Preliminary remedial action objectives;
(iv) Potential remedial technologies and the need for or usefulness of treatability studies;
(v) Potential ARARs associated with the location and contaminants of the Site and the potential response actions being contemplated; and
(vi) Whether a temporary Site office should be set up to support Site work.

b. Evaluate Existing Information - The Respondents shall compile and review all existing Site data. The Respondents shall refer to Table 2-1 (Data Collection Information Sources) of the RI/FS Guidance for a list of data collection information sources and the Respondents shall exhaust all of those sources in compiling the data.

(i) The Respondents shall compile all existing information describing hazardous substance sources, migration pathways, and potential human and environmental receptors. The Respondents shall compile all existing

data relating to the varieties and quantities of hazardous substances released on and near the Site. The Respondents shall compile and review all available data relating to past disposal practices of any kind on and near the Site. The Respondents shall compile existing data concerning the physical and chemical characteristics of the hazardous substances, and their distribution among the environmental media (ground water, soil, surface water, sediments, and air) on and near the Site.

(ii) The Respondents shall compile existing data which resulted from any previous sampling events that may have been conducted on and near the Site. The Respondents shall gather existing data which describe previous responses that have been conducted on and near the Site by local, state, federal, or private parties.

(iii) The Respondents shall gather existing information regarding physiography, geology, hydrogeology, hydrology, meteorology, and ecology of the Site.

(iv) The Respondents shall gather existing data regarding background ground water, background soil, background surface water, background sediments, and background air characteristics.

(v) The Respondents shall gather existing data regarding demographics and land use.

(vi) The Respondents shall gather existing data which identify and locate residential, municipal, or industrial wells on and near the Site. The Respondents shall gather existing data which identify surface water uses for areas surrounding the Site including, but not limited to, downstream of the Site.

(vii) The Respondents shall gather existing information describing the flora and fauna of the Site. The Respondents shall gather existing data regarding threatened, endangered, or rare species, sensitive environmental areas, or critical habitats on and near the Site. The Respondent shall compile existing results from any previous biological testing to document any known ecological effect such as acute or chronic toxicity or bioaccumulation in the food chain.

(viii) The Respondents shall use data compiled and reviewed to describe additional data needed to characterize the Site, to better define potential

applicable or relevant and appropriate requirements (ARARs), and to develop a range of preliminarily identified remedial alternatives.

Task 2: <u>Remedial Investigation and Feasibility Study Work Plan</u>

7. The Respondents shall prepare and submit a ***Draft RI/FS Work Plan*** within **sixty (60) calendar days** after the Effective Date of the AOC.

8. The Respondents shall prepare and submit to the EPA a ***Final RI/FS Work Plan*** within **twenty (20) calendar days** after the receipt of the EPA's comments on the Draft Work Plan that is responsive to the directions in EPA's comments.

9. The Respondents shall use information from appropriate EPA guidance and technical direction provided by the EPA's Remedial Project Manager as the basis for preparing the RI/FS Work Plan.

10. The Respondents shall develop the Draft RI/FS Work Plan (WP) in conjunction with the Draft RI/FS Sampling and Analysis Plan (Task 3, RI/FS Sampling and Analysis Plan) and the Draft RI/FS Site Health and Safety Plan (Task 4, RI/FS Site Health and Safety Plan), although each plan may be submitted to the EPA under separate cover. The Draft RI/FS WP shall include a comprehensive description of the Work to be performed, the methodologies to be utilized, and a corresponding schedule for completion. In addition, the Draft RI/FS WP shall include the rationale for performing the required activities.

11. Specifically, the Draft RI/FS WP shall present a statement of the problem(s) and potential problem(s) posed by the Site and the objectives of the RI/FS. Furthermore, the Draft RI/FS WP shall include a Site background summary setting forth the Site description which includes the geographic location of the Site, and to the extent possible, a description of the Site's physiography, hydrology, geology, and demographics; the Site's ecological, cultural and natural resource features; a synopsis of the Site history and a description of previous responses that have been conducted at the Site by local, state, federal, or private parties; and a summary of the existing data in terms of physical and chemical characteristics of the contaminants identified, and their distribution among the environmental media at the Site. In addition, the Draft RI/FS WP shall include a description of the site management strategy developed during scoping, and a preliminary identification of remedial alternatives and data needs for evaluation of remedial alternatives. The Draft RI/FS WP shall reflect coordination with treatability study requirements (Task 8, Treatability Studies) and will show a process for and manner of identifying Federal and State chemical, location, and action-specific ARARs.

12. The Draft RI/FS WP shall include a Preliminary Conceptual Site Model (CSM). The CSM is a representation of the site that documents current site conditions. The intent of

the CSM is to provide input into the Sampling and Analysis Plans. It identifies possible source areas and affected media, characterizes the distribution of contaminant concentrations across the site, and identifies all potential exposure pathways, migration routes, and potential receptors. The CSM identifies the anticipated future land use, potential ground water use, and is initially developed from existing site data. The CSM is a key component of the RI/FS and shall be revised as new Site investigations produce updated or more accurate information. Specifically, the CSM will be used to: (1) identify data needs that will be targeted during the RI/FS; (2) identify exposure pathways or contaminates for which current data is useable in terms of quality and quantity, to quantify exposures and assess risk; and (3) develop a preliminary list of potential contaminants of concern.

13. Finally, the major part of the Draft RI/FS WP shall be a detailed description of the Tasks (Tasks 1-10) to be performed, information needed for each Task and for the Baseline Risk Assessments, information to be produced during and at the conclusion of each Task, and a description of the Work products and deliverables that the Respondents will submit to the EPA. This includes the deliverables set forth in the remainder of this SOW; a schedule for each of the required activities which is consistent with this SOW; a project management plan, including a data management plan (e.g., requirements for project management systems and software, minimum data requirements, data format and backup data management) and monthly reports to the EPA; and meetings and presentations to the EPA at the conclusion of each major phase of the RI/FS. The Respondents shall refer to the EPA's guidance document titled "Interim Final Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA" (EPA 1988b) which describes the RI/FS WP format and the required content.

14. The Respondents are responsible for fulfilling additional data and analysis needs identified by the EPA consistent with the general scope and objectives of this RI/FS. Because of the nature of the Site and the iterative nature of the RI/FS, additional data requirements and analyses may be identified throughout the process. If any significant additional Work is required to meet the objectives stated in the RI/FS WP, based upon new information obtained during the RI/FS, the Respondents shall submit a Draft RI/FS WP Amendment to the EPA for review and approval prior to any additional Work being conducted in accordance with the AOC and SOW. The EPA may, at its discretion, give verbal approval for Work to be conducted prior to providing written approval of the Draft RI/FS WP Amendment.

