

UNITED STATES DISTRICT COURT  
SOUTHERN DISTRICT OF TEXAS  
GALVESTON DIVISION

UNITED STATES OF AMERICA,  
Plaintiff, and

STATE OF TEXAS,  
Plaintiff in Intervention,

v.

Alcoa Inc.; Baker Hughes Inc.; BASF Corporation;  
BP Products North America Inc.; Welchem, Inc.;  
Champion Technologies, Inc. (f/k/a Champion  
Chemicals, Inc.); Chevron U.S.A. Inc.; Dixie  
Chemical Company, Inc.; Exxon Mobil Corporation;  
Mobil Oil Exploration & Producing Southeast Inc.;  
Mobil Exploration and Producing North America  
Inc.; Reliance Electric Company; FMC Corporation;  
Groendyke Transport, Inc.; Halliburton Energy  
Services, Inc.; Marathon Oil Company; Mission  
Petroleum Carriers, Inc.; Nalco Company; Occidental  
Chemical Corporation; Perma-Fix Environmental  
Services, Inc.; Pharmacia Corporation (f/k/a  
Monsanto Company); Quality Carriers, Inc.; Quality  
Distribution, Inc.; Rohm and Haas Company; Texaco,  
Inc.; Texas Instruments Incorporated; The Dow  
Chemical Company; The Goodyear Tire & Rubber  
Company; Trimac Transportation, Inc.; Ameri-Liquid  
Transport, Inc.; DSI Transports, Inc. (now known as  
Trimac Transportation South Inc.); Liquid  
Transporters Inc. (now known as Trimac  
Transportation East Inc.); Robertson Tank Lines (now  
known as Trimac Transportation Group Inc.); Ryder  
Bulk Transportation Services (now known as Triplus  
Inc.); Trimac Bulk Transportation, Inc. (now known  
as Triplus Inc.); Union Carbide Corporation; Union  
Pacific Railroad Co.; Land Navigator, Ltd.; and the  
Defendants Listed in Appendices F and G (excluding  
the Texas Commission on Environmental Quality),

Defendants.

Civil No: 3:12-cv-210

Remedial Design/Remedial Action  
Consent Decree

STATE OF TEXAS,

Crossclaimant,

v.

UNITED STATES OF AMERICA,

Crossdefendant.

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## I. BACKGROUND

A. The United States of America (“United States”), on behalf of the Administrator of the United States Environmental Protection Agency (“EPA”), the National Oceanic and Atmospheric Administration (“NOAA”), and the Fish and Wildlife Service of the United States Department of the Interior (“FWS”), filed a complaint in this matter pursuant to Sections 106 and 107 of the Comprehensive Environmental Response, Compensation, and Liability Act (“CERCLA”), 42 U.S.C. §§ 9606 and 9607.

B. The United States in its complaint seeks, *inter alia*: (1) Natural Resource Damages; (2) reimbursement of costs incurred by EPA and the Department of Justice for response actions at the Malone Service Company Superfund Site in Texas City, Texas, together with accrued interest; and (3) performance of response actions by the Settling Defendants at the Site consistent with the National Contingency Plan, 40 C.F.R. Part 300 (as amended) (“NCP”).

C. In accordance with the NCP and Section 121(f)(1)(F) of CERCLA, 42 U.S.C. § 9621(f)(1)(F), EPA notified the State of Texas on December 22, 2009, of negotiations with potentially responsible parties (“PRPs”) regarding the implementation of the remedial design and remedial action for the Site, and EPA has provided the State with an opportunity to participate in such negotiations and be a party to this Consent Decree.

D. The State of Texas (“State”), on behalf of the Texas Commission on Environmental Quality (“TCEQ”), has filed a complaint against the Settling Defendants and the United States in this Court alleging that the Settling Defendants and Settling Federal Agencies are liable to the State under Section 107 of CERCLA, 42 U.S.C. § 9607, and that the Settling Defendants are liable to the State under Section 361.197 of the Texas Solid Waste Disposal Act (“TSWDA”), Tex. Health & Safety Code § 361.197. In the same complaint, the State, on behalf of the Texas Trustees (defined herein as the Texas Parks and Wildlife Department (“TPWD”), the Texas General Land Office (“TGLO”), and TCEQ) alleges that the Settling Defendants and the Settling Federal Agencies are liable to the Texas Trustees for Natural Resource Damages under Section 107 of CERCLA, 42 U.S.C. § 9607, and that the Settling Defendants are liable to the Texas Trustees under the Texas Water Code § 26.265.

E. In accordance with Section 122(j)(1) of CERCLA, 42 U.S.C. § 9622(j)(1), EPA notified NOAA and FWS on December 23, 2009, of negotiations with PRPs regarding the release of hazardous substances that may have resulted in injury to the natural resources under federal trusteeship and encouraged the trustees to participate in the negotiation of this Consent Decree.

F. The Settling Defendants do not admit any liability to Plaintiffs arising out of the transactions or occurrences alleged in the complaints, nor do they acknowledge that the release or threatened release of hazardous substance(s) at or from the Site constitutes an imminent and substantial endangerment to the public health or welfare or the environment. Settling Federal Agencies do not admit any liability arising out of the transactions or occurrences alleged in any counterclaim asserted by Settling Defendants or any claim by the State.

G. Pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, EPA placed the Site on the National Priorities List, set forth at 40 C.F.R. Part 300, Appendix B, by publication in the Federal Register on June 14, 2001, 66 Fed. Reg. 32235.

H. In response to a release or a substantial threat of a release of a hazardous substance(s) at or from the Site, EPA and certain Principal Settling Defendants commenced on September 29, 2003, a Remedial Investigation and Feasibility Study (“RI/FS”) for the Site pursuant to 40 C.F.R. § 300.430.

I. Those Principal Settling Defendants completed a Remedial Investigation (“RI”) Report in April 2006 and a Feasibility Study (“FS”) Report in June 2008. Principal Settling Defendants also have been performing storm water management and Site control, including removal of liquid wastes from aboveground storage tanks, under EPA oversight.

J. On January 13, 2009, the Site property was transferred to Land Navigator, Ltd. by a Special Warranty Deed (“Special Warranty Deed”) containing restrictions that, among other things, prevent the following: any activities on the property that would interfere with remediation; any future development of the property for residential, commercial office, or industrial purposes; and any groundwater extraction or construction of improvements in the vicinity of contaminated groundwater until after EPA has certified completion of remedial action (including attainment of all cleanup standards). Land Navigator, Ltd. has provided a Grant of Access Easement, dated February 20, 2009, (“Grant of Access Easement”) to the MCP (as defined in the Grant), the United States, and the State for purposes of implementing or overseeing any necessary remediation on the property. The Special Warranty Deed, Grant of Access Easement, and a current title insurance commitment were provided to EPA on August 15, 2009.

K. Pursuant to Section 117 of CERCLA, 42 U.S.C. § 9617, EPA published notice of the completion of the FS and of the proposed plan for remedial action on May 20, 2009, in a major local newspaper of general circulation. EPA provided an opportunity for written and oral comments from the public on the proposed plan for remedial action. A copy of the transcript of the public meeting is available to the public as part of the administrative record upon which the Superfund Division Director, EPA Region 6, based the selection of the response action.

L. The decision by EPA on the remedial action to be implemented at the Site is embodied in a final Record of Decision (“ROD”), executed on September 30, 2009, on which the State has given its concurrence. The ROD includes a responsiveness summary to the public comments. Notice of the final plan was published in accordance with Section 117(b) of CERCLA, 42 U.S.C. § 9617(b).

M. Based on the information presently available to EPA and the State, EPA and the State believe that the Work will be properly and promptly conducted by Principal Settling Defendants if conducted in accordance with the requirements of this Consent Decree and its appendices.

N. Solely for the purposes of Section 113(j) of CERCLA, 42 U.S.C. § 9613(j), the Remedial Action set forth in the ROD and the Work to be performed by Principal Settling Defendants shall constitute a response action taken or ordered by the President for which judicial review shall be limited to the administrative record.

O. The Texas Trustees, NOAA, and FWS (“Trustees”) are the natural resource trustees for the Site, coordinating the necessary natural resource damage assessment and restoration activities.

P. The Parties recognize, and the Court by entering this Consent Decree finds, that this Consent Decree has been negotiated by the Parties in good faith and implementation of this Consent Decree will expedite the cleanup of the Site and will avoid prolonged and complicated litigation between the Parties, and that this Consent Decree is fair, reasonable, and in the public interest.

NOW, THEREFORE, it is hereby Ordered, Adjudged, and Decreed:

## II. JURISDICTION

1. This Court has jurisdiction over the subject matter of this action pursuant to 28 U.S.C. Sections 1331 and 1345, and 42 U.S.C. Sections 9606, 9607, and 9613(b). This Court has supplemental jurisdiction over the state law claims, brought under the Texas Health and Safety Code and the Texas Water Code, pursuant to 28 U.S.C. § 1367. This Court also has personal jurisdiction over Settling Defendants. Solely for the purposes of this Consent Decree and the underlying complaints, Settling Defendants waive all objections and defenses that they may have to jurisdiction of the Court or to venue in this District. Settling Defendants shall not challenge the terms of this Consent Decree or this Court's jurisdiction to enter and enforce this Consent Decree.

## III. PARTIES BOUND

2. This Consent Decree applies to and is binding upon the United States and the State and upon Settling Defendants and their heirs, successors, and assigns. Any change in ownership or corporate status of a Settling Defendant including, but not limited to, any transfer of assets or real or personal property, shall in no way alter such Settling Defendant's responsibilities under this Consent Decree.

3. Principal Settling Defendants shall provide a copy of this Consent Decree to each contractor hired to perform the Work required by this Consent Decree and to each person representing any Principal Settling Defendant with respect to the Site or the Work, and shall condition all contracts entered into hereunder upon performance of the Work in conformity with the terms of this Consent Decree. Principal Settling Defendants or their contractors shall provide written notice of the Consent Decree to all subcontractors hired to perform any portion of the Work required by this Consent Decree. Principal Settling Defendants shall nonetheless be responsible for ensuring that their contractors and subcontractors perform the Work in accordance with the terms of this Consent Decree. With regard to the activities undertaken pursuant to this Consent Decree, each contractor and subcontractor shall be deemed to be in a contractual relationship with Principal Settling Defendants within the meaning of Section 107(b)(3) of CERCLA, 42 U.S.C. § 9607(b)(3).

## IV. DEFINITIONS

4. Unless otherwise expressly provided in this Consent Decree, terms used in this Consent Decree that are defined in CERCLA or in regulations promulgated under CERCLA shall have the meaning assigned to them in CERCLA or in such regulations. Whenever terms listed below are used in this Consent Decree or in the appendices attached hereto and incorporated hereunder, the following definitions shall apply solely for purposes of this Consent Decree:

“CERCLA” shall mean the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. §§ 9601, *et seq.*

“Cashout Settling Defendants” shall mean the Major Cashout Settling Defendants and the De Minimis Cashout Settling Defendants, listed in Appendices F and G, respectively.

“Consent Decree” or “Decree” shall mean this Consent Decree and all appendices attached hereto (which are listed in Section XXIX). In the event of conflict between this Consent Decree and any appendix, this Consent Decree shall control.

The term “day” shall mean a calendar day unless expressly stated to be a working day. The term “working day” shall mean a day other than a Saturday, Sunday, or federal holiday. In computing any period of time under this Consent Decree, where the last day would fall on a Saturday, Sunday, or federal holiday, the period shall run until the close of business of the next working day.

“De Minimis Cashout Settling Defendants” shall mean those parties listed in Appendix G.

“Effective Date” shall be the date upon which this Consent Decree is entered by the Court as recorded on the Court docket, or, if the Court instead issues an order approving the Consent Decree, the date such order is recorded on the Court docket.

“EPA” shall mean the United States Environmental Protection Agency and any successor departments or agencies of the United States.

“FWPCA” shall mean the Federal Water Pollution Control Act, as amended, 33 U.S.C. §§ 1251–1387 (also known as the Clean Water Act).

“Future NRD Assessment Costs” shall mean the costs of assessing Natural Resource Damages incurred by the Texas Trustees and FWS after February 28, 2010, and incurred by NOAA after February 27, 2010.

“Future Oversight Costs” shall mean that portion of Future Response Costs that EPA incurs in monitoring and supervising Principal Settling Defendants’ performance of the Work to determine whether such performance is consistent with the requirements of this Consent Decree, including costs incurred in reviewing plans, reports, and other deliverables submitted pursuant to this Consent Decree, as well as costs incurred in overseeing implementation of the Work; however, Future Oversight Costs do not include, *inter alia*: the costs incurred by the United States pursuant to Paragraph 9 (Notice to Successors-in-Title), Sections VII (Remedy Review), IX (Access and Institutional Controls), XV (Emergency Response), and Paragraph 49 (Funding for Work Takeover), or the costs incurred by the United States in enforcing the terms of this Consent Decree, including all costs incurred in connection with Dispute Resolution pursuant to Section XX (Dispute Resolution) and all litigation costs.

“Future Response Costs” shall mean all costs, including, but not limited to, direct and indirect costs, that the United States incurs in reviewing or developing plans, reports, and other deliverables submitted pursuant to this Consent Decree, in overseeing implementation of the Work, or otherwise implementing, overseeing, or enforcing this Consent Decree, including, but not limited to, payroll costs, contractor costs, travel costs, laboratory costs, the costs incurred

pursuant to Paragraph [9](#) (Notice to Successors-in-Title), Sections VII (Remedy Review), IX (Access and Institutional Controls) (including, but not limited to, the cost of attorney time and any monies paid to secure access and/or to secure, implement, monitor, maintain, or enforce Institutional Controls including, but not limited to, the amount of just compensation), XV (Emergency Response), Paragraph [49](#) (Funding for Work Takeover), and Section XXX (Community Relations). Future Response Costs shall also include all Interim Response Costs.