Task 3: <u>RI/FS Sampling and Analysis Plan</u>

15. The Respondents shall prepare a ***Draft RI/FS Sampling and Analysis Plan (SAP)*** within **sixty (60) calendar days** after the Effective Date of the AOC.

16. The Respondents shall prepare and submit to the EPA a ***Final RI/FS Sampling and Analysis Plan (SAP)*** within **twenty (20) calendar days** after the receipt of the EPA's comments on the draft plan that is responsive to the directions in EPA's comments.

17. The Draft RI/FS SAP shall provide a mechanism for planning field activities and shall consist of an RI/FS Field Sampling Plan and Quality Assurance Project Plan as follows:

    a. RI/FS Field Sampling Plan (FSP)- The RI/FS FSP shall define in detail the sampling and data gathering methods that will be used for the project to define the nature and extent of contamination and ecological risk assessment-related studies (Task 7, Risk Assessments). It shall include, but not be limited to, sampling objectives, sample rational, location and frequency, sampling equipment and procedures, and sample handling and analysis. The RI/FS FSP shall contain a completed Sample Design Collection Worksheet and a Method Selection Worksheet. These worksheet templates can be found in the EPA's guidance document titled "Guidance for Data Useability in Risk Assessment" (EPA 1992a). In addition, the FSP shall include a comprehensive description of the Site including geology, location, and physiographic, hydrological, ecological, cultural, and natural resource features of the Site, a brief synopses of the history of the Site, summary of existing data, and information on fate and transport and effects of chemicals. As such, the Respondents shall provide a strategy that includes both biased sampling and random sampling. The human health and ecological risk assessments require that the sampling be conducted to demonstrate that the data are statistically representative of the Site. The Respondents shall also confirm that the detection limits for all laboratories are in accordance within the goals stated in the EPA's risk assessment guidance. The FSP shall consider the use of all existing data and shall justify the need for additional data whenever existing data will meet the same objective. The FSP shall be written so that a field sampling team unfamiliar with the Site would be able to gather the samples and field information required. The Respondents shall refer to EPA's guidance documents titled "Interim Final Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA" (EPA 1988b) which describes the RI/FS FSP format and the required content.

    b. RI/FS Quality Assurance Project Plan (QAPP) - The RI/FS QAPP shall describe the project objectives and organization, functional activities, and quality assurance and quality control (QA/QC) protocols that will be used to achieve the desired Data Quality Objectives (DQOs). The DQOs shall at a minimum reflect use of analytical methods for identifying contamination and remediating contamination consistent with the levels for remedial action objectives identified in the NCP. In addition, the RI/FS QAPP shall address sampling procedures, sample custody, analytical procedures, data reduction, data validation, data reporting, and

personnel qualifications. The Respondents shall refer to EPA's guidance documents titled "EPA Guidance for Quality Assurance Project Plans, EPA QA/G-5" (EPA 1998b) and "EPA Requirements for Quality Assurance Project Plans, EPA QA/R-5" (EPA 2001), which describes the RI/FS QAPP format and the required content.

18. The Respondents shall demonstrate in advance, to the EPA's satisfaction, that each analytical laboratory it may use is qualified to conduct the proposed Work. This includes use of methods and analytical protocols for the chemicals of concern in the media of interest within detection and quantification limits consistent with both QA/QC procedures and the DQOs approved in the RI/FS QAPP for the Site by the EPA. The laboratory must have, and follow, an approved QA program. If a laboratory not in the Contract Laboratory Program (CLP) is selected, methods consistent with CLP methods shall be used where appropriate. Any methods not consistent with CLP methods shall be approved by EPA prior to their use. Furthermore, if a laboratory not in the CLP program is selected, a laboratory QA program must be submitted to the EPA for review and approval. The EPA may require the Respondents to submit detailed information to demonstrate that the laboratory is qualified to conduct the Work, including information on personnel and qualifications, equipment, and material specifications.

Task 4: <u>RI/FS Site Health and Safety Plan</u>

19. The Respondents shall prepare and submit to the EPA an ***RI/FS Site Health and Safety Plan (HSP)*** within **twenty (20) calendar days** after the Effective Date of this AOC.

20. A HSP that is in compliance with Occupational Safety and Health Administration and EPA requirements must be in place prior to any onsite activities. The EPA will review, but not approve, the RI/FS Site HSP. In addition, EPA may require a revised RI/FS Site HSP to be submitted for review in the event that the RI/FS WP is changed or amended (e.g., such as in the performance of pilot studies which may result in the airborne emissions of hazardous substances from the Site). The Respondents shall refer to the EPA's guidance document titled "Interim Final Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA" (EPA 1988b) which describes the RI/FS Site HSP format and the required content.

Task 5: <u>Community Relations Plan</u>

21. The development and implementation of community relations activities, including conducting community interviews and developing a community relations plan, are the responsibilities of EPA. Respondents must assist as required by EPA by providing information regarding the Site's history, preparing meeting visual aids as required, participating in public meetings, dissemination of news releases, and/or by preparing fact

sheets for distribution to the general public. In addition, EPA may require that Respondents establish a community information repository at or near the Site to house one copy of the administrative record. The extent of Respondents' involvement in community relations activities is left to the discretion of EPA. Respondents' community relations responsibilities, if any, are specified in the community relations plan. All community relations activities will be subject to oversight by EPA.

22. The Respondents shall make arrangements for public meetings and workshops as directed by EPA, including, but not limited to, the selection and reservation of a meeting space, and providing the necessary audio-visual equipment including screens, overhead projectors, and computer projectors.

23. The Respondents shall reserve a court reporter for public meetings regarding the Proposed Plan. A full page original and a 3.5 inch computer disk in Word Perfect format, or a CD, of the transcripts shall be provided to EPA (three copies), with additional copies provided to the State and the Site information repository.