“FWS” shall mean the Fish and Wildlife Service of the United States Department of the Interior and any successor departments or agencies of the United States.

“Institutional Controls” shall mean Proprietary Controls and state or local laws, regulations, ordinances, zoning restrictions, or other governmental controls or notices that (a) limit land, water, and/or resource use to minimize the potential for human exposure to Waste Materials at the Site; (b) limit land, water, and/or resource use to implement, ensure non-interference with, or ensure the protectiveness of the Remedial Action; and/or (c) provide information intended to modify or guide human behavior at the Site.

“Interim Response Costs” shall mean all costs, including direct and indirect costs, (a) paid by the United States in connection with the Site between September 30, 2009, and the Effective Date, or (b) incurred prior to the Effective Date but paid after that date.

“Interest” shall mean interest at the rate specified for interest on investments of the EPA Hazardous Substance Superfund established by 26 U.S.C. § 9507, compounded annually on October 1 of each year, in accordance with 42 U.S.C. § 9607(a). The applicable rate of interest shall be the rate in effect at the time the interest accrues. The rate of interest is subject to change on October 1 of each year.

“Interest Earned” shall mean interest earned on amounts in the MSC Site Disbursement Special Account, which shall be computed monthly at a rate based on the annual return on investments of the Hazardous Substance Superfund. The applicable rate of interest shall be the rate in effect at the time the interest accrues.

“Major Cashout Settling Defendants” shall mean those parties listed in Appendix F.

“MSC Site Special Account” shall mean the special account, within the EPA Hazardous Substance Superfund, established for the Site by EPA pursuant to Section 122(b)(3) of CERCLA, 42 U.S.C. § 9622(b)(3), pursuant to administrative orders on consent for the Site pursuant to Section 122(g) of CERCLA, 42 U.S.C. § 9622(g).

“MSC Site Disbursement Special Account” shall mean the special account, within the EPA Hazardous Substance Superfund, established for the Site by EPA pursuant to Section 122(b)(3) of CERCLA, 42 U.S.C. § 9622(b)(3), and Paragraph [63](#).

“National Contingency Plan” or “NCP” shall mean the National Oil and Hazardous Substances Pollution Contingency Plan promulgated pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, codified at 40 C.F.R. Part 300, and any amendments thereto.

“Natural Resource Damages” or “NRD” means damages, including the reasonable costs of damages assessment and Restoration Costs, recoverable pursuant to Section 107(a) of CERCLA, 42 U.S.C. § 9607(a), Section 311(f)(4) and (5) of the FWPCA, 33 U.S.C. § 1321(f)(4)



and (5), and/or Texas Water Code § 26.265 by the United States and/or the Texas Trustees on behalf of the public for injury to, destruction of, loss of, or loss of use of natural resources or resource services, resulting from the release of hazardous substances at or from the Site. “NRD” includes Past NRD Assessment Costs, Future NRD Assessment Costs, and Restoration Costs.

“NOAA” shall mean the National Oceanic and Atmospheric Administration of the United States Department of Commerce and any successor departments or agencies of the United States.

“Operation and Maintenance” or “O&M” shall mean all activities required to maintain the effectiveness of the Remedial Action as required under the Operation and Maintenance Plan approved or developed by EPA pursuant to Section VI (Performance of the Work by Principal Settling Defendants) and the SOW, and maintenance, monitoring, and enforcement of Institutional Controls.

“Owner Settling Defendant” shall mean Land Navigator, Ltd., a wholly owned subsidiary of Project Navigator, Ltd.

“Paragraph” shall mean a portion of this Consent Decree identified by an Arabic numeral or an upper or lower case letter.

“Parties” shall mean the United States, the State of Texas, and Settling Defendants.

“Past NRD Assessment Costs” shall mean the costs of assessing Natural Resource Damages incurred by the Texas Trustees and FWS on or before February 28, 2010, and incurred by NOAA on or before February 27, 2010.

“Past Response Costs” shall mean all costs, including, but not limited to, direct and indirect costs, that the United States paid at or in connection with the Site through September 30, 2009, plus Interest on all such costs which has accrued pursuant to 42 U.S.C. § 9607(a) through such date.

“Performance Standards” shall mean the cleanup standards and other measures of achievement of the goals of the Remedial Action, set forth in the ROD and Sections II and III of the SOW and any modified standards established pursuant to this Consent Decree.

“Plaintiffs” shall mean the United States and the State of Texas.

“Principal Settling Defendants” shall mean those Parties identified in Appendix D.

“Proprietary Controls” shall mean easements or covenants running with the land that (a) limit land, water, or resource use and/or provide access rights and (b) are created pursuant to common law or statutory law by an instrument that is recorded by the owner in the appropriate land records office. Proprietary Controls include, but are not limited to, the Restrictive Covenants in Paragraph 5 of the Special Warranty Deed, the access easements in the Grant of Access Easement (referenced in Paragraph [I.J](#) of this Consent Decree), and any Additional Proprietary Controls imposed pursuant to Paragraph [26.c](#) of this Consent Decree.

“RCRA” shall mean the Solid Waste Disposal Act, as amended, 42 U.S.C. §§ 6901, *et seq.* (also known as the Resource Conservation and Recovery Act).

“Record of Decision” or “ROD” shall mean the EPA Record of Decision relating to the Site signed on September 30, 2009, by the Director of the Superfund Division, EPA Region 6, or his/her delegate, and all attachments thereto. The ROD is attached as Appendix A.

“Remedial Action” shall mean all activities Principal Settling Defendants are required to perform under the Consent Decree to implement the ROD, in accordance with the SOW, the final Remedial Design and Remedial Action Work Plans, and other plans approved by EPA, including implementation of Institutional Controls, until the Performance Standards are met, and excluding performance of the Remedial Design, O&M, and the activities required under Section XXVI (Retention of Records).

“Remedial Action Work Plan” shall mean the document developed pursuant to Paragraph [12](#) and approved by EPA, and any modifications thereto.

“Remedial Design” shall mean those activities to be undertaken by Principal Settling Defendants to develop the final plans and specifications for the Remedial Action pursuant to the Remedial Design Work Plan.

“Remedial Design Work Plan” shall mean the document developed pursuant to Paragraph [11](#) and approved by EPA, and any modifications thereto.

“Restoration Costs” shall mean costs incurred in connection with any action or combination of actions to restore, replace, rehabilitate, or acquire the equivalent of any natural resources or services injured, lost, or destroyed as a result of the release of hazardous substances at or from the Site. Such costs include costs incurred for the design, implementation, permitting (as necessary), monitoring, and oversight of restoration projects and the costs of complying with the requirements of the law to conduct a restoration planning and implementation process.

“Section” shall mean a portion of this Consent Decree identified by a Roman numeral.

“Settling Defendants” shall mean the Principal Settling Defendants, the Major Cashout Settling Defendants, and the De Minimis Cashout Settling Defendants, listed in Appendices D, F, and G, respectively, and the Owner Settling Defendant.

“Settling Federal Agencies” shall mean the United States Department of Defense (including, but not limited to, the Army, Navy, Air Force, and Defense Logistics Agency), the United States Department of Homeland Security (including, but not limited to, the United States Coast Guard); United States Department of Veterans Affairs; the United States Department of the Interior; the United States National Aeronautics and Space Administration; the United States Postal Service; the United States General Service Administration; and the United States Department of Agriculture.

“Site” shall mean the Malone Service Company Superfund Site, encompassing approximately 150 acres, located at 5300 Campbell Bayou Road in Texas City, Galveston County, Texas, and depicted generally on the maps attached as Appendix C, including groundwater beneath the Site and any Swan Lake/Galveston Bay sediments containing hazardous substances from the Site.

“State” shall mean the State of Texas, acting on behalf of the TCEQ with respect to claims for State Past Response Costs and State Future Response Costs, and acting on behalf of the Texas Trustees with respect to NRD claims.

“State Past Response Costs” shall mean all costs that the State has paid at or in connection with the Site pursuant to Section 133(c) of the TSWDA, Tex. Health & Safety Code § 361.133(c), through September 30, 2009, plus Interest on all such costs that has accrued through such date.

“State Future Response Costs” shall mean all costs that the State incurs in implementing, overseeing, or enforcing this Consent Decree.

“Statement of Work” or “SOW” shall mean the statement of work for implementation of the Remedial Design, Remedial Action, and O&M at the Site, as set forth in Appendix B to this Consent Decree and any modifications made in accordance with this Consent Decree.

“Supervising Contractor” shall mean the principal contractor retained by Principal Settling Defendants to supervise and direct the implementation of the Work under this Consent Decree.

“TCEQ” shall mean the Texas Commission on Environmental Quality, an agency of the State of Texas, and its successor agencies.

“Texas Trustees” shall mean the State of Texas natural resource damage trustees, comprising the TCEQ, TPWD, and the TGLO, as appointed by the Governor of Texas.

“TGLO” shall mean the Texas General Land Office, an agency of the State of Texas, and its successor agencies.

“TPWD” shall mean the Texas Parks and Wildlife Department, an agency of the State of Texas, and its successor agencies.

“Transfer” shall mean to sell, assign, convey, lease, mortgage, or grant a security interest in, or where used as a noun, a sale, assignment, conveyance, or other disposition of any interest by operation of law or otherwise.

“Trustees” shall mean the Texas Trustees, NOAA, and FWS, the natural resource trustees for the Site.

“TSWDA” shall mean the Texas Solid Waste Disposal Act, Tex. Health & Safety Code § 361.001 *et seq.*

“United States” shall mean the United States of America and each department, agency and instrumentality of the United States, including EPA, the Settling Federal Agencies, NOAA, and FWS.

“Waste Material” shall mean (1) any “hazardous substance” under Section 101(14) of CERCLA, 42 U.S.C. § 9601(14); (2) any pollutant or contaminant under Section 101(33) of CERCLA, 42 U.S.C. § 9601(33); (3) any “solid waste” under Section 1004(27) of RCRA, 42 U.S.C. § 6903(27); and (4) any “solid waste” or “hazardous substances” under Tex. Health & Safety Code §§ 361.003(11 & 34) and 361.133(c).

“Work” shall mean all activities and obligations Principal Settling Defendants are required to perform under this Consent Decree, except the payments required under Paragraph [62](#) and the activities required under Section XXVI (Retention of Records).

## V. GENERAL PROVISIONS

5. Objectives of the Parties. The objectives of the Parties in entering into this Consent Decree are to protect public health or welfare or the environment by the design and implementation of response actions at the Site by Principal Settling Defendants, to pay response costs of the Plaintiffs, and to resolve the claims of Plaintiffs against Settling Defendants and the claims of the State and Settling Defendants which have been or could have been asserted against the United States with regard to this Site as provided in this Consent Decree.

6. Commitments by Settling Defendants and Settling Federal Agencies.

a. Principal Settling Defendants shall finance and perform the Work in accordance with this Consent Decree, the ROD, the SOW, and all work plans and other plans, standards, specifications, and schedules set forth in this Consent Decree or developed by Principal Settling Defendants and approved by EPA pursuant to this Consent Decree. As provided in this Consent Decree, Settling Defendants shall pay the United States and the State their response costs (including Past Response Costs, Future Response Costs, State Past Response Costs, and State Future Response Costs), and Natural Resource Damages (including Past and Future NRD Assessment Costs). As provided in this Consent Decree, Settling Federal Agencies shall pay EPA for Past Response Costs and Future Response Costs, the State for its State Past Response Costs and State Future Response Costs, Settling Defendants for their past and future response costs, and the Trustees for Natural Resource Damages (including Past and Future NRD Assessment Costs).

b. The obligations of Principal Settling Defendants to finance and perform the Work, including obligations to pay amounts due under this Consent Decree, are joint and several. In the event of the insolvency of any Principal Settling Defendant or the failure by any Principal Settling Defendant to implement any requirement of this Consent Decree, the remaining Principal Settling Defendants shall complete all such requirements.

7. Compliance With Applicable Law. All activities undertaken by Principal Settling Defendants pursuant to this Consent Decree shall be performed in accordance with the requirements of all applicable federal and state laws and regulations. Principal Settling Defendants must also comply with all applicable or relevant and appropriate requirements of all federal and state environmental laws as set forth in the ROD and the SOW. The activities conducted pursuant to this Consent Decree, if approved by EPA, shall be deemed to be consistent with the NCP.

8. Permits.

a. As provided in Section 121(e) of CERCLA, 42 U.S.C. § 9621(e), and Section 300.400(e) of the NCP, no permit shall be required for any portion of the Work conducted entirely on-site (i.e., within the areal extent of contamination or in very close proximity to the contamination and necessary for implementation of the Work). Where any portion of the Work that is not on-site requires a federal or state permit or approval, Principal

Settling Defendants shall submit timely and complete applications and take all other actions necessary to obtain all such permits or approvals.

b. Principal Settling Defendants may seek relief under the provisions of Section XIX (Force Majeure) for any delay in the performance of the Work resulting from a failure to obtain, or a delay in obtaining, any permit or approval referenced in Paragraph 8.a and required for the Work, provided that they have submitted timely and complete applications and taken all other actions necessary to obtain all such permits or approvals.

c. This Consent Decree is not, and shall not be construed to be, a permit issued pursuant to any federal or state statute or regulation.