Task 6: <u>Site Characterization</u>

24. As part of the Remedial Investigation (RI), the Respondents shall perform the activities described in this Task, including the preparation of a Preliminary Site Characterization Report and a RI Report (Task 9, Remedial Investigation Report). The overall objective of the Site's characterization will be to describe areas of the Site that may pose a threat to human health or the environment. This will be accomplished by first determining the Site's physiography, geology, hydrology and biology (??). Surface and subsurface pathways of migration shall be defined by the Respondents. The Respondents shall identify the sources of contamination and define the nature, extent, and volume of the sources of contamination, including their physical and chemical constituents. The Respondents shall also investigate the extent of migration of this contamination as well as its volume and any changes in its physical or chemical characteristics, to provide for a comprehensive understanding of the nature and extent of contamination at the Site. Using this information, Respondents will then determine and project the contaminant fate and transport.

25. The Respondents shall implement the Final RI/FS WP, and SAP during this phase of the RI/FS. Field data will be collected and analyzed to provide the information required to accomplish the objectives of the study. The Respondents shall notify the EPA at least **fifteen (15) calendar days** in advance of the field work regarding the planned dates for field activities, including, but not limited to, ecological field surveys, field layout of the sampling grid, installation of wells, initiating sampling (air, surface water, ground water, sediments, soils, sludges, and biota), installation and calibration of equipment, aquifer tests, and initiation of analysis and other field investigation activities (including

geophysical surveys and borehole geophysics). The Respondents shall demonstrate that the laboratory and type of laboratory analyses that will be utilized during the Site's characterization meets the specific QA/QC requirements and the DQOs of the investigation of the Site as specified in the Final RI/FS SAP. Activities are often iterative, and to satisfy the objectives of the RI/FS, it may be necessary for the Respondents to supplement the Work specified in the Final RI/FS WP.

26. The Respondents shall perform the following activities as part of Task 6 (Site Characterization):

a. Field Investigation - The field investigation shall include the gathering of data to define the Site's physical and biological characteristics, sources of contamination, and the nature, extent, fate, and transport of contamination at the Site. These activities shall be performed by the Respondents in accordance with the Final RI/FS WP and SAP. At a minimum, this field investigation shall address the following:

(i) Implementation and Documentation of Field Support Activities - The Respondents shall initiate field support activities following the Final RI/FS WP and SAP approval by the EPA. Field support activities may include obtaining access to the Site, scheduling, and procurement of equipment, office space, laboratory services, and/or contractors.

(ii) Investigation and Definition of Site Physical and Biological Characteristics - The Respondents shall collect data on the physical and biological characteristics of the Site and its surrounding areas including the physiography, geology, hydrology, and specific physical characteristics. This information shall be ascertained through a combination of physical measurements, observations, and sampling efforts, and will be utilized to define potential transport pathways and human and ecological receptor populations (including risks to endangered or threatened species). In defining the Site's physical characteristics, the Respondents shall also obtain sufficient engineering data for the projection of contaminant fate and transport and development and screening of remedial action alternatives, including information to assess treatment technologies.

(iii) Surveying and Mapping of the Site - The Respondents shall develop a map of the Site that includes topographic information and physical features on and near the Site. If no detailed topographic map for the Site exists, a survey of the Site shall be conducted.

(iv) Existing Well Inventory and Survey - The Respondents shall inventory and survey existing monitoring, residential, water supply, and industrial wells located within one mile of the Site. At a minimum the well information provided shall include the location, elevation, construction details including total depth and screened interval, aquifer name, use, and lithology (as determined from available well drilling records).

(v) Waste Characterization - The Respondents shall determine the location, type, and quantities as well as the physical or chemical characteristics of any waste remaining at the Site. If hazardous substances are held in containment vessels, the integrity of the containment structure and the characteristics of the contents shall be determined.

(vi) Definition of Sources of Contamination - The Respondents shall locate each source of contamination. For each location, the areal extent and depth of contamination will be determined by sampling at incremental depths on a sampling grid. The physical characteristics and chemical constituents and their concentrations will be determined for all known and discovered sources of contamination. The Respondents shall conduct sufficient sampling to define the boundaries of the contaminant sources to the level established in the Final RI/FS QAPP and DQOs. Defining the source of contamination shall include analyzing the potential for contaminant release (e.g., long-term leaching from soil), contaminant mobility and persistence, and characteristics important for evaluating remedial actions, including information to assess treatment technologies.

(vii) Description of the Nature and Extent of Contamination - The Respondent shall gather information to describe the nature and extent of contamination as a final step during the field investigation. This information shall also include soil contaminant retention capacity and mechanisms, ground water recharge and discharge areas, and ground water flow direction and rate at the Site. To describe the nature and extent of contamination, the Respondents shall implement an iterative sampling and monitoring program, and any study program identified in the Final RI/FS WP or SAP, such that by using analytical techniques sufficient to detect and quantify the horizontal and vertical concentration profiles of any potential contaminants, including any degradation or daughter contaminants, the migration of contaminants through the various media at the Site can be determined.

(viii) In addition, the Respondents shall gather data for calculations of contaminant fate and transport.

(ix) This process shall be continued until the area and depths of contamination are known, based on validated data, to the level of contamination established in the Final RI/FS QAPP and DQOs. The Respondents shall describe the factors influencing contaminant movement and prepare an extrapolation of future contaminant movement. The information on the nature and extent of contamination will be used to determine the level of risk presented by the Site and to help determine aspects of the appropriate remedial action alternatives to be evaluated.

b. Data Analyses - The Respondents shall analyze the data collected and refine the Conceptual Site Model by presenting and analyzing validated data on source characteristics, the nature and extent of contamination, the transport pathways and fate of the contaminants present at the Site, and the effects on human health and the environment:

(i) Evaluation of Site Characteristics - The Respondent shall analyze and evaluate the data to describe the Site's physical and biological characteristics, contaminant source characteristics, nature and extent of contamination, and contaminant fate and transport. Results of the Site's physical characteristics, source characteristics, and extent of contamination analyses are utilized in the analysis of contaminant fate and transport. The evaluation will include the actual and potential magnitude of releases from the sources, and horizontal and vertical spread of contamination as well as the mobility and persistence of the contaminants. Where modeling is appropriate, such models shall be identified by the Respondents to the EPA in a ***Technical Memorandum on Modeling of Site Characteristics*** prior to their use. If EPA disapproves of or requires revisions to the technical memorandum, in whole or in part, Respondents shall amend and submit to EPA a revised technical memorandum on modeling which is responsive to directions and EPA comments within **fifteen (15) calendar days** of receipt of EPA's comments.

All data and programming, including any proprietary programs, shall be made available to the EPA together with a sensitivity analysis. The RI data shall be presented in a format to facilitate the Respondents' preparation of the Baseline Human Health and Ecological Risk Assessments (Task 7, Risk Assessments). All data shall be archived in a database in a format that would be accessible to investigators as needed.

The Respondents shall agree to discuss and then collect information as necessary to address any data gaps identified by the EPA that are needed to

complete the risk assessments. Also, this evaluation shall provide any information relevant to the Site's characteristics necessary for evaluation of the need for remedial action in the risk assessments and for the development and evaluation of remedial alternatives. Analyses of data collected for the Site's characterization shall meet the DQOs developed in the Final RI/FS QAPP and stated in the Final RI/FS SAP (or revised during the RI).

c. Data Management Procedures - The Respondents shall consistently document the quality and validity of field and laboratory data compiled during the RI as follows:

(i) Documentation of Field Activities - Information gathered during the Site's characterization shall be consistently documented and adequately recorded by the Respondents in well maintained field logs and laboratory reports. The method(s) of documentation shall be specified in the Final RI/FS WP and/or the SAP. Field logs shall be utilized to document observations, measurements, and significant events that have occurred during field activities. Laboratory reports shall document sample custody, analytical responsibility and results, adherence to prescribed protocols, non-conformity events, corrective measures, and data deficiencies.

(ii) Sample Management and Tracking - The Respondents shall maintain field reports, sample shipment records, analytical results, and QA/QC reports to ensure that only validated analytical data are reported and utilized in the risk assessments and the development and evaluation of remedial alternatives. Analytical results developed under the Final RI/FS WP shall not be included in any characterization reports of the Site unless accompanied by or cross-referenced to a corresponding QA/QC report. In addition, the Respondent shall establish a data security system to safeguard chain-of-custody forms and other project records to prevent loss, damage, or alteration of project documentation.

d. Site Characterization Deliverables - The Respondent shall prepare the Preliminary Site Characterization Summary Report as follows:

(i) The Respondents shall submit a ***Draft Preliminary Site Characterization (PSC) Report*** to EPA for review and approval within **thirty (30) calendar days** following receipt of all validated sample analytical results from the laboratory.

(ii) The Respondents shall submit to the EPA the ***Final Preliminary Site Characterization (PSC) Report*** that is responsive to the directions in

EPA's comments within **twenty (20) calendar days** from the receipt of the EPA's comments on the draft report.

(iii) The PSC Report shall describe the investigative activities that have taken place, and describe and display the Site's data documenting the location and characteristics of surface and subsurface features and contamination at the Site including the affected medium, location, types, physical state, and concentration and quantity of contaminants. In addition, the location, dimensions, physical condition, and varying concentrations of each contaminant throughout each source, and the extent of contaminant migration through each of the affected media shall be documented.

The Draft PSC Report shall provide the EPA and the Respondent with a preliminary reference for developing the Baseline Human Health and Ecological Risk Assessments, evaluating the development and screening of remedial alternatives, and the refinement and identification of ARARs.

Task 7: <u>Risk Assessments</u>

27. The Respondents shall perform a Baseline Human Health Risk Assessment (BHHRA), Screening Level Ecological Risk Assessment (SLERA), and a Baseline Ecological Risk Assessment (BERA) (if necessary) for the Site. The Respondent will prepare one section of the Final RI/FS WP (Task 2) which discusses the risk assessment process and outlines the steps necessary for coordinating with the EPA at key decision points within the process. Submittal of deliverables, meetings and/or conference calls, and presentations to the EPA will be reflected in the project schedule in the Final RI/FS WP to demonstrate the progress made on the risk assessments. The DQOs listed within the Final RI/FS QAPP will include DQOs specific to risk assessment needs, and critical samples needed for the risk assessments will be so identified within the Final RI/FS SAP. These risk assessments shall consist of both Human Health and Ecological Risk Assessments as follows:

a. <u>Baseline Human Health Risk Assessment</u> - The Respondents shall perform a BHHRA to evaluate and assess the risk to human health posed by the contaminants present at the Site. The Respondent shall refer to the appropriate EPA guidance documents (EPA 1989b, 1991a, 1991b, 1991c, 1992a, and 1998a) in conducting the BHHRA. The Respondents shall address the following in the BHHRA:

(i) Hazard Identification (sources)/Dose-Response Assessment - After completion of the Preliminary Site Characterization Report, the Respondents shall review available information on the hazardous

substances present at the Site and identify the major contaminants of concern. The Respondents, with concurrence from the EPA, shall select contaminants of concern based on their intrinsic toxicological properties.

(ii) No later than **twenty (20) calendar days** following receipt of EPA approval of the Final PSC Report, the Respondents shall submit to EPA for review and approval a ***Draft Potential Chemicals of Concern (PCOC) Memorandum*** listing hazardous substances present at the Site (i.e., chemicals of concern as described in the Risk Assessment Guidance for Superfund).

(iii) The Respondents shall submit to the EPA the ***Final Potential Chemicals of Concern (PCOC) Memorandum*** that is responsive to the directions in EPA's comments within **seven (7) calendar days** from the receipt of the EPA's comments on the draft memorandum.

(iv) Conceptual Exposure/Pathway Analysis - The Respondents shall identify and analyze actual and potential exposure pathways. The proximity of contaminants to exposure pathways and their potential to migrate into critical exposure pathways shall be assessed.

(v) Characterization of Site and Potential Receptors - The Respondents shall identify and characterize human populations in the exposure pathways.

(vi) No later than **thirty (30) calendar days** following receipt of EPA approval of the Final PSC Report, the Respondents shall submit a ***Draft Exposure Assessment Memorandum*** to EPA for review and approval.

(vii) The Respondents shall submit a ***Final Exposure Assessment Memorandum*** that is responsive to the directions in EPA's comments within **fifteen (15) calendar days** of receipt of the EPA's comments on the draft memorandum.

(viii) During the exposure assessment, the Respondents shall identify the magnitude of actual or potential human exposures, the frequency and duration of these exposures, and the routes by which receptors are exposed. The exposure assessment shall include an evaluation of the likelihood of such exposures occurring and shall provide the

basis for the development of acceptable exposure levels. In developing the exposure assessment, the Respondents shall develop reasonable maximum estimates of exposure for both current land use conditions and potential future land use conditions at the Site. The Exposure Assessment memorandum shall describe the exposure scenarios, assumptions, fate and transport models, and data.