9. Notice to Successors-in-Title and Transfers of Real Property.

a. The Special Warranty Deed (referenced in Paragraph 1.J of this Consent Decree) that transferred ownership of the Site to the Owner Settling Defendant is recorded in the land records office of Galveston County, Texas. The Special Warranty Deed describes the real property and provides notice to all successors-in-title that the real property is part of the Site and subject to the land use restrictions set forth in the Special Warranty Deed. Owner Settling Defendant shall, within 15 days after the Effective Date, submit to TCEQ for review and to EPA for review and approval a proposed notice to be filed with the land records office of Galveston County, Texas, that gives notice that EPA has selected a remedy for the Site, and that Principal Settling Defendants have entered into a Consent Decree requiring them to implement the remedy. The notice shall identify the United States District Court in which the Consent Decree was filed, the name and civil action number of this case, and the date the Consent Decree was entered by the Court. Owner Settling Defendant shall record the notice(s) within ten days of EPA's approval of the notice. Owner Settling Defendant shall provide EPA with a certified copy of the recorded notice(s) within ten days of recording such notice(s). Within 30 days of the issuance of EPA's Certification of Completion of Remedial Action under Paragraph 51, Owner Settling Defendant or the Principal Settling Defendants shall, after consulting with TCEQ, submit to EPA for review and approval a proposed notice to be filed with the land records office of Galveston County, Texas, that gives notice of the location of the RCRA Subtitle C equivalent containment cell (including at least metes and bounds) and the location and concentrations of contaminants of concern present in groundwater and soil at the Site based on available data.

b. Owner Settling Defendant shall, at least 60 days prior to any Transfer of any real property located at the Site, give written notice: (i) to the transferee regarding the Consent Decree, the Grant of Access Easement, the Special Warranty Deed, and any Institutional Controls regarding the real property; and (ii) to EPA and the State regarding the proposed Transfer, including the name and address of the transferee and the date on which the transferee was notified pursuant to this Subparagraph.

c. Owner Settling Defendant may Transfer any real property located at the Site only if Owner Settling Defendant has obtained an agreement from the transferee, enforceable by Principal Settling Defendants and the United States, to (i) allow access and restrict land/water use, pursuant to Paragraphs 27.a and 27.b, and (ii) subordinate its rights to the Proprietary Controls in the Special Warranty Deed and the Grant of Access Easement and any Additional Proprietary Controls imposed pursuant to Paragraph 26.c, and EPA has approved the agreement

in writing. If, after a Transfer of the real property, the transferee fails to comply with the agreement provided for in this Paragraph 9.c, Owner Settling Defendant and Principal Settling Defendants shall take all reasonable steps to obtain the transferee's compliance with such agreement. The United States may seek the transferee's compliance with the agreement and/or assist Owner Settling Defendant and Principal Settling Defendants in obtaining compliance with the agreement. Principal Settling Defendants shall reimburse the United States under Section XVI (Payments for Response Costs, NRD, & NRD Assessment Costs), for all costs incurred, direct or indirect, by the United States regarding obtaining compliance with such agreement, including, but not limited to, the cost of attorney time.

d. In the event of any Transfer of real property located at the Site, unless the United States otherwise consents in writing, Principal Settling Defendants shall continue to comply with their obligations under the Consent Decree, including, but not limited to, their obligation to provide and/or secure access, to implement, maintain, monitor, and report on Institutional Controls, and to abide by such Institutional Controls.

## VI. PERFORMANCE OF THE WORK BY PRINCIPAL SETTLING DEFENDANTS

### 10. Selection of Supervising Contractor.

a. All aspects of the Work to be performed by Principal Settling Defendants pursuant to Sections VI (Performance of the Work by Principal Settling Defendants), VII (Remedy Review), VIII (Quality Assurance, Sampling and Data Analysis), IX (Access and Institutional Controls), and XV (Emergency Response) shall be under the direction and supervision of the Supervising Contractor, the selection of which shall be subject to disapproval by EPA after a reasonable opportunity for review and comment by the State. Within thirty (30) days after the lodging of this Consent Decree, Principal Settling Defendants shall notify EPA and the State in writing of the name, title, and qualifications of any contractor proposed to be the Supervising Contractor. With respect to any contractor proposed to be Supervising Contractor, Principal Settling Defendants shall demonstrate that the proposed contractor has a quality assurance system that complies with ANSI/ASQC E4-1994, "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs" (American National Standard, January 5, 1995), by submitting a copy of the proposed contractor's Quality Management Plan ("QMP"). The QMP should be prepared in accordance with "EPA Requirements for Quality Management Plans (QA/R-2)" (EPA/240/B-01/002, March 2001, reissued May 2006) or equivalent documentation as determined by EPA. EPA will issue a notice of disapproval or an authorization to proceed regarding hiring of the proposed contractor. If at any time thereafter, Principal Settling Defendants propose to change a Supervising Contractor, Principal Settling Defendants shall give such notice to EPA and the State and must obtain an authorization to proceed from EPA, after a reasonable opportunity for review and comment by the State, before the new Supervising Contractor performs, directs, or supervises any Work under this Consent Decree. If EPA issues, before the date of lodging of this Consent Decree, an authorization to proceed regarding the hiring of a proposed Supervising Contractor, for the purposes of this Decree and the SOW, the date of the authorization to proceed shall be deemed to be the date of lodging.

b. If EPA disapproves a proposed Supervising Contractor, EPA will notify Principal Settling Defendants in writing. Principal Settling Defendants shall submit to EPA and

the State a list of contractors, including the qualifications of each contractor, that would be acceptable to them within 30 days of receipt of EPA's disapproval of the contractor previously proposed. EPA will provide written notice of the names of any contractor(s) that it disapproves and an authorization to proceed with respect to any of the other contractors. Principal Settling Defendants may select any contractor from that list that is not disapproved and shall notify EPA and the State of the name of the contractor selected within 21 days of EPA's authorization to proceed.

c. If EPA fails to provide written notice of its authorization to proceed or disapproval as provided in this Paragraph and this failure prevents Principal Settling Defendants from meeting one or more deadlines in a plan approved by EPA pursuant to this Consent Decree, Principal Settling Defendants may seek relief under Section XIX (Force Majeure).

11. General RD/RA Work Plan and Remedial Design.

a. Within 45 days after EPA's issuance of an authorization to proceed pursuant to Paragraph 10, Principal Settling Defendants shall hold a Scoping Meeting with EPA pursuant to the SOW. Within 90 days after the Scoping Meeting, Principal Settling Defendants shall submit to EPA and the State a work plan for the design and performance of the Remedial Action at the Site ("General RD/RA Work Plan"). The General RD/RA Work Plan and subsequent work plans and design documents for the Work collectively shall provide for the design and performance of the remedy set forth in the ROD, in accordance with the SOW and for achievement of the Performance Standards and other requirements set forth in the ROD, this Consent Decree, and/or the SOW. Upon its approval by EPA, the General RD/RA Work Plan shall be incorporated into and enforceable under this Consent Decree. At the same time the General RD/RA Work Plan is submitted, Principal Settling Defendants shall submit to EPA and the State a Health and Safety Plan for field design activities which conforms to the applicable Occupational Safety and Health Administration and EPA requirements including, but not limited to, 29 C.F.R. § 1910.120.

b. The General RD/RA Work Plan shall include plans and schedules for implementation of remedial design, pre-design tasks and remedial action activities as described in the SOW. The General RD/RA Work Plan shall be submitted with Component Plans, as described in the SOW, which shall include, but are not limited to: (1) the Health and Safety Plan; (2) Air Monitoring Plan; (3) Hurricane and Flooding Contingency Plan; (4) Storm Water Management Plan; (5) Spill Control and Countermeasures Plan; (6) Sampling and Analysis Plan; (7) the Quality Assurance Project Plan ("QAPP"); (8) Project Management Plan (the project delivery strategy); (9) Data Management Plan; (10) Permitting Plan (if required); (11) Construction Management Plan; (12) Construction Quality Assurance Plan ("CQAP"); and (13) the Community Relations Plan. The CQAP, which shall detail the approach to quality assurance during construction activities at the Site, shall specify a quality assurance official independent of the Supervising Contractor to conduct a quality assurance program during the construction phase of the project. The CQAP shall detail the methods and procedures to be used to verify achievement of Performance Standards.

c. After the Effective Date and approval of the General RD/RA Work Plan by EPA, after a reasonable opportunity for review and comment by the State, and submission of the Health and Safety Plan for all field activities to EPA and the State, Principal Settling

Defendants shall implement the General RD/RA Work Plan. Principal Settling Defendants shall submit to EPA and the State all plans, reports, and other deliverables required under the SOW and the approved General RD/RA Work Plan in accordance with the approved schedule for review and approval pursuant to Section XI (EPA Approval of Plans, Reports, and Other Deliverables).

d. The SOW divides the Remedial Design and Remedial Action into four Phases. Phases Two, Three, and Four shall each have a separate prefinal and final Remedial Design, as well as a separate remedial action work plan (“Remedial Action Work Plan” or “RA Work Plan”). The prefinal and final design submissions for Phases Two, Three, and Four shall include, at a minimum, the design criteria and final plans and specifications for that phase of the Work. In addition, the following plans shall include updated schedules for completion of subsequent Work activities, as set forth in the SOW: the Phase One Work Plans; the Pre-Design Investigations Report; the Phase Two RA Work Plan; the Phase Two Final Design; the Phase Three RA Work Plan; the Phase Three Final Design; and the Phase Four RA Work Plan. Upon their approval by EPA, the Phase One Work Plans; the Pre-Design Investigations Report; the Phase Two RA Work Plan; the Phase Two Final Design; the Phase Three RA Work Plan; the Phase Three Final Design; and the Phase Four RA Work Plan shall be incorporated into and enforceable under this Consent Decree. An Operation and Maintenance Plan shall be submitted as part of the Final Design of Phase Four.

12. Remedial Action.

a. Within the times specified in EPA-approved schedules pursuant to the SOW, Principal Settling Defendants shall submit Remedial Action Work Plans to EPA and the State for the performance of the Remedial Action activities of Phases Two, Three, and Four at the Site. The Remedial Action Work Plans shall provide for construction and implementation of the remedy set forth in the ROD and achievement of the Performance Standards, in accordance with this Consent Decree, the ROD, the SOW, and the design plans and specifications developed in the Final Remedial Designs and approved by EPA. Upon their approval by EPA, the Remedial Action Work Plans shall be incorporated into and enforceable under this Consent Decree. At the same time as they submit the Remedial Action Work Plans, Principal Settling Defendants shall submit to EPA and the State as needed an updated Construction Health and Safety Plan and Spill Control and Countermeasures Plan for field activities required by the Remedial Action Work Plans, which conform to the applicable Occupational Safety and Health Administration and EPA requirements including, but not limited to, 29 C.F.R. § 1910.120.

b. The Remedial Action Work Plans for each Phase shall include, but are not limited to, the following: (1) schedule for completion of the Remedial Action activities for that phase; (2) method for selection of the contractor; (3) schedule for developing and submitting other required Remedial Action plans; (4) methods for satisfying permitting requirements; (5) methodology for implementing the Spill Control and Countermeasures Plan; (6) tentative formulation of the Remedial Action team; (7) an updated Construction Quality Assurance Plan (by construction contractor); and (8) procedures and plans for the decontamination of equipment and the disposal of contaminated materials. The Remedial Action Work Plans also shall include the methodology for implementing the Construction Quality Assurance Plan and a schedule for implementing all Remedial Action tasks identified in the final design submission for that Phase



and shall identify the initial formulation of Principal Settling Defendants' Remedial Action project team (including, but not limited to, the Supervising Contractor).

c. Upon approval of the Remedial Action Work Plans by EPA, after a reasonable opportunity for review and comment by the State, Principal Settling Defendants shall implement the activities required under the Remedial Action Work Plans. Principal Settling Defendants shall submit to EPA and the State all reports and other deliverables required under the approved Remedial Action Work Plans in accordance with the approved schedules for review and approval pursuant to Section XI (EPA Approval of Plans, Reports, and Other Deliverables). Unless otherwise directed by EPA, Principal Settling Defendants shall not commence physical Remedial Action activities at the Site for any Phase prior to approval of the Remedial Action Work Plan for that Phase.

13. Principal Settling Defendants shall continue to implement the Remedial Action until the Performance Standards are achieved. Principal Settling Defendants shall implement O&M for so long thereafter as is required by this Consent Decree.

14. Modification of SOW or Related Work Plans.

a. If EPA determines that it is necessary to modify the work specified in the SOW and/or in work plans developed pursuant to the SOW to achieve and maintain the Performance Standards or to carry out and maintain the effectiveness of the remedy set forth in the ROD, and such modification is consistent with the scope of the remedy set forth in the ROD, then EPA may issue such modification in writing and shall notify Principal Settling Defendants of such modification. For the purposes of this Paragraph and Paragraphs [51](#) (Completion of the Remedial Action) and [52](#) (Completion of the Work) only, the "scope of the remedy set forth in the ROD" is:

1. Sludge (Principal Threat Waste): Remove Site sludge, including all sludge from the Site Earthen Impoundment (which includes the Sludge Pit and Oil Pit), API separators, ASTs (tanks), and source material located in other areas of the Site below ground surface (in subsurface soils), and solidify. Transfer and consolidate the solidified sludge into an on-site, aboveground RCRA Subtitle C equivalent cell.
2. Soil: Remove and consolidate unconsolidated soils with contamination exceeding the Site remediation levels into the RCRA Subtitle C equivalent cell. Backfill excavated areas to ground surface with clean soil, except to the extent the Parties agree that excavated areas need not be backfilled.
3. Ground Water: Install ground water monitoring wells to monitor Site ground water and the RCRA Subtitle C equivalent cell. Ground water monitoring of contaminated ground water plumes will document if natural attenuation is degrading the plumes, and will detect any off-site migration of organic contaminants in ground water above the TCEQ Class 3 Groundwater Protective Concentration Levels (PCLs) and metals concentrations greater than TCEQ Class 3 Groundwater PCLs or background levels, whichever are higher. If the EPA determines that contaminants in ground water are migrating to a Site boundary monitoring well, and potentially off-site, at concentrations above the TCEQ Class 3 Groundwater PCLs, or migrating to an aquifer not currently known to be contaminated, an active remedy (e.g., extraction, containment) may be

required. Monitoring of groundwater is required for 30 years; EPA may modify this monitoring period if monitoring data support that the plumes are stable or shrinking (i.e., that natural attenuation is effective in containing or decreasing the plumes) and therefore that there is no potential for off-site migration of contaminants in ground water over the foregoing standards.

4. Institutional Controls, such as a notification, information device, deed restriction, restrictive covenant, or easement, have been or will be placed on the Site property to protect the integrity of the remedy and to prevent exposure to hazardous substances. The Institutional Controls have been or will be prepared and attached to the deed and will include reports showing the location and concentrations of contaminants of concern present in the ground water underlying the Site. For the Institutional Controls component for ground water, information on the nature and extent of ground water contamination will be updated annually to EPA and TCEQ. Institutional Controls, such as prohibiting construction of buildings within 100 feet of contaminated ground water areas of the Site, will be used to prevent inhalation exposure from vapor intrusion. The Institutional Controls will restrict any excavation or drilling to ground water, and will also prohibit disturbance of the RCRA Subtitle C equivalent cell. The Institutional Controls have been or will be recorded on the property deeds filed with the county. Institutional Controls will provide long-term protection by reducing the potential risk for people to be exposed.

If Principal Settling Defendants object to the modification they may, within 30 days after EPA's notification, seek dispute resolution under Paragraph [80](#) (Record Review).

b. The SOW and/or related work plans shall be modified: (i) in accordance with the modification issued by EPA; or (ii) if Principal Settling Defendants invoke dispute resolution, in accordance with the final resolution of the dispute. The modification shall be incorporated into and enforceable under this Consent Decree, and Principal Settling Defendants shall implement all work required by such modification. Principal Settling Defendants shall incorporate the modification into the Remedial Design or Remedial Action Work Plans under Paragraph [11](#) or [12](#), as appropriate.

c. Nothing in this Paragraph shall be construed to limit EPA's authority to require performance of further response actions as otherwise provided in this Consent Decree.

d. The EPA Project Coordinator may approve extensions to any schedule in the SOW or any work plan approved by EPA under the SOW without the signatures of the Parties or approval of the Court, but the total number of days for all extensions granted by the EPA Project Coordinator combined shall not exceed 180 days. Any extensions beyond a combined total of 180 days may be granted only with the approval of the EPA Branch Chief supervising the EPA Project Coordinator. All requests for extensions and EPA approvals of any extensions shall be made in writing.

15. Nothing in this Consent Decree, the SOW, or the Remedial Design or Remedial Action Work Plans constitutes a warranty or representation of any kind by Plaintiffs that compliance with the work requirements set forth in the SOW and the Work Plans will achieve the Performance Standards.

16. Off-Site Shipment of Waste Material.

a. Principal Settling Defendants may ship Waste Material from the Site to an off-Site facility only if they verify, prior to any shipment, that the off-Site facility is operating in compliance with the requirements of Section 121(d)(3) of CERCLA, 42 U.S.C. § 9621(d)(3), and 40 C.F.R. § 300.440, by obtaining a determination from EPA that the proposed receiving facility is operating in compliance with 42 U.S.C. § 9621(d)(3) and 40 C.F.R. § 300.440.

b. Principal Settling Defendants may ship Waste Material from the Site to an out-of-state waste management facility only if, prior to any shipment, they provide written notice to the appropriate state environmental official in the receiving facility's state and to the EPA Project Coordinator. This notice requirement shall not apply to any off-Site shipments when the total quantity of all such shipments will not exceed ten cubic yards. The written notice shall include the following information, if available: (i) the name and location of the receiving facility; (ii) the type and quantity of Waste Material to be shipped; (iii) the schedule for the shipment; and (iv) the method of transportation. Principal Settling Defendants also shall notify the state environmental official referenced above and the EPA Project Coordinator of any major changes in the shipment plan, such as a decision to ship the Waste Material to a different out-of-state facility. Principal Settling Defendants shall provide the written notice after the award of the contract for Remedial Action construction and before the Waste Material is shipped.

## VII. REMEDY REVIEW

17. Periodic Review. Principal Settling Defendants shall conduct any studies and investigations that EPA requests in order to permit EPA to conduct reviews of whether the Remedial Action is protective of human health and the environment at least every five years as required by Section 121(c) of CERCLA, 42 U.S.C. § 9621(c), and any applicable regulations.

18. EPA Selection of Further Response Actions. If EPA determines, at any time, that the Remedial Action is not protective of human health and the environment, EPA may select further response actions for the Site in accordance with the requirements of CERCLA and the NCP.

19. Opportunity To Comment. Principal Settling Defendants and, if required by Sections 113(k)(2) or 117 of CERCLA, 42 U.S.C. §§ 9613(k)(2) or 9617, the public, will be provided with an opportunity to comment on any further response actions proposed by EPA as a result of the review conducted pursuant to Section 121(c) of CERCLA and to submit written comments for the record during the comment period.

20. Principal Settling Defendants' Obligation To Perform Further Response Actions. If EPA selects further response actions for the Site, EPA may require Principal Settling Defendants to perform such further response actions, but only to the extent that the reopener conditions in Paragraph 97 or Paragraph 98 (United States' Pre- and Post-certification Reservations) are satisfied. Principal Settling Defendants may invoke the procedures set forth in Section XX (Dispute Resolution) to dispute (a) EPA's determination that the reopener conditions of Paragraph 97 or Paragraph 98 of Section XXII (Covenants by Plaintiffs) are satisfied, (b) EPA's determination that the Remedial Action is not protective of human health and the

environment, or (c) EPA's selection of the further response actions. Disputes pertaining to whether the Remedial Action is protective or to EPA's selection of further response actions shall be resolved pursuant to Paragraph 80 (Record Review).

21. Submission of Plans. If Principal Settling Defendants are required to perform further response actions pursuant to Paragraph 20, they shall submit a plan for such response action to EPA for approval in accordance with the procedures of Section VI (Performance of the Work by Principal Settling Defendants). Principal Settling Defendants shall implement the approved plan in accordance with this Consent Decree.

#### VIII. QUALITY ASSURANCE, SAMPLING, AND DATA ANALYSIS

22. Quality Assurance.

a. Principal Settling Defendants shall use quality assurance, quality control, and chain-of-custody procedures for all treatability, design, compliance, and monitoring samples in accordance with "EPA Requirements for Quality Assurance Project Plans (QA/R5)" (EPA/240/B-01/003, March 2001, reissued May 2006), "Guidance for Quality Assurance Project Plans (QA/G-5)" (EPA/240/R-02/009, December 2002), and subsequent amendments to such guidelines upon notification by EPA to Principal Settling Defendants of such amendment. Amended guidelines shall apply only to procedures conducted after such notification.

b. Prior to the commencement of any monitoring project under this Consent Decree, Principal Settling Defendants shall submit to EPA for approval, after a reasonable opportunity for review and comment by the State, a Quality Assurance Project Plan ("QAPP") that is consistent with the SOW, the NCP, and applicable guidance documents. If relevant to the proceeding, the Parties agree that validated sampling data generated in accordance with the QAPP(s) and reviewed and approved by EPA shall be admissible as evidence, without objection, in any proceeding under this Consent Decree. Principal Settling Defendants shall ensure that EPA and State personnel and their authorized representatives are allowed access at reasonable times to all laboratories utilized by Principal Settling Defendants in implementing this Consent Decree. In addition, Principal Settling Defendants shall ensure that such laboratories shall analyze all samples submitted by EPA pursuant to the QAPP for quality assurance monitoring. Principal Settling Defendants shall ensure that the laboratories they utilize for the analysis of samples taken pursuant to this Consent Decree perform all analyses according to accepted EPA methods. Accepted EPA methods consist of those methods that are documented in the "USEPA Contract Laboratory Program Statement of Work for Inorganic Analysis, ILM05.4," and the "USEPA Contract Laboratory Program Statement of Work for Organic Analysis, SOM01.2," and any amendments made thereto during the course of the implementation of this Decree; however, upon approval by EPA, after opportunity for review and comment by the State, Principal Settling Defendants may use other analytical methods which are as stringent as or more stringent than the accepted EPA methods. Principal Settling Defendants shall ensure that all laboratories they use for analysis of samples taken pursuant to this Consent Decree participate in an EPA or EPA-equivalent QA/QC program. Principal Settling Defendants shall use only laboratories that have a documented Quality System which complies with ANSI/ASQC E4-1994, "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs" (American National Standard, January 5, 1995), and "EPA Requirements for Quality Management Plans (QA/R-2)" (EPA/240/B-01/002, March 2001, reissued May 2006)

or equivalent documentation as determined by EPA. EPA may consider laboratories accredited under the National Environmental Laboratory Accreditation Program (“NELAP”) as meeting the Quality System requirements. Principal Settling Defendants shall ensure that all field methodologies utilized in collecting samples for subsequent analysis pursuant to this Consent Decree are conducted in accordance with the procedures set forth in the QAPP approved by EPA.

23. Upon request, Principal Settling Defendants shall allow split or duplicate samples to be taken by EPA and the TCEQ or their authorized representatives. Principal Settling Defendants shall notify EPA and the TCEQ not less than 28 days in advance of any sample collection activity unless shorter notice is agreed to by EPA. In addition, EPA and the TCEQ shall have the right to take any additional samples that EPA or the TCEQ deem necessary. Upon request, EPA and the TCEQ shall allow Principal Settling Defendants to take split or duplicate samples of any samples they take as part of Plaintiffs’ oversight of Principal Settling Defendants’ implementation of the Work.

24. Principal Settling Defendants shall submit two hard copies each to EPA and the TCEQ of the results of all sampling and/or tests or other data obtained or generated by or on behalf of Principal Settling Defendants with respect to the Site and/or the implementation of this Consent Decree unless EPA or TCEQ, respectively, agrees otherwise.

25. Notwithstanding any provision of this Consent Decree, the United States and the State retain all of their information gathering and inspection authorities and rights, including enforcement actions related thereto, under CERCLA, RCRA, and any other applicable statutes or regulations.

#### IX. ACCESS AND INSTITUTIONAL CONTROLS

26. The Site is presently owned and controlled by the Owner Settling Defendant, subject to control by Principal Settling Defendants acting as and through members of the “MCP” as defined in the Special Warranty Deed dated January 13, 2009, (referenced in Paragraph [L.J](#) of this Consent Decree), and subject to access requirements and land and groundwater use restrictions as set forth in the Special Warranty Deed. As long as the Site, or any other real property where access or land/water use restrictions are needed, is owned or controlled by the Owner Settling Defendant or is owned, controlled, or subject to control by any of Principal Settling Defendants or by the Principal Settling Defendants acting as and through members of the “MCP” as defined in the Special Warranty Deed dated January 13, 2009:

a. such Owner Settling Defendant and Principal Settling Defendants shall, commencing on the date of lodging of the Consent Decree, provide the United States, the State, and the other Principal Settling Defendants, and their representatives, contractors, and subcontractors, with access at all reasonable times to the Site, or such other real property, to conduct any activity regarding the Consent Decree including, but not limited to, the following activities:

- (1) Monitoring the Work;
- (2) Verifying any data or information submitted to the United States or the State;

- Site;
- (3) Conducting investigations regarding contamination at or near the Site;
  - (4) Obtaining samples;
  - (5) Assessing the need for, planning, or implementing additional response actions at or near the Site;
  - (6) Assessing implementation of quality assurance and quality control practices as defined in the approved Quality Assurance Project Plans;
  - (7) Implementing the Work pursuant to the conditions set forth in Paragraph [103](#) (Work Takeover);
  - (8) Inspecting and copying records, operating logs, contracts, or other documents maintained or generated by Principal Settling Defendants or their agents, consistent with Section XXV (Access to Information);
  - (9) Assessing Principal Settling Defendants' compliance with the Consent Decree;
  - (10) Determining whether the Site or other real property is being used in a manner that is prohibited or restricted, or that may need to be prohibited or restricted under the Consent Decree; and
  - (11) Implementing, monitoring, maintaining, reporting on, and enforcing any Institutional Controls.

b. commencing on the date of lodging of the Consent Decree, Owner Settling Defendant and Principal Settling Defendants shall not use the Site, or such other real property, in any manner that EPA determines will pose an unacceptable risk to human health or to the environment due to exposure to Waste Materials or interfere with or adversely affect the implementation, integrity, or protectiveness of the Remedial Action. The restrictions shall preclude, at a minimum, the following (except with respect to activities to implement response actions):

- (1) any excavation below two feet;
- (2) use of, or drilling to, ground water;
- (3) disturbance of the on-site cap;
- (4) construction of buildings in areas impacted by the ground water, and on-site construction or use of buildings without prior performance of a vapor intrusion study (OSWER EPA530-D-02-004, November 2002, or subsequent vapor intrusion guidance); and
- (5) residential, commercial, or industrial Site development.

c. Owner Settling Defendant and/or Principal Settling Defendants shall:

- (1) if EPA determines that Proprietary Controls in addition to (or instead of) those contained in the Special Warranty Deed and the Grant of Access Easement are

necessary, within 21 days of EPA's written request, consult with TCEQ regarding the form of the Proprietary Controls, and, within 60 days of EPA's written request, submit to TCEQ for review and to EPA for review and approval regarding such real property: (i) draft Additional Proprietary Controls that implement EPA's request and that are enforceable under state law; and (ii) a current title insurance commitment or other evidence of title acceptable to EPA, which shows title to the land affected by the Additional Proprietary Controls to be free and clear of all prior liens and encumbrances (except when EPA waives the release or subordination of such prior liens or encumbrances or when, despite best efforts, Principal Settling Defendants are unable to obtain release or subordination of such prior liens or encumbrances);

(2) within 15 days of EPA's approval and acceptance of the Additional Proprietary Controls and the title evidence, update the title search and, if it is determined that nothing has occurred since the effective date of the commitment, or other title evidence, to affect the title adversely, record the Additional Proprietary Controls with the appropriate land records office. Within 30 days of recording the Additional Proprietary Controls, such Principal Settling Defendants shall provide EPA and copy TCEQ with a final title insurance policy, or other final evidence of title acceptable to EPA, and a certified copy of the original recorded Additional Proprietary Controls showing the clerk's recording stamps. If the Additional Proprietary Controls are to be conveyed to the United States, the Additional Proprietary Controls and title evidence (including final title evidence) shall be prepared in accordance with the U.S. Department of Justice Title Standards 2001, and approval of the sufficiency of title shall be obtained as required by 40 U.S.C. § 3111.

d. Owner Settling Defendant and/or Principal Settling Defendants shall not amend, modify, or terminate the Grant of Access Easement, the Restrictive Covenants set forth in the Special Warranty Deed, or any Additional Proprietary Controls imposed pursuant to Paragraph [26.c](#) without first receiving EPA's written approval of any changes, after submitting any proposed changes to TCEQ for review and to EPA for review and approval.