(ix) Risk Characterization - During risk characterization, the Respondents shall compare chemical-specific toxicity information, combined with quantitative and qualitative information from the exposure assessment, to measured levels of contaminant exposure levels and the levels predicted through environmental fate and transport modeling. These comparisons shall determine whether concentrations of contaminants at or near the Site are affecting or could potentially affect human health.

For chemicals lacking an EPA toxicity value, Respondents shall submit to EPA for review and approval a ***Draft Toxicological and Epidemiological Studies Memorandum*** which will list of the toxicological and epidemiological studies that will be used to perform the toxicity assessment. If EPA disapproves of or requires revisions to the toxicological and epidemiological studies memorandum, in whole or in part, Respondents shall amend and submit to EPA a ***Final Toxicological and Epidemiological Studies Memorandum*** which is responsive to the directions in all EPA comments **within fifteen (15) calendar days** of receiving EPA's comments.

(x) Identification of Limitations/Uncertainties - The Respondents shall identify critical assumptions (e.g., background concentrations and conditions) and uncertainties in the BHHRA.

(xi) Conceptual Site Model - Based on contaminant identification, exposure assessment, toxicity assessment, and risk characterization, the Respondents shall update the Conceptual Site Model for the Site.

b. No later than **thirty (30) calendar days** following receipt of EPA approval of the Final Exposure Assessment Memorandum, the Respondents shall prepare and submit to the EPA for review and approval a ***Draft Baseline Human Health Risk Assessment (BHHRA) Report***.

c. The Respondents shall submit a ***Final Baseline Human Health Risk Assessment (BHHRA) Report*** that is responsive to the directions in EPA's comments within **twenty (20) calendar days** of receipt of the EPA's comments on the draft report.

d. The Respondents shall prepare and submit an Baseline Ecological Risk Assessment (BERA) Report that conforms to Ecological Risk Assessment Guidance for Superfund: Process for Designing & Conducting Ecological Risk Assessments, (U.S. EPA, OSWER Directive, No. 9285.7-25, February 1997) and other current EPA guidance, including but not limited to EPA 1989b, EPA 1992a, EPA 1992b, and EPA 1993. The scoping of all phases of the BERA shall follow the general approach provided in EPA 1992b and shall include discussions between the Respondents' and the EPA's risk assessors and risk managers.

The eight steps in the Baseline Ecological Risk Assessment (BERA) process include: Step 1 - Screening-Level Problem Formulation and Ecological Effects Evaluation, Step 2 - Screening-Level Preliminary Exposure Estimate and Risk Calculation, and submittal of a Screening Level Ecological Risk Assessment (SLERA) Report, and continues with, if necessary, Step 3 - Baseline Risk Assessment Problem Formulation, Step 4 - Study Design and Data Quality Objectives, and submittal of a ecological risk assessment work plan included with the RI/FS Sampling and Analysis Plan, Step 5 - Field Verification and Sampling Design, Step 6 - Site Investigation and Analysis of Exposure and Effects, Step 7 - Risk Characterization and submittal of the Baseline Ecological Risk Assessment (BERA) Report, and Step 8 - Risk Management. The Respondents shall perform the BERA in accordance with the appropriate EPA's guidance documents (EPA 1992a, 1997, and 1998a). The Respondents shall interact closely with the EPA's Remedial Project Manager and risk assessment staff assigned to the Site to ensure that draft deliverables are acceptable and major rework is avoided on subsequent submittals. The scope of the BERA will be determined via a phased approach as outlined in the EPA's guidance documents and documented in the following deliverables:

(i) Step 1, Screening Level Problem Formulation and Ecological Effects Evaluation - The "Screening Level Problem Formulation and Ecological Effects Evaluation" step is part of the initial ecological risk screening assessment. For this initial step, it is likely that site-specific information for determining the nature and extent of contamination and for characterizing ecological receptors at the Site is limited. This step includes all the functions of problem formulation (Steps 3 and 4) and ecological effects analysis, but on a screening level. The results of this step will be used in conjunction with exposure estimates during the

preliminary risk calculation in Step 2 (Screening-Level Preliminary Exposure Estimate and Risk Calculation).

(ii) For the screening level problem formulation, the Respondents shall develop a Conceptual Site Model that addresses these five issues: 1) environmental setting and contaminants known or suspected to exist at the Site, 2) contaminant fate and transport mechanisms that might exist at the Site, 3) the mechanisms of ecotoxicity associated with contaminants and likely categories of receptors that could be affected, 4) the complete exposure pathways that might exist at the Site, and 5) selection of endpoints to screen for ecological risk.

(iii) The next step in the initial ecological risk screening assessment will be the preliminary ecological effects evaluation and the establishment of contaminant exposure levels that represent conservative thresholds for adverse ecological effects. Screening ecotoxicity values shall represent a no-observed-adverse-effect-level for long-term exposures to a contaminant. Ecological effects of most concern are those that can impact populations[3] (or higher levels of biological organizations) and include adverse effects on development, reproduction, and survivorship. For some of the data reported in the literature, conversions may be necessary to allow the data to be used for measures of exposure other than those reported. The Respondents shall consult with the EPA's Remedial Project Manager and risk assessors concerning any extrapolations used in developing screening ecotoxicity values.

(iv) Step 2, Screening-Level Exposure Estimate and Risk Calculation - The "Screening-Level Exposure Estimate and Risk Calculation" comprises the second step in the ecological risk screening assessment for the Site. Risk is estimated by comparing maximum documented exposure concentrations with the ecotoxicity screening values from Step 1. At the conclusion of Step 2, the Respondents shall decide, with concurrence from the EPA, that either the screening-level ecological risk assessment is adequate to determine that ecological threats are negligible, or the process should continue to a more detailed ecological risk assessment (Steps 3 through 7). If the process continues, the screening-level assessment serves to identify exposure pathways and preliminary contaminants of concern for the BERA by eliminating those contaminants and exposure pathways that pose negligible risks.

[3] Threatened and endangered species are an exception, since they are assessed at the individual level.

(v) To estimate exposures for the screening-level ecological risk calculation, on-site contaminant levels and general information on the types of biological receptors that might be exposed should be known from Step 1. Only complete exposure pathways should be evaluated and the highest measured or estimated on-site contaminant concentration for each environmental medium should be used to estimate exposures, thereby ensuring that potential ecological threats are not missed.

(vi) The Respondents will estimate a quantitative screening-level risk using the exposure estimates developed according to Step 2 and the screening ecotoxicity values developed according to Step 1. For the screening-level risk calculation, the hazard quotient approach, which compares point estimates of screening ecotoxicity values and exposure values, is adequate to estimate risk.