27. If ownership of the Site is transferred to persons other than the Owner Settling Defendant, Owner Settling Defendant and Principal Settling Defendants shall secure from such persons:

a. an agreement to provide access thereto for the United States, the State, and Principal Settling Defendants, and their representatives, contractors, and subcontractors, to conduct any activity regarding the Consent Decree including, but not limited to, the activities listed in Paragraph [26.a](#);

b. an agreement, enforceable by Principal Settling Defendants and the United States, to refrain from using the Site, or such other real property, in any manner that EPA determines will pose an unacceptable risk to human health or to the environment due to exposure to Waste Materials or interfere with or adversely affect the implementation, integrity, or protectiveness of the Remedial Action. The agreement shall include, but not be limited to, the land/water use restrictions listed in Paragraph [26.b](#) and any Additional Proprietary Controls imposed pursuant to Paragraph [26.c](#); and

c. the execution and recordation in the appropriate land records office of an acknowledgment that the property is subject to the access easement as set forth in the Special

Warranty Deed and Grant of Access Easement, and all Proprietary controls, including the Restrictive Covenants in Paragraph 5 of the Special Warranty Deed, and any Additional Proprietary Controls imposed pursuant to Paragraph [26.c](#).

28. If any real property other than the Site where access and/or land/water use restrictions are needed, is owned or controlled by persons other than the Owner Settling Defendant or any Principal Settling Defendant, Principal Settling Defendants shall use best efforts to secure from such persons:

a. an agreement to provide access thereto for the United States, the State, and Principal Settling Defendants, and their representatives, contractors, and subcontractors, to conduct any activity regarding the Consent Decree including, but not limited to, the activities listed in Paragraph [26.a](#);

b. an agreement, enforceable by Principal Settling Defendants and the United States, to refrain from using the Site, or such other real property, in any manner that EPA determines will pose an unacceptable risk to human health or to the environment due to exposure to Waste Materials or interfere with or adversely affect the implementation, integrity, or protectiveness of the Remedial Action. If EPA determines that land/water use restrictions are needed for such real property, the agreement shall include, but not be limited to, the land/water use restrictions listed in Paragraph [26.b](#); and

c. the execution and recordation in the appropriate land records office of Proprietary Controls, that (i) grant a right of access to conduct any activity regarding the Consent Decree including, but not limited to, those activities listed in Paragraph [26.a](#), and (ii) grant the right to enforce any land/water use restrictions set forth in Paragraph [26.b](#) that EPA determines are required, including, but not limited to, the specific restrictions listed therein.

(1) The Proprietary Controls shall be granted to one or more of the following persons, as determined by EPA: (i) the United States, on behalf of EPA, and its representatives; (ii) the State and its representatives; (iii) Principal Settling Defendants and their representatives; and/or (iv) other appropriate grantees. The Proprietary Controls, other than those granted to the United States, shall include a designation that EPA (and/or the State as appropriate) is a “third party beneficiary,” allowing EPA and TCEQ to maintain the right to enforce the Proprietary Control without acquiring an interest in real property. If any Proprietary Controls are granted to any Principal Settling Defendants pursuant to this Paragraph, then such Principal Settling Defendants shall monitor, maintain, report on, and enforce such Proprietary Controls.

(2) In accordance with the schedule set forth in the O&M Plan, Principal Settling Defendants shall submit to TCEQ for review and to EPA for review and approval regarding such property: (i) if requested by EPA, a draft Proprietary Control, drafted after consultation with TCEQ, containing the substance of the Restrictive Covenants in Paragraph 5 of the Special Warranty Deed, the access easements in the Grant of Access Easement (referenced in Paragraph [1.J](#) of this Consent Decree), and any Additional Proprietary Controls imposed pursuant to Paragraph [26.c](#) of this Consent Decree, or as EPA otherwise specifies, and that is enforceable under state law; and (ii) a current title insurance commitment, or other evidence of title acceptable to EPA, which shows title to the land affected by the Proprietary Control to be free and clear of all prior liens and encumbrances (except when EPA waives the



release or subordination of such prior liens or encumbrances or when, despite best efforts, Principal Settling Defendants are unable to obtain release or subordination of such prior liens or encumbrances).

(3) Within 15 days of EPA's approval and acceptance of the Proprietary Control and the title evidence, Principal Settling Defendants shall update the title search and, if it is determined that nothing has occurred since the effective date of the commitment, or other title evidence, to affect the title adversely, the Proprietary Control shall be recorded with the appropriate land records office. Within 30 days of the recording of the Proprietary Control, Principal Settling Defendants shall provide EPA and copy TCEQ with a final title insurance policy, or other final evidence of title acceptable to EPA, and a certified copy of the original recorded Proprietary Control showing the clerk's recording stamps. If the Proprietary Control is to be conveyed to the United States, the Proprietary Control and title evidence (including final title evidence) shall be prepared in accordance with the U.S. Department of Justice Title Standards 2001, and approval of the sufficiency of title must be obtained as required by 40 U.S.C. § 3111.

29. For purposes of Paragraphs [26](#) and [28](#), "best efforts" includes the payment of reasonable sums of money to obtain access, an agreement to restrict land/water use, a Proprietary Control, and/or an agreement to release or subordinate a prior lien or encumbrance. The United States may, as it deems appropriate, assist Principal Settling Defendants in obtaining access, agreements to restrict land/water use, Proprietary Controls, or the release or subordination of a prior lien or encumbrance. Principal Settling Defendants shall reimburse the United States under Section XVI (Payments for Response Costs, NRD, & NRD Assessment Costs) for all costs incurred, direct or indirect, by the United States in obtaining such access, agreements to restrict land/water use, Proprietary Controls, and/or the release/subordination of prior liens or encumbrances including, but not limited to, the cost of attorney time and the amount of monetary consideration paid or just compensation.

30. If EPA determines that Institutional Controls in the form of state or local laws, regulations, ordinances, zoning restrictions, or other governmental controls are needed, Principal Settling Defendants shall cooperate with EPA's and the State's efforts to secure and ensure compliance with such governmental controls.

31. Notwithstanding any provision of the Consent Decree, the United States and the State retain all of their access authorities and rights, as well as all of their rights to require Institutional Controls, including enforcement authorities related thereto, under CERCLA, RCRA, and any other applicable statute or regulations.

#### X. REPORTING REQUIREMENTS

32. In addition to any other requirement of this Consent Decree, Principal Settling Defendants shall submit two copies to EPA (unless otherwise agreed by EPA), and two copies to the TCEQ, of written monthly progress reports that: (a) describe the actions which have been taken toward achieving compliance with this Consent Decree during the previous month; (b) include a summary of all results of sampling and tests and all other data received or generated by Principal Settling Defendants or their contractors or agents in the previous month; (c) identify all plans, reports, and other deliverables required by this Consent Decree completed and submitted during the previous month; (d) describe all actions, including, but not limited to, data collection

and implementation of work plans, which are scheduled for the next six weeks and provide other information relating to the progress of construction, including, but not limited to, critical path diagrams, Gantt charts and Pert charts; (e) include information regarding percentage of completion, unresolved delays encountered or anticipated that may affect the future schedule for implementation of the Work, and a description of efforts made to mitigate those delays or anticipated delays; (f) include any modifications to the work plans or other schedules that Principal Settling Defendants have proposed to EPA or that have been approved by EPA; and (g) describe all activities undertaken in support of the Community Relations Plan during the previous month and those to be undertaken in the next six weeks. Principal Settling Defendants shall submit these progress reports to EPA and the TCEQ by the fourteenth day of every month following the lodging of this Consent Decree until EPA notifies Principal Settling Defendants pursuant to Paragraph [52.b](#) of Section XIV (Certification of Completion). If requested by EPA or the TCEQ, Principal Settling Defendants shall also provide briefings for EPA and the TCEQ to discuss the progress of the Work.

33. Principal Settling Defendants shall notify EPA of any change in the schedule described in the monthly progress report for the performance of any activity, including, but not limited to, data collection and implementation of work plans, no later than seven days prior to the performance of the activity.

34. Upon the occurrence of any event during performance of the Work that Principal Settling Defendants are required to report pursuant to Section 103 of CERCLA, 42 U.S.C. § 9603, or Section 304 of the Emergency Planning and Community Right-to-know Act (“EPCRA”), 42 U.S.C. § 11004, Principal Settling Defendants shall within 24 hours of the onset of such event orally notify the EPA Project Coordinator or the Alternate EPA Project Coordinator (in the event of the unavailability of the EPA Project Coordinator), or, in the event that neither the EPA Project Coordinator or Alternate EPA Project Coordinator is available, the Response and Prevention Branch, Region 6, United States Environmental Protection Agency, at 866-372-7745. These reporting requirements are in addition to the reporting required by CERCLA Section 103 or EPCRA Section 304.

35. Within 20 days of the onset of such an event, Principal Settling Defendants shall furnish to EPA and TCEQ a written report, signed by Principal Settling Defendants’ Project Coordinator, setting forth the events that occurred and the measures taken, and to be taken, in response thereto. Within 30 days of the conclusion of such an event, Principal Settling Defendants shall submit a report setting forth all actions taken in response thereto.

36. Principal Settling Defendants shall submit three copies (unless otherwise agreed by EPA) of all plans, reports, data, and other deliverables required by the SOW, the Remedial Design Work Plan, the Remedial Action Work Plan, or any other approved plans to EPA in accordance with the schedules set forth in such plans. Principal Settling Defendants shall simultaneously submit one copy of all such plans, reports, data, and other deliverables to the TCEQ. Upon request by EPA, Principal Settling Defendants shall submit in electronic form all or any portion of any deliverables Principal Settling Defendants are required to submit pursuant to the provisions of this Consent Decree.

37. All deliverables submitted by Principal Settling Defendants to EPA which purport to document Principal Settling Defendants' compliance with the terms of this Consent Decree shall be signed by an authorized representative of Principal Settling Defendants.

#### XI. EPA APPROVAL OF PLANS, REPORTS, AND OTHER DELIVERABLES

##### 38. Initial Submissions.

a. After review of any plan, report, or other deliverable that is required to be submitted for approval pursuant to this Consent Decree, EPA, after reasonable opportunity for review and comment by the State, shall: (i) approve, in whole or in part, the submission; (ii) approve the submission upon specified conditions; (iii) disapprove, in whole or in part, the submission; or (iv) any combination of the foregoing.

b. EPA also may modify the initial submission to cure deficiencies in the submission if: (i) EPA determines that disapproving the submission and awaiting a resubmission would cause substantial disruption to the Work; or (ii) previous submission(s) have been disapproved due to material defects and the deficiencies in the initial submission under consideration indicate a bad faith lack of effort to submit an acceptable plan, report, or deliverable.

39. Resubmissions. Upon receipt of a notice of disapproval under Paragraph 38.a.(iii) or (iv), or if required by a notice of approval upon specified conditions under Paragraph 38.a.(ii), Principal Settling Defendants shall, within 30 days or such longer time as specified by EPA in such notice, correct the deficiencies and resubmit the plan, report, or other deliverable for approval. After review of the resubmitted plan, report, or other deliverable, EPA may: (a) approve, in whole or in part, the resubmission; (b) approve the resubmission upon specified conditions; (c) modify the resubmission; (d) disapprove, in whole or in part, the resubmission, requiring Principal Settling Defendants to correct the deficiencies; or (e) any combination of the foregoing.

40. Material Defects. If an initially submitted or resubmitted plan, report, or other deliverable contains a material defect, and the plan, report, or other deliverable is disapproved or modified by EPA under Paragraph 38.b.(ii) or 39 due to such material defect, then the material defect shall constitute a lack of compliance for purposes of Paragraph 83. The provisions of Section XX (Dispute Resolution) and Section XXI (Stipulated Penalties) shall govern the accrual and payment of any stipulated penalties regarding Principal Settling Defendants' submissions under this Section.

41. Implementation. Upon approval, approval upon conditions, or modification by EPA under Paragraph 38 or 39, of any plan, report, or other deliverable, or any portion thereof: (a) such plan, report, or other deliverable, or portion thereof, shall be incorporated into and enforceable under this Consent Decree; and (b) Principal Settling Defendants shall take any action required by such plan, report, or other deliverable, or portion thereof, subject only to their right to invoke the Dispute Resolution procedures set forth in Section XX (Dispute Resolution) with respect to the modifications or conditions made by EPA. The implementation of any non-deficient portion of a plan, report, or other deliverable submitted or resubmitted under Paragraph 38 or 39 shall not relieve Principal Settling Defendants of any liability for stipulated penalties under Section XXI (Stipulated Penalties).

## XII. PROJECT COORDINATORS

42. Within 20 days of lodging this Consent Decree, Principal Settling Defendants, the State and EPA will notify each other, in writing, of the name, address, and telephone number of their respective designated Project Coordinators and Alternate Project Coordinators. If a Project Coordinator or Alternate Project Coordinator initially designated is changed, the identity of the successor will be given to the other Parties at least five working days before the change occurs, unless impracticable, but in no event later than the actual day the change is made. Principal Settling Defendants' Project Coordinator shall be subject to disapproval by EPA and shall have the technical expertise sufficient to adequately oversee all aspects of the Work. Principal Settling Defendants' Project Coordinator shall not be an attorney for any Settling Defendant in this matter. The Principal Settling Defendants' Project Coordinator may assign other representatives, including other contractors, to serve as a Site representative for oversight of performance of daily operations during remedial activities.

43. Plaintiffs may designate other representatives, including, but not limited to, EPA and State employees, and federal and State contractors and consultants, to observe and monitor the progress of any activity undertaken pursuant to this Consent Decree. EPA's Project Coordinator and Alternate Project Coordinator shall have the authority lawfully vested in a Remedial Project Manager (RPM) and an On-Scene Coordinator (OSC) by the NCP, 40 C.F.R. Part 300. EPA's Project Coordinator or Alternate Project Coordinator shall have authority, consistent with the NCP, to halt any Work required by this Consent Decree and to take any necessary response action when he or she determines that conditions at the Site constitute an emergency situation or may present an immediate threat to public health or welfare or the environment due to release or threatened release of Waste Material.

44. EPA's Project Coordinator and Principal Settling Defendants' Project Coordinator will meet, at a minimum, on a monthly basis.

## XIII. PERFORMANCE GUARANTEE

45. In order to ensure the full and final completion of the Work, Principal Settling Defendants shall establish and maintain a performance guarantee, initially in the amount of \$56,400,000 (or as otherwise determined pursuant to this Section), for the benefit of EPA (hereinafter "Estimated Cost of the Work"). The performance guarantee, which must be satisfactory in form and substance to EPA, shall be in the form of one or more of the following mechanisms (provided that, if Principal Settling Defendants intend to use multiple mechanisms, such multiple mechanisms shall be limited to surety bonds guaranteeing payment, letters of credit, trust funds, and insurance policies):

a. A surety bond unconditionally guaranteeing payment and/or performance of the Work that is issued by a surety company among those listed as acceptable sureties on federal bonds as set forth in Circular 570 of the U.S. Department of the Treasury;

b. One or more irrevocable letters of credit, payable to or at the direction of EPA, that is issued by one or more financial institution(s) (i) that has the authority to issue letters of credit and (ii) whose letter-of-credit operations are regulated and examined by a federal or state agency;

c. A trust fund established for the benefit of EPA that is administered by a trustee (i) that has the authority to act as a trustee and (ii) whose trust operations are regulated and examined by a federal or state agency;

d. A policy of insurance that (i) provides EPA with acceptable rights as a beneficiary thereof; and (ii) is issued by an insurance carrier (a) that has the authority to issue insurance policies in the applicable jurisdiction(s) and (b) whose insurance operations are regulated and examined by a federal or state agency;

e. A demonstration by one or more Principal Settling Defendants that each such Principal Settling Defendant meets the financial test criteria of 40 C.F.R. § 264.143(f) with respect to the Estimated Cost of the Work (plus the amount(s) of any other federal or any state environmental obligations financially assured through the use of a financial test or guarantee), provided that all other requirements of 40 C.F.R. § 264.143(f) are met to EPA's satisfaction; or

f. A written guarantee to fund or perform the Work executed in favor of EPA by one or more of the following: (i) a direct or indirect parent company of a Principal Settling Defendant, or (ii) a company that has a "substantial business relationship" (as defined in 40 C.F.R. § 264.141(h)) with at least one Principal Settling Defendant; provided, however, that any company providing such a guarantee must demonstrate to the satisfaction of EPA that it satisfies the financial test and reporting requirements for owners and operators set forth in subparagraphs (1) through (8) of 40 C.F.R. § 264.143(f) with respect to the Estimated Cost of the Work (plus the amount(s) of any other federal or any state environmental obligations financially assured through the use of a financial test or guarantee) that it proposes to guarantee hereunder.

46. Principal Settling Defendants have selected, and EPA has found satisfactory, as an initial performance guarantee pursuant to Paragraph 45.c, a trust fund pursuant to a Trust Agreement substantially in the form attached hereto as Appendix E. Within sixty (60) days after the Effective Date, Principal Settling Defendants shall execute or otherwise finalize all instruments or other documents required in order to make the selected performance guarantee(s) legally binding in a form substantially identical to the documents attached hereto as Appendix E, and such performance guarantee(s) shall thereupon be fully effective. Within seventy-five (75) days of the Effective Date, Principal Settling Defendants shall submit copies of all executed and/or otherwise finalized instruments or other documents required in order to make the selected performance guarantee(s) legally binding to the EPA Financial Management Officer, the United States, EPA, and the State in accordance with Section XXVII (Notices and Submissions).

a. The trust fund may include a segregated subaccount that is limited to funds contributed by the Cashout Settling Defendants to resolve claims under CERCLA relating to the Site and that is intended by the Principal and Cashout Settling Defendants to be treated as a Qualified Settlement Fund under the continuing jurisdiction of the Court for federal and state tax purposes in accordance with the requirements of 26 C.F.R. Section 1.468B. Alternatively, such subaccount shall not be established as a Qualified Settlement Fund under the continuing jurisdiction of the Court. Such alternative subaccounts shall take the respective forms shown on attached Appendix E.

47. If, at any time after the Effective Date and before issuance of the Certification of Completion of the Work pursuant to Paragraph 52, Principal Settling Defendants provide a

performance guarantee for completion of the Work by means of a demonstration or guarantee pursuant to Paragraph 45.e or 45.f, the relevant Principal Settling Defendants shall also comply with the other relevant requirements of 40 C.F.R. § 264.143(f) relating to these mechanisms unless otherwise provided in this Consent Decree, including but not limited to: (a) the initial submission of required financial reports and statements from the relevant entity's chief financial officer ("CFO") and independent certified public accountant ("CPA"), in the form prescribed by EPA in its financial test sample CFO letters and CPA reports available at: <http://www.epa.gov/compliance/resources/policies/cleanup/superfund/fa-test-samples.pdf>; (b) the annual re-submission of such reports and statements within 90 days after the close of each such entity's fiscal year; and (c) the prompt notification of EPA after each such entity determines that it no longer satisfies the financial test requirements set forth at 40 C.F.R. § 264.143(f)(1) and in any event within 90 days after the close of any fiscal year in which such entity no longer satisfies such financial test requirements. For purposes of the performance guarantee mechanisms specified in this Section XIII, references in 40 C.F.R. Part 264, Subpart H, to "closure," "post-closure," and "plugging and abandonment" shall be deemed to include the Work; the terms "current closure cost estimate," "current post-closure cost estimate," and "current plugging and abandonment cost estimate" shall be deemed to include the Estimated Cost of the Work; the terms "owner" and "operator" shall be deemed to refer to each Principal Settling Defendant making a demonstration under Paragraph 45.e; and the terms "facility" and "hazardous waste facility" shall be deemed to include the Site.

48. In the event that EPA determines at any time that a performance guarantee provided by any Principal Settling Defendant pursuant to this Section is inadequate or otherwise no longer satisfies the requirements set forth in this Section, whether due to an increase in the estimated cost of completing the Work or for any other reason, or in the event that any Principal Settling Defendant becomes aware of information indicating that a performance guarantee provided pursuant to this Section is inadequate or otherwise no longer satisfies the requirements set forth in this Section, whether due to an increase in the estimated cost of completing the Work or for any other reason, Principal Settling Defendants, within 30 days of receipt of notice of EPA's determination or, as the case may be, within 30 days of any Principal Settling Defendant becoming aware of such information, shall obtain and present to EPA for approval a proposal for a revised or alternative form of performance guarantee listed in Paragraph 45 that satisfies all requirements set forth in this Section XIII; provided, however, that if any Principal Settling Defendant cannot obtain such revised or alternative form of performance guarantee within such 30-day period, and provided further that the Principal Settling Defendant shall have commenced to obtain such revised or alternative form of performance guarantee within such 30-day period, and thereafter diligently proceeds to obtain the same, EPA shall extend such period for such time as is reasonably necessary for the Principal Settling Defendant in the exercise of due diligence to obtain such revised or alternative form of performance guarantee, such additional period not to exceed 45 days. On day 30, Principal Settling Defendant shall provide to EPA a status report on its efforts to obtain the revised or alternative form of guarantee. In seeking approval for a revised or alternative form of performance guarantee, Principal Settling Defendants shall follow the procedures set forth in Paragraph 50.b.(2). Principal Settling Defendants' inability to post a performance guarantee for completion of the Work shall in no way excuse performance of any other requirements of this Consent Decree, including, without limitation, the obligation of

Principal Settling Defendants to complete the Work in strict accordance with the terms of this Consent Decree.

49. Funding for Work Takeover. The commencement of any Work Takeover pursuant to Paragraph [103](#) shall trigger EPA's right to receive the benefit of any performance guarantee(s) provided pursuant to Paragraphs [45.a](#), [45.b](#), [45.c](#), [45.d](#), or [45.f](#), and at such time EPA shall have immediate access to resources guaranteed under any such performance guarantee(s), whether in cash or in kind, as needed to continue and complete the Work assumed by EPA under the Work Takeover. Upon the commencement of any Work Takeover, if (a) for any reason EPA is unable to promptly secure the resources guaranteed under any such performance guarantee(s), whether in cash or in kind, necessary to continue and complete the Work assumed by EPA under the Work Takeover, or (b) in the event that the performance guarantee involves a demonstration of satisfaction of the financial test criteria pursuant to Paragraph [45.e](#) or Paragraph [45.f\(ii\)](#), Principal Settling Defendants (or in the case of Paragraph [45.f\(ii\)](#), the guarantor) shall immediately upon written demand from EPA deposit into a special account within the EPA Hazardous Substance Superfund or such other account as EPA may specify, in immediately available funds and without setoff, counterclaim, or condition of any kind, a cash amount up to but not exceeding the estimated cost of completing the Work as of such date, as determined by EPA. In addition, if at any time EPA is notified by the issuer of a performance guarantee that such issuer intends to cancel the performance guarantee mechanism it has issued, then, unless Principal Settling Defendants provide a substitute performance guarantee mechanism in accordance with this Section XIII no later than 30 days prior to the impending cancellation date, EPA shall be entitled (as of and after the date that is 30 days prior to the impending cancellation) to draw fully on the funds guaranteed under the then-existing performance guarantee. All EPA Work Takeover costs not reimbursed under this Paragraph shall be reimbursed under Section XVI (Payments for Response Costs, NRD, & NRD Assessment Costs).

50. Modification of Amount and/or Form of Performance Guarantee.

a. Reduction of Amount of Performance Guarantee. If Principal Settling Defendants believe that the estimated cost of completing the Work has diminished below the amount set forth in Paragraph [45](#), Principal Settling Defendants may, no more than once during each calendar year after the first anniversary of the Effective Date, or at any other time agreed to by the Parties, petition EPA in writing to request a reduction in the amount of the performance guarantee provided pursuant to this Section so that the amount of the performance guarantee is equal to the estimated cost of completing the Work. Principal Settling Defendants shall submit a written proposal for such reduction to EPA that shall specify, at a minimum, the estimated cost of completing the Work and the basis upon which such cost was calculated. In seeking approval for a reduction in the amount of the performance guarantee, Principal Settling Defendants shall follow the procedures set forth in Paragraph [50.b.\(2\)](#) for requesting a revised or alternative form of performance guarantee, except as specifically provided in this Paragraph [50.a](#). If EPA decides to accept Principal Settling Defendants' proposal for a reduction in the amount of the performance guarantee, either to the amount set forth in Principal Settling Defendants' written proposal or to some other amount as selected by EPA, EPA will notify the petitioning Principal Settling Defendants of such decision in writing. Upon EPA's acceptance of a reduction in the amount of the performance guarantee, the Estimated Cost of the Work shall be deemed to be the estimated cost of completing the Work set forth in EPA's written decision. After receiving EPA's written

decision, Principal Settling Defendants may reduce the amount of the performance guarantee in accordance with and to the extent permitted by such written acceptance and shall submit copies of all executed and/or otherwise finalized instruments or other documents required in order to make the selected performance guarantee(s) legally binding in accordance with Paragraph 50.b.(2). In the event of a dispute, Principal Settling Defendants may reduce the amount of the performance guarantee required hereunder only in accordance with a final administrative or judicial decision resolving such dispute pursuant to Section XX (Dispute Resolution). No change to the form or terms of any performance guarantee provided under this Section, other than a reduction in amount, is authorized except as provided in Paragraphs 48 or 50.b.

b. Change of Form of Performance Guarantee.

(1) If, after the Effective Date, Principal Settling Defendants desire to change the form or terms of any performance guarantee(s) provided pursuant to this Section, Principal Settling Defendants may, on any anniversary of the Effective Date, or at any other time agreed to by the Parties, petition EPA in writing to request a change in the form or terms of the performance guarantee provided hereunder. The submission of such proposed revised or alternative performance guarantee shall be as provided in Paragraph 50.b.(2). Any decision made by EPA on a petition submitted under this Paragraph shall be made in EPA's sole and unreviewable discretion, and such decision shall not be subject to challenge by Principal Settling Defendants pursuant to the dispute resolution provisions of this Consent Decree or in any other forum.