(vii) At the end of Step 2, the Respondents shall decide, with concurrence from the EPA, whether the information available is adequate to support a risk management decision. The three possible decisions at this point will be: (1) there is adequate information to conclude that ecological risks are negligible and therefore no need for remediation on the basis of ecological risk; (2) the information is not adequate to make a decision at this point, and the ecological risk assessment process will continue to Step 3; or (3) the information indicates a potential for adverse ecological effects, and a more thorough assessment is warranted.

(viii) The Respondent shall document the decision and the basis for it in a ***Draft Screening Level Ecological Risk Assessment (SLERA) Report*** and submit it to the EPA for review and approval within **thirty (30) calendar days** after the Effective Date of this AOC.

(ix) The SLERA Report shall identify any bio-accumulative contaminants present at the Site. The list of potentially bio-accumulative contaminants is included in Table 3-1 of Guidance for Conducting Ecological Risk Assessments at Remediation Sites in Texas (TCEQ), December 2001. Any bio-accumulative contaminants present at the Site shall be carried forward to the BERA if a BERA is necessary.

(x) The Respondents shall submit a ***Final Screening Level Ecological Risk Assessment (SLERA) Report*** that is responsive to the directions in EPA's comments within **fifteen (15) calendar days** of receipt of the EPA's comments on the draft report.

(xi) Step 3, Baseline Risk Assessment Problem Formulation - The "Baseline Risk Assessment Problem Formulation" step of the BERA, if necessary, will refine the screening-level problem formulation and expands on the ecological issues that are of concern at the Site. In the screening-level assessment, conservative assumptions are used where site-specific information is lacking. In Step 3, the results of the screening assessment and additional site-specific information are used to determine the scope and goals of the BERA. Steps 3 through 7 will be required only if the screening-level assessment, in Steps 1 and 2, indicated a need for further ecological risk evaluation.

(xii) Problem formulation at Step 3 will include the following activities: (a) refining preliminary contaminants of ecological concern; (b) further characterizing ecological effects of contaminants; (c) reviewing and refining information on contaminant fate and transport, complete exposure pathways, and ecosystems potentially at risk; (d) selecting assessment endpoints; and (e) developing a Conceptual Site Model (CSM) with working hypotheses or questions that the Site investigation will address.

(xiii) Step 4, Study Design and Data Quality Objective Process - The "Study Design and Data Quality Objective Process" step of the BERA will establish the measurement endpoints which complete the CSM in Step 3. The CSM will then be used to develop the study design and DQOs. The deliverable of Step 4 will be an ecological risk assessment work plan included in the RI/FS Sampling and Analysis Plan (Task 3), which shall describe the CSM, assessment endpoints, exposure pathways, questions and testable hypotheses, measurement endpoints and their relation to assessment endpoints, and uncertainties and assumptions. The ecological work plan shall also include a sampling and analysis plan that describes data needs; scientifically valid and sufficient study design and data analysis procedures; study methodology and protocols, including sampling techniques; data reduction and interpretation techniques, including statistical analyses; and quality assurance procedures and quality control techniques including validation of sample results.

(xiv) Step 5, Field Verification of Sampling Design - The "Field Verification of Sampling Design" step of the BERA process will ensure that the DQOs for the Site can be met. This step verifies that the selected assessment endpoints, testable hypotheses, exposure pathway model, measurement endpoints, and study design from Steps 3 and 4 are appropriate and implementable at the Site. Step 6 of the BERA process cannot begin until the Final RI/FS Sampling and Analysis Plan is approved by the EPA.

(xv) Step 6, Site Investigation and Analysis Phase - The "Site Investigation and Analysis Phase" of the BERA process shall follow the ecological work plan in the Final RI/FS Sampling and Analysis Plan developed in Step 4 and verified in Step 5. The Step 6 results are then used to characterize ecological risks in Step 7.

(xvi) The ecological work plan, included in the RI/FS Sampling and Analysis Plan, will be based on the CSM and will specify the assessment endpoints, risk questions, and testable hypotheses. During the site investigation, the Respondents shall adhere to the DQOs and to any requirements for co-located sampling. The analysis phase of the BERA process will consist of the technical evaluation of data on existing and potential exposures and ecological effects at the Site. Existing and potential exposure concentrations shall be calculated based on the 95% upper confidence level (UCL) of the mean media concentration, and not the average values. This analysis will be based on the information collected during Steps 1 through 5 and will include additional assumptions or models to interpret the data in the context of the CSM. Changing field conditions and new information on the nature and extent of contamination may require a change to the RI/FS Sampling and analysis Plan.

(xvii) Step 7 - Risk Characterization - The "Risk Characterization" step is considered the final phase of the BERA process and will include two major components: risk estimation and risk description. Risk estimation is based on the Site investigation results and will consist of integrating the exposure profiles with the exposure-effects information and summarizing the associated uncertainties. The risk description will provide information important for interpreting the risk results and will identify a threshold for adverse effects on the assessment endpoints.

(xviii) No later than **sixty (60) calendar days** following receipt of EPA approval of the Final PSC Report, the Respondents shall submit to EPA for review and approval a ***Draft Baseline Ecological Risk Assessment (BERA) Report.***

(xix) The Respondents shall submit a Final ***Baseline Ecological Risk Assessment (BERA) Report*** that is responsive to the directions in EPA's comments within **thirty (30) calendar days** of the receipt of the EPA's comments on the draft report.

(xx) Step 8 - Risk Management - "Risk Management" at the Site will be the responsibility of the EPA's Remedial Project Manager, who must balance risk reductions associated with cleanup of contaminants with potential impacts of the remedial actions themselves. In Step 7, a threshold for effects on the assessment endpoint(s) as a range between contamination levels identified as posing no ecological risk and the lowest contamination levels identified as likely to produce adverse ecological effects will be identified. In Step 8, the EPA's Remedial Project Manager will evaluate several factors in deciding whether or not to clean up to within that range. This risk management decision will be finalized by the EPA in the Record of Decision for the Site.