(2) Principal Settling Defendants shall submit a written proposal for a revised or alternative performance guarantee to EPA which shall specify, at a minimum, the estimated cost of completing the Work, the basis upon which such cost was calculated, and the proposed revised performance guarantee, including all proposed instruments or other documents required in order to make the proposed performance guarantee legally binding. The proposed revised or alternative performance guarantee must satisfy all requirements set forth or incorporated by reference in this Section. Principal Settling Defendants shall submit such proposed revised or alternative performance guarantee to the EPA Financial Management Officer in accordance with Section XXVII (Notices and Submissions). EPA will notify Principal Settling Defendants in writing of its decision to accept or reject a revised or alternative performance guarantee submitted pursuant to this Paragraph. Within ten days after receiving a written decision approving the proposed revised or alternative performance guarantee, Principal Settling Defendants shall execute and/or otherwise finalize all instruments or other documents required in order to make the selected performance guarantee(s) legally binding in a form substantially identical to the documents submitted to EPA as part of the proposal, and such performance guarantee(s) shall thereupon be fully effective. Within 30 days of receiving a written decision approving the proposed revised or alternative performance guarantee, Principal Settling Defendants shall submit to the EPA Financial Management Officer, the United States, EPA, and the State in accordance with Section XXVII (Notices and Submissions) copies of all executed and/or otherwise finalized instruments or other documents required in order to make the selected performance guarantee(s) legally binding.

c. Release of Performance Guarantee. Principal Settling Defendants shall not release, cancel, or discontinue any performance guarantee provided pursuant to this Section except



as provided in this Paragraph. If Principal Settling Defendants receive written notice from EPA in accordance with Paragraph [52](#) that the Work has been fully and finally completed in accordance with the terms of this Consent Decree, or if EPA otherwise so notifies Principal Settling Defendants in writing, Principal Settling Defendants may thereafter release, cancel, or discontinue the performance guarantee(s) provided pursuant to this Section. In the event of a dispute, Principal Settling Defendants may release, cancel, or discontinue the performance guarantee(s) required hereunder only in accordance with a final administrative or judicial decision resolving such dispute pursuant to Section XX (Dispute Resolution).

#### XIV. CERTIFICATION OF COMPLETION

##### 51. Completion of the Remedial Action.

a. Within 90 days after Principal Settling Defendants conclude that the Remedial Action has been fully performed and the Performance Standards have been achieved, Principal Settling Defendants shall schedule and conduct a pre-certification inspection to be attended by Principal Settling Defendants, EPA, and the State. If, after the pre-certification inspection, Principal Settling Defendants still believe that the Remedial Action has been fully performed and the Performance Standards have been achieved, they shall submit a written report requesting certification to EPA for approval, with a copy to the State, pursuant to Section XI (EPA Approval of Plans, Reports, and Other Deliverables) within 30 days of the inspection. In the report, a registered professional engineer and Principal Settling Defendants' Project Coordinator shall state that the Remedial Action has been completed in full satisfaction of the requirements of this Consent Decree. The written report shall include as-built drawings signed and stamped by a professional engineer. The report shall contain the following statement, signed by a responsible corporate official of a Principal Settling Defendant or Principal Settling Defendants' Project Coordinator:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

If, after completion of the pre-certification inspection and receipt and review of the written report, EPA, after reasonable opportunity for review and comment by the State, determines that the Remedial Action or any portion thereof has not been completed in accordance with this Consent Decree or that the Performance Standards have not been achieved, EPA will notify Principal Settling Defendants in writing of the activities that must be undertaken by Principal Settling Defendants pursuant to this Consent Decree to complete the Remedial Action and achieve the Performance Standards, provided, however, that EPA may only require Principal Settling Defendants to perform such activities pursuant to this Paragraph to the extent that such activities are consistent with the "scope of the remedy set forth in the ROD," as that term is defined in Paragraph [14](#).a. EPA will set forth in the notice a schedule for performance of such activities consistent with the Consent Decree and the SOW or require Principal Settling Defendants to

submit a schedule to EPA for approval pursuant to Section XI (EPA Approval of Plans, Reports, and Other Deliverables). Principal Settling Defendants shall perform all activities described in the notice in accordance with the specifications and schedules established pursuant to this Paragraph, subject to their right to invoke the dispute resolution procedures set forth in Section XX (Dispute Resolution).

b. If EPA concludes, based on the initial or any subsequent report requesting Certification of Completion of the Remedial Action and after a reasonable opportunity for review and comment by the State, that the Remedial Action has been performed in accordance with this Consent Decree and that the Performance Standards have been achieved, EPA will so certify in writing to Principal Settling Defendants. This certification shall constitute the Certification of Completion of the Remedial Action for purposes of this Consent Decree, including, but not limited to, Section XXII (Covenants by Plaintiffs). Certification of Completion of the Remedial Action shall not affect Principal Settling Defendants' remaining obligations under this Consent Decree.

52. Completion of the Work.

a. Within 90 days after Principal Settling Defendants conclude that all phases of the Work, other than any remaining activities required under Section VII (Remedy Review), have been fully performed, Principal Settling Defendants shall schedule and conduct a pre-certification inspection to be attended by Principal Settling Defendants, EPA, and the State. If, after the pre-certification inspection, Principal Settling Defendants still believe that the Work has been fully performed, Principal Settling Defendants shall submit a written report by a registered professional engineer stating that the Work has been completed in full satisfaction of the requirements of this Consent Decree. The report shall contain the statement set forth in Paragraph [51.a](#), signed by a responsible corporate official of a Principal Settling Defendant or Principal Settling Defendants' Project Coordinator. If, after review of the written report, EPA, after reasonable opportunity for review and comment by the State, determines that any portion of the Work has not been completed in accordance with this Consent Decree, EPA will notify Principal Settling Defendants in writing of the activities that must be undertaken by Principal Settling Defendants pursuant to this Consent Decree to complete the Work, provided, however, that EPA may only require Principal Settling Defendants to perform such activities pursuant to this Paragraph to the extent that such activities are consistent with the "scope of the remedy set forth in the ROD," as that term is defined in Paragraph 14.a. EPA will set forth in the notice a schedule for performance of such activities consistent with the Consent Decree and the SOW or require Principal Settling Defendants to submit a schedule to EPA for approval pursuant to Section XI (EPA Approval of Plans, Reports, and Other Deliverables). Principal Settling Defendants shall perform all activities described in the notice in accordance with the specifications and schedules established therein, subject to their right to invoke the dispute resolution procedures set forth in Section XX (Dispute Resolution).

b. If EPA concludes, based on the initial or any subsequent request for Certification of Completion of the Work by Principal Settling Defendants and after a reasonable opportunity for review and comment by the State, that the Work has been performed in accordance with this Consent Decree, EPA will so notify Principal Settling Defendants in writing.

## XV. EMERGENCY RESPONSE

53. If any action or occurrence during the performance of the Work which causes or threatens a release of Waste Material from the Site that constitutes an emergency situation or may present an immediate threat to public health or welfare or the environment, Principal Settling Defendants shall, subject to Paragraph 54, immediately take all appropriate action to prevent, abate, or minimize such release or threat of release, and shall immediately notify the EPA's Project Coordinator, or, if the Project Coordinator is unavailable, EPA's Alternate Project Coordinator. If neither of these persons is available, Principal Settling Defendants shall notify the EPA Response and Prevention Branch, Region 6, at 866-372-7745. Principal Settling Defendants shall take such actions in consultation with EPA's Project Coordinator or other available authorized EPA officer and in accordance with all applicable provisions of the Health and Safety Plans, the Contingency Plans, and any other applicable plans or documents developed pursuant to the SOW. In the event that Principal Settling Defendants fail to take appropriate response action as required by this Section, and EPA takes such action instead, Principal Settling Defendants shall reimburse EPA all costs of the response action under Section XVI (Payments for Response Costs, NRD, & NRD Assessment Costs).

54. Subject to Section XXII (Covenants by Plaintiffs), nothing in the preceding Paragraph or in this Consent Decree shall be deemed to limit any authority of the United States, or the State, (a) to take all appropriate action to protect human health and the environment or to prevent, abate, respond to, or minimize an actual or threatened release of Waste Material on, at, or from the Site, or (b) to direct or order such action, or seek an order from the Court, to protect human health and the environment or to prevent, abate, respond to, or minimize an actual or threatened release of Waste Material on, at, or from the Site.

## XVI. PAYMENTS FOR RESPONSE COSTS, NRD, & NRD ASSESSMENT COSTS

### 55. Payment by Settling Defendants for Past Response Costs and Future Oversight Costs.

a. Within 30 days of the Effective Date, Principal Settling Defendants shall pay to EPA \$900,000 in payment for Past Response Costs and Future Oversight Costs. Payment shall be made in accordance with Paragraphs 59.a and 59.c (Payment Instructions).

b. Within 30 days of the effective Date, Principal Settling Defendants, in lieu of a payment that the State owes EPA, shall pay EPA \$504,277.27. (This is an amount that is due from the State to EPA pursuant to an order of the Bankruptcy Court. The State's claim against the Principal Settling Defendants has been adjusted accordingly.)

c. The total amount to be paid to EPA by Settling Defendants pursuant to this Paragraph shall be deposited by EPA into the MSC Site Special Account.

d. Within 30 days of the Effective Date, Principal Settling Defendants shall pay to the State \$285,682.86 in payment for State Past Response Costs and \$55,000 in payment for the State's attorneys' fees. Payment shall be made in accordance with Paragraph 59.d (Instructions for Payments to the State of Texas). TCEQ has joined the group of De Minimis Cashout Settling Defendants listed in Appendix G. In lieu of making a cash payment, TCEQ has contributed the \$6,766 necessary to become a De Minimis Cashout Settling Defendant by

reducing the State's claim for State Past Response Costs by \$6,766. (The payment of \$285,682.86 has been adjusted to reflect an offset for both the \$504,277.27 described in Subparagraph "b" above and the \$6,766 payment described here.) This payment reflects the TCEQ's net claim after the recovery of response costs from other entities including certain bankruptcy estates. It also reflects estimated future recoveries, with allowance for delay and difficulty of collection. The Settling Defendants and the State hereto agree to compromise and settle their claims according to the terms of this subparagraph, regardless of whether the TCEQ's future recoveries are more than, less than, or the same as the current estimates.

56. Payments by Principal Settling Defendants for Future Response Costs Other Than Future Oversight Costs and Interim Response Costs. Principal Settling Defendants shall pay to EPA all Future Response Costs not inconsistent with the NCP other than Future Oversight Costs and Interim Response Costs.

a. On a periodic basis, EPA will send Principal Settling Defendants a bill requiring payment that includes a SCORPIOS (Superfund Cost Recovery Package Image and On-Line System) report and a DOJ case cost summary. Principal Settling Defendants shall make payments within 30 days of Principal Settling Defendants' receipt of each bill requiring payment, except as otherwise provided in Paragraph 60, in accordance with Paragraphs 59.b and 59.c.

b. The total amount to be paid by Principal Settling Defendants pursuant to Subparagraph "a" of this Paragraph shall be deposited by EPA into the MSC Site Special Account.

c. Principal Settling Defendants shall pay to the State all State Future Response Costs not inconsistent with the NCP. The State will send Principal Settling Defendants a bill requiring payment, that includes direct and indirect costs incurred by the State and its contractors and documentation of such costs (including personnel labor hours and rates, indirect cost calculations, contractor invoices, and disbursement receipts over \$100), on a periodic basis or as required. Principal Settling Defendants shall make all payments within 60 days of Principal Settling Defendants' receipt of each bill requiring payment, except as otherwise provided in Paragraph 60. Principal Settling Defendants shall make all payments to the State required by this Paragraph in accordance with Paragraph 59.d.

57. Payments by Settling Federal Agencies for Response Costs.

a. Payment to Principal Settling Defendants. As soon as reasonably practicable after the Effective Date, by Automated Clearing House Electronic Funds Transfer in accordance with instructions provided by Principal Settling Defendants, the United States Postal Service, on its own behalf, shall pay \$10.29, and the United States, on behalf of the remaining Settling Federal Agencies, shall pay \$1,455,018.71, to Principal Settling Defendants in payment of Past Response Costs and Future Response Costs, and in payment of Settling Defendants' past response costs and future response costs at the Site.

b. Payment to the State. As soon as reasonably practicable after the Effective Date, the United States Postal Service, on its own behalf, shall pay \$0.25 (twenty-five cents), and the United States, on behalf of the remaining Settling Federal Agencies, shall pay \$34,999.75 to the State in payment of State Past Response Costs and State Future Response Costs by Wire Transfer in accordance with Paragraph 59.d, below.

c. Interest. In the event that any payment required by Paragraphs [57.a](#) or [57.b](#), is not made within 120 days of the Effective Date, Interest on the unpaid balance shall be paid at the rate established pursuant to Section 107(a) of CERCLA, 42 U.S.C. § 9607(a), commencing on the 121<sup>st</sup> day after the Effective Date and accruing through the date of the payment.

58. The Parties to this Consent Decree recognize and acknowledge that the payment obligations of the United States under this Consent Decree (with the exception of the obligations of the United States Postal Service) can only be paid from appropriated funds legally available for such purpose. Nothing in this Consent Decree shall be interpreted or construed as a commitment or requirement that any Settling Federal Agency obligate or pay funds in contravention of the Anti-Deficiency Act, 31 U.S.C. § 1341, or any other applicable provision of law.