Task 8: <u>Treatability Studies</u>

28. Treatability testing shall be performed, if required by EPA, by the Respondents to assist in the detailed analysis of alternatives. In addition, if applicable, testing results and operating conditions shall be used in the detailed design of the selected remedial technology. The following activities shall be performed by the Respondents:

a. Determination of Candidate Technologies and of the Need for Testing - The Respondents shall identify the candidate technologies for a treatability studies program. Treatability studies may consist of laboratory screening, bench-scale testing, and/or pilot-scale testing. The listing of candidate technologies will cover the range of technologies required for alternatives analysis. The specific data requirements for the testing program will be determined and refined during the characterization of the Site and the development and screening of remedial alternatives. The Respondent shall perform the following activities:

(i) Conduct of Literature Survey and Determination of the Need for Treatability Testing - The Respondents shall conduct a literature survey to gather information on performance, relative costs, applicability, removal efficiencies, operation and maintenance requirements, and implementability of candidate technologies. If practical technologies have not been sufficiently demonstrated or cannot be adequately evaluated for this Site on the basis of available information, treatability testing may need to be conducted. Where it is determined by the EPA that treatability testing is required, and unless the Respondents can demonstrate to the EPA's satisfaction that they are not needed, the Respondents shall be required to submit a Treatability Study Work Plan to the EPA proposing the type(s) of treatability study to be conducted (i.e., laboratory screening, bench-scale testing, and/or pilot-scale testing), and outlining the steps and data necessary to initiate and evaluate the treatability testing program.

(ii) The Respondents shall submit a ***Draft Treatability Study (TS) Work Plan***, which includes a Sampling and Analysis Plan (SAP) and Health and Safety Plan, within **thirty (30) calendar days** after the receipt of the notice from the EPA that treatability studies are required.

(iii) The Respondents shall submit a ***Final Treatability Study (TS) Work Plan*** that is responsive to the directions in EPA's comments within **twenty (20) calendar days** of the receipt of the EPA's comments on the draft work plan.

(iv) The Respondents shall submit a ***Draft Treatability Study (TS) Report*** to the EPA for review and approval according to the project schedule in the Final Treatability Study Work Plan.

(v) The Respondents shall submit a ***Final Treatability Study (TS) Report*** that is responsive to the directions in EPA's comments within **twenty (20) calendar days** of the receipt of the EPA's comments on the draft report. This Report shall evaluate the technology's effectiveness and implementability in relation to the Preliminary Remediation Goals established for the Site. Actual results must be compared with predicted results to justify effectiveness and implementability discussions.

Task 9: <u>Remedial Investigation Report</u>

29. No later than **sixty (60) calendar days** following receipt of EPA approval of the PSC Report, the Respondents shall prepare and submit a ***Draft Remedial Investigation (RI) Report***.

30. The Respondents shall submit a ***Final Remedial Investigation (RI) Report*** that is responsive to the directions in EPA's comments within **thirty (30) calendar days** of the receipt of the EPA's comments on the draft report.

31. The Respondents shall refer to the EPA's guidance document titled "Interim Final Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA" (EPA 1988b) and shall specifically follow Table 3-13 (Suggested RI Report Format) for the RI Report format and the required content. The information shall include a summary of the results of the field activities to characterize the Site, classification of ground water beneath the Site, nature and extent of contamination, and appropriate site-specific discussions for fate and transport of contaminants.

32. The Respondents shall conduct a presentation to the EPA within **fifteen (15) calendar days** following submission of the Final RI Report. At this presentation, the Respondents shall present and discuss the findings of the RI, Remedial Action Objectives, candidate technologies and remedy alternatives envisioned for the FS, and the comparative analysis.

Task 10: <u>Feasibility Study</u>

33. The Respondents shall perform a Feasibility Study (FS) as specified in this SOW. The FS shall include, but not be limited to, the development and screening of alternatives for remedial action, a detailed analysis of alternatives for remedial action, submittal of Draft and Final FS Reports, and other reports/memoranda as follows:

34. No later than **thirty (30) calendar days** following receipt of EPA approval of the Final PSC Report, the Respondents shall submit a ***Draft Remedial Alternatives Memorandum*** to the EPA for review and approval.

35. The Respondents shall submit a ***Final Remedial Alternatives Memorandum*** that is responsive to the directions in EPA's comments within **fifteen (15) calendar days** of the receipt of the EPA's comments on the draft memorandum.

    a. The Respondents shall develop an appropriate range of remedial alternatives that will be evaluated through development and screening. The Remedial Alternatives Memorandum shall summarize the assembled alternatives for each affected medium and the chemical, location, and action-specific ARARs for each of the considered alternatives. The reasons for eliminating alternatives during the preliminary screening process shall be specified.
    b. The Remedial Alternatives Memorandum shall summarize the results of the screening process in relation to the Remedial Action Objectives and the more specific Preliminary Remediation Goals for the Site.

36. No later than **forty five (45) calendar days** after receipt of EPA approval of the Final RI Report, the Respondents shall submit to EPA for review and approval a ***Draft Feasibility Study (FS) Report.***

37. The Respondents shall submit an ***Interim-Final Feasibility Study (FS) Report*** that is responsive to the directions in EPA's comments within **thirty (30) calendar days** of the receipt of the EPA's comments on the draft report.

38. The Respondents shall refer to the EPA's guidance document titled "Interim Final Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA" (EPA 1988b), specifically Table 6-5 (Suggested FS Report Format) for FS Report content and format.

39. The FS Report shall include a detailed analysis of remedial alternatives for the candidate remedies identified during the screening process. This detailed analysis shall follow the EPA's guidance document titled "Interim Final Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA" (EPA 1988b) and other appropriate guidance documents. The major components of the analysis of alternatives for remedial action shall consist of an analysis of each option against a set of evaluation criteria and a separate discussion for the comparative analysis of all options with respect to each other in a manner consistent with the NCP. The Respondents shall not consider state and community acceptance during the analysis of alternatives. The EPA will perform the analysis of these two criteria.

40. The nine evaluation criteria used to evaluate the different remediation alternatives individually and against each other in order to select a remedy include the following:

    a. Overall protection of human health and the environment;
    b. Compliance with ARARs;
    c. Long-term effectiveness and permanence;
    d. Reduction of toxicity, mobility, or volume;
    e. Short-term effectiveness;
    f. Implementability;
    g. Cost;
    h. State acceptance; and
    i. Community acceptance.

41. The FS Report shall provide the basis for the Proposed Plan developed by the EPA under CERCLA and shall document the development and analysis of remedial alternatives. The Interim-Final FS Report may be subject to change following comments received during the public comment period on the EPA's Proposed Plan. The EPA will forward any comments pertinent to the content of the Interim-Final FS Report to the Respondents. The Respondents shall submit a ***Final FS Report*** that is responsive to the directions in EPA's comments within **thirty (30) calendar days** of the receipt of these comments.

APPENDIX SOW-1

SCHEDULE OF DELIVERABLES/MEETINGS

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY
SAN JACINTO RIVER WASTE PITS SUPERFUND SITE

DELIVERABLES/MEETINGS	DUE DATES (CALENDAR DAYS)
1. Scoping Phase Meeting	Meeting to occur within fifteen (15) days after the Effective Date of the AOC.
2. RI/FS Site Health and Safety Plan	Plan due within twenty (20) days after the Effective Date of the AOC. Plan must be in place prior to any onsite activities.
3. Screening Level Ecological Risk Assessment (SLERA) Report	Draft due within thirty (30) days after the Effective Date of the AOC. Final due within fifteen (15) days of the receipt of the EPA's comments.
4. RI/FS Work Plan	Draft due within sixty (60) days after the Effective Date of the AOC. Final due within twenty (20) days after the receipt of the EPA's comments.
5. RI/FS Sampling and Analysis Plan	Draft due within sixty (60) days after the Effective Date of the AOC. Final due within twenty (20) days after the receipt of the EPA's comments.
6. Technical Memorandum on Modeling of Site Characteristics.	Draft due when Respondents propose that modeling is appropriate. Final due within fifteen (15) days after receipt of the EPA's comments.
7. Preliminary Site Characterization (PSC) Report	Draft due within thirty (30) days after receipt of all validated laboratory data. Final due within twenty (20) days of the receipt of the EPA's comments.
8. Potential Chemicals of Concern (PCOC) Memorandum	Draft due within twenty (20) days after receipt of EPA approval of Final PSC Report. Final due within seven (7) days of the receipt of the EPA's comments.
9. Exposure Assessment Memorandum	Draft due within thirty (30) days after receipt of EPA approval of Final PSC Report. Final due within fifteen (15) days of the receipt of the EPA's comments.
10. Toxicological and Epidemiological Studies Memorandum.	Draft due as specified in the Final RI/FS Work Plan. Final due within fifteen (15) days of the receipt of the EPA's comments.

DELIVERABLES/MEETINGS	DUE DATES (CALENDAR DAYS)
11. Baseline Human Health Risk Assessment Report	Draft due within thirty (30) days after receipt of EPA approval of Final Exposure Assessment memorandum. Final due within twenty (20) days of the receipt of the EPA's comments.
12. Baseline Ecological Risk Assessment Report	Draft due within sixty (60) days after receipt of EPA approval of Final PSC Report. Final due within thirty (30) days of the receipt of the EPA's comments.
13. Treatability Study Work Plan	Draft due within thirty (30) days of the receipt of EPA's notice that treatability studies are required. Final due within twenty (20) days of the receipt of the EPA's comments.
14. Treatability Study Report	Draft due as specified in the Final Treatability Study Work Plan. Final due within twenty (20) days of the receipt of the EPA's comments.
15. Remedial Investigation (RI) Report	Draft due within sixty (60) days after receipt of EPA approval of Final PSC Report. Final due within thirty (30) days of the receipt of the EPA's comments.
16. Presentation to the EPA	Within fifteen (15) days after submission of the Final RI Report.
17. Remedial Alternatives Memorandum	Draft due within thirty (30) days after receipt of EPA approval of Final PSC Report. Final due within fifteen (15) days of the receipt of the EPA's comments.
18. Draft and Interim-Final Feasibility Study (FS) Report	Draft due within forty five (45) days after receipt of EPA approval of Final RI Report. Interim-Final due within thirty (30) days of the receipt of the EPA's comments.
19. Final Feasibility Study Report	Due thirty (30) days after receipt of EPA comments following public comment period.
20. Monthly Progress Reports	Initially due as specified in the RI/FS Work Plan. Thereafter, due by the tenth day of the following month.

APPENDIX SOW-2

GUIDANCE DOCUMENTS

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY
SAN JACINTO RIVER WASTE PITS SUPERFUND SITE

The following list, although not comprehensive, comprises many of the regulations and guidance documents that apply to the RI/FS process:

1. The (revised) National Contingency Plan

2. "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, " U.S. EPA, Office of Emergency and Remedial Response, October 1988, OSWER Directive No. 9355.3-01

3. "Interim Guidance on Potentially Responsible Party Participation in Remedial Investigation and Feasibility Studies," U.S. EPA, Office of Waste Programs Enforcement, Appendix A to OSWER Directive No. 9355.3-01.

4. "Guidance on Oversight of Potentially Responsible Party Remedial Investigations and Feasibility Studies, Volume I" U.S. EPA, Office of Waste Programs Enforcement, July 1, 1991, OSWER Directive No. 9835.31(c).

5. "Guidance on Oversight of Potentially Responsible Party Remedial Investigations and Feasibility Studies, Volume II" U.S. EPA, Office of Waste Programs Enforcement, July 1, 1991, OSWER Directive No. 9835.1(d).

6. "A Compendium of Superfund Field Operations Methods," Two Volumes, U.S. EPA, Office of Emergency and Remedial Response, EPA/540/P-87/001a, August 1987, OSWER Directive No. 9355.0-14.

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APPENDIX SOW-3

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY
SAN JACINTO RIVER WASTE PITS SUPERFUND SITE

A preliminary list of probable Applicable or Relevant and Appropriate Requirements (ARARs) will be generated by the Respondents during the Remedial Investigation and Feasibility Study process. This list will be compiled according to established EPA guidance, research of existing regulations, and collection of site-specific information and data. Three types of ARARs will be identified:

1. Chemical-Specific ARARs: These ARARs are usually health or risk-based numerical values or methodologies used to determine acceptable concentrations of chemicals that may be found in or discharged to the environment (e.g., maximum contaminant levels that establish safe levels in drinking water).

2. Location-Specific ARARs: These ARARs restrict actions or contaminant concentrations in certain environmentally sensitive areas. Examples of areas regulated under various Federal laws include flood plains, wetlands, and locations where endangered species or historically significant cultural resources are present.

3. Action-Specific ARARs: These ARARs are usually technology or activity-based requirements or limitations on actions or conditions involving specific substances.

Chemical and location-specific ARARs are identified early in the process, generally during the site investigation, while action-specific ARARs are usually identified during the Feasibility Study in the detailed analysis of alternatives.