59. Payment Instructions for Settling Defendants.

a. Instructions for Payments of Past Response Costs and Future Oversight Costs. All payments required, elsewhere in this Consent Decree, to be made in accordance with this Paragraph [59.a](#) shall be made at <https://www.pay.gov> to the U.S. Department of Justice account, in accordance with instructions provided to Settling Defendants by the Financial Litigation Unit (“FLU”) of the United States Attorney’s Office for the Southern District of Texas after the Effective Date. Any payments exceeding \$9.9 million and required, elsewhere in this Consent Decree, to be made in accordance with this Paragraph may be made by FedWire Electronic Funds Transfer (“EFT”) to the U.S. Department of Justice account in accordance with current EFT procedures, and in accordance with instructions provided to Settling Defendants by the FLU after the Effective Date. The payment instructions provided by the Financial Litigation Unit shall include a Consolidated Debt Collection System (“CDCS”) number, which shall be used to identify all payments required to be made in accordance with this Consent Decree. The FLU shall provide the payment instructions to:

Bob Piniewski  
Project Navigator, Ltd.  
10497 Town and Country Way, Suite 830  
Houston, TX 77024  
Phone: 919-435-0934  
Cell: 919-539-1928  
Email: [bobp@projectnavigator.com](mailto:bobp@projectnavigator.com)

on behalf of Settling Defendants. Settling Defendants may change the individual to receive payment instructions on their behalf by providing written notice of such change in accordance with Section XXVII (Notices and Submissions).

b. Instructions for Future Response Costs Payments other than Future Oversight Costs and Stipulated Penalties. All payments required, elsewhere in this Consent Decree, to be made in accordance with this Paragraph [59.b](#) shall be made by Fedwire EFT to:

Federal Reserve Bank of New York  
ABA = 021030004  
Account = 68010727  
SWIFT address = FRNYUS33  
33 Liberty Street  
New York NY 10045  
Field Tag 4200 of the Fedwire message should read “D 68010727 Environmental Protection Agency.”

c. Instructions for Payments. All payments of Response Costs made under Paragraph [59.a](#) or [59.b](#) shall reference the CDCS Number, EPA Site/Spill ID Number 06GZ and DOJ Case Number 90-11-2-07465/4. At the time of any payment required to be made in accordance with Paragraphs [59.a](#) or [59.b](#), Principal Settling Defendants shall send notice that payment has been made to the United States, and to EPA, in accordance with Section XXVII (Notices and Submissions), and to the EPA Cincinnati Finance Office by email at [acctsreceivable.cinwd@epa.gov](mailto:acctsreceivable.cinwd@epa.gov), or by mail at 26 Martin Luther King Drive, Cincinnati, Ohio 45268. Such notice shall also reference the CDCS Number, Site/Spill ID Number, and DOJ Case Number.

d. Instructions for Payments to the State of Texas. All payments required under this Consent Decree to be made to the State, except payments for NRD Assessment Costs under Paragraph [62.b](#), shall be made by Wire Transfer to the Comptroller of Public Accounts, State of Texas, for the Attorney General’s Suspense Account, using the following instructions:

Financial Institution:	TX COMP AUSTIN
Routing Number:	114900164
Account Name:	Comptroller of Public Accounts Treasury Operations
Account Number to Credit:	463600001
Reference:	AG No. 09-3106847 (Malone Superfund Site)
Attention:	Office of the Attorney General Chief, EPD Div. (463-2012)
Contact:	Abel Rosas, Fin. Rptg (475-4380)

At the time of payment, the payor shall likewise send a copy of the Wire Transfer authorization form and transaction record, together with a transmittal letter, in accordance with Section XXVII of this Decree (Notices and Submissions), and shall send a copy by email to [Thomas.Edwards@oag.state.tx.us](mailto:Thomas.Edwards@oag.state.tx.us). The transmittal letter shall state that the payment is made pursuant to this Consent Decree, and shall reference the civil action number of this case and AG No. 093106847.

60. Principal Settling Defendants may contest any Future Response Costs or State Future Response Costs billed under Paragraph [56](#) if they determine that EPA or the State has made a mathematical error or included a cost item that is not within the definition of Future Response Costs or State Future Response Costs, or if they believe EPA incurred excess costs as a direct result of an EPA action that was inconsistent with a specific provision or provisions of the NCP. Such objection shall be made in writing within 60 days of receipt of the bill and must be

sent to the United States (if the United States' accounting is being disputed) or the State (if the State's accounting is being disputed) pursuant to Section XXVII (Notices and Submissions). Any such objection shall specifically identify the contested Future Response Costs or State Future Response Costs and the basis for objection. In the event of an objection, Principal Settling Defendants shall pay all uncontested Future Response Costs to the United States and all uncontested State Future Response Costs to the State within 60 days of Principal Settling Defendants' receipt of the bill requiring payment. Simultaneously, Principal Settling Defendants shall establish an interest-bearing escrow account in a federally insured bank duly chartered in the State of Texas and remit to that escrow account funds equivalent to the amount of the contested Future Response Costs or State Future Response Costs. Principal Settling Defendants shall send to the United States, as provided in Section XXVII (Notices and Submissions), and the State a copy of the transmittal letter and check paying the uncontested Future Response Costs or State Future Response Costs, and a copy of the correspondence that establishes and funds the escrow account, including, but not limited to, information containing the identity of the bank and bank account under which the escrow account is established as well as a bank statement showing the initial balance of the escrow account. Simultaneously with establishment of the escrow account, Principal Settling Defendants shall initiate the Dispute Resolution procedures in Section XX (Dispute Resolution). If the United States or the State prevails in the dispute, Principal Settling Defendants shall pay the sums due (with accrued interest) to the United States or the State, as applicable, within five days of the resolution of the dispute. If Principal Settling Defendants prevail concerning any aspect of the contested costs, Principal Settling Defendants shall pay that portion of the costs (plus associated accrued interest) for which they did not prevail to the United States or the State, as applicable, within five days of the resolution of the dispute. Any balance of the escrow account shall be disbursed to Principal Settling Defendants. All payments to the United States under this Paragraph shall be made in accordance with Paragraphs [59.b](#) and [59.c](#) (Payment Instructions). All payments to the State under this Paragraph shall be made in accordance with Paragraph [59.d](#) (Instructions for Payments to the State of Texas). The dispute resolution procedures set forth in this Paragraph in conjunction with the procedures set forth in Section XX (Dispute Resolution) shall be the exclusive mechanisms for resolving disputes regarding Principal Settling Defendants' obligation to reimburse the United States for Future Response Costs and the State for State Future Response Costs.

61. Interest. In the event that any payment for Past Response Costs, Future Oversight Costs, State Past Response Costs, State Future Response Costs, and the State's attorneys fees under this Section is not made by the date required, Principal Settling Defendants shall pay Interest on the unpaid balance. The Interest to be paid on Past Response Costs, Future Oversight Costs, State Past Response Costs, and the State's attorneys fees under this Paragraph shall begin to accrue on the Effective Date. The Interest on all subsequent Future Response Costs shall begin to accrue on the date of the bill. The Interest shall accrue through the date of Principal Settling Defendants' payment. Payments of Interest made under this Paragraph shall be in addition to such other remedies or sanctions available to Plaintiffs by virtue of Principal Settling Defendants' failure to make timely payments under this Section including, but not limited to, payment of stipulated penalties pursuant to Paragraph [84](#).

62. Payments for NRD; Use of Such Funds.

Within 30 days of the Effective Date, Principal Settling Defendants shall pay a total of \$3,035,873 for Natural Resource Damages, as provided in Paragraphs 62.a and 62.b. As soon as reasonably practicable after the Effective Date, the Settling Federal Agencies shall pay \$73,127 for Natural Resource Damages, as provided in Paragraph 62.c. The total to be paid for Natural Resource Damages is \$3,109,000.

a. Payments for Restoration Costs, Future NRD Assessment Costs, and the United States' Past NRD Assessment Costs.

(1) Within 30 days of the Effective Date, Principal Settling Defendants shall pay a total of \$2,908,753 to the United States for the Texas and federal Trustees' Restoration Costs, Future NRD Assessment Costs incurred by all Trustees, and Past NRD Assessment Costs incurred by the United States. Payment shall be made at <https://www.pay.gov> to the U.S. Department of Justice account, in accordance with instructions provided to Principal Settling Defendants by the Financial Litigation Unit of the United States Attorney's Office for the Southern District of Texas after the Effective Date. The payment instructions provided by the Financial Litigation Unit shall include a Consolidated Debt Collection System ("CDCS") number, which shall be used to identify all payments required to be made in accordance with this Consent Decree. The FLU shall provide the payment instructions to:

Bob Piniewski  
Project Navigator, Ltd.  
10497 Town and Country Way, Suite 830  
Houston, TX 77024  
Phone: 919-435-0934  
Cell: 919-539-1928  
Email: [bobp@projectnavigator.com](mailto:bobp@projectnavigator.com)

on behalf of Principal Settling Defendants. Principal Settling Defendants may change the individual to receive payment instructions on their behalf by providing written notice of such change in accordance with Section XXVII (Notices and Submissions).

(2) Of the \$2,981,880 total amount to be paid by Principal Settling Defendants and Settling Federal Agencies pursuant to this Subparagraph "a" and Subparagraph "c," respectively:

- (a) \$2,878,962 shall be deposited in a segregated sub-account within the United States Department of the Interior's ("DOI's") Natural Resource Damage Assessment and Restoration Fund ("NRDAR Fund") to be used jointly by the Trustees to pay for Restoration Costs and Future NRD Assessment Costs in accordance with Subparagraph "d," below.
- (b) \$27,327 shall be deposited in the NRDAR Fund, to be applied toward Past NRD Assessment Costs incurred by DOI.



- (c) \$75,591 shall be deposited in NOAA's Damage Assessment and Restoration Revolving Fund, to be applied toward Past NRD Assessment Costs incurred by NOAA.

Upon making the payment to the United States required by this Paragraph, Principal Settling Defendants shall send written notice that the payment has been made to the following:

Department of the Interior  
NBC/Division of Financial Management Services  
Branch of Accounting Operations  
Mail Stop D-2777  
7401 W. Mansfield Ave.  
Lakewood, CO 80235

Chief, Environmental Enforcement Section  
Environment and Natural Resources Division  
U.S. Department of Justice  
P.O. Box 7611  
Washington, D.C. 20044-7611  
Re: DJ # 90-11-2-07465/2

and

Richard Seiler  
TCEQ, MC133  
P.O. Box 13087  
Austin, Texas 78711-3087  
Re: Malone NRDA

b. Payments for Past NRD Assessment Costs Incurred by the State.

(1) Within 30 days of the Effective Date, Principal Settling Defendants shall pay a total of \$127,120 for the Texas Trustees' Past NRD Assessment Costs in accordance with the following instructions:

- (a) Principal Settling Defendants shall pay by wire transfer in accordance with Paragraph 59.d, or mail a certified check in the amount of \$127,120, payable to the "State of Texas" and referencing "Malone NRD" and AG# 093138295." Of the \$127,120:
- \$80,628 shall be allocated to TCEQ;
  - \$29,773 shall be allocated to TPWD; and
  - \$16,719 shall be allocated to the TGLO.

The certified check in the amount of \$127,120 to the State of Texas for Past NRD Assessment Costs shall be mailed to:

Chief  
Environmental Protection Division

Texas Attorney General's Office (066)  
P.O. Box 12548  
Austin, Texas 78711-2548.

c. Payments by Settling Federal Agencies. As soon as reasonably practicable after the Effective Date, by Automated Clearing House Electronic Funds Transfer in accordance with instructions provided by the Financial Litigation Unit of the United States Attorney's Office for the Southern District of Texas, the United States Postal Service, on its own behalf, shall pay \$0.52 (fifty-two cents), and the United States, on behalf of the remaining Settling Federal Agencies, shall pay \$73,126.48, to the United States Attorney's Office in payment of Natural Resource Damages (Restoration Costs and Past and Future NRD Assessment Costs incurred and to be incurred by the United States and the State). The \$73,127 shall be deposited in the same segregated sub-account within DOI's NRDAR Fund described in Subparagraph "a.(2)(a)," above, to be used jointly by the Trustees in accordance with Subparagraph "d," below.

d. Use and Management of Funds in the NRDAR Segregated Sub-Account. All funds segregated in the sub-account of the NRDAR Fund pursuant to Subparagraph "a.(2)(a)," above (the "segregated sub-account") (to which the Principal Settling Defendants are to pay \$2,878,962 and the Settling Federal Agencies are to pay \$73,127), shall be held by the Department of the Interior on behalf of the Trustees and used only to reimburse the Trustees for Future NRD Assessment Costs and to restore, replace, rehabilitate, or acquire the equivalent of any natural resources or services injured, lost, or destroyed as a result of the release of hazardous substances at or from the Site (including the design, implementation, permitting (as necessary), monitoring, and oversight of restoration projects and compliance with the requirements of the law to conduct a restoration planning and implementation process). The Department of the Interior shall not make any charge against the segregated sub-account for any investment or management services provided and shall hold all funds in the segregated sub-account, including return on investments or accrued interest, subject to the provisions of this Consent Decree.

e. Decisions regarding the use of funds in the segregated sub-account shall be made jointly by the Trustees. The Natural Resource Trustees commit to the expenditure of all funds in the segregated sub-account (not otherwise used to reimburse the Trustees for Future Assessment Costs) for the design, implementation, permitting (as necessary), monitoring, and oversight of restoration projects and for the costs of complying with the requirements of the law to conduct a restoration planning and implementation process. The allocation of funds for specific projects or categories of projects will be contained in a Restoration Plan prepared and implemented jointly by the Trustees, for which public notice, opportunity for public input, and consideration of public comment will be provided. The Trustees jointly retain the ultimate authority and responsibility to use the funds in the segregated sub-account to restore natural resources in accordance with applicable law, this Consent Decree, and any memorandum or other agreement among them. No Settling Defendant shall be entitled to dispute, pursuant to this Consent Decree or in any other forum or proceeding, any decision relating to the use of funds in the segregated sub-account.

f. If any payment required by this Paragraph is not made within 30 days of the Effective date, Principal Settling Defendants shall pay a stipulated penalty of \$1,000 per day for the first through the 30<sup>th</sup> day of noncompliance and \$2,000 per day for the 31<sup>st</sup> and subsequent

days of noncompliance. Stipulated penalties shall be paid 50% to the State and 50% to the United States, in accordance with the payment instructions in this Paragraph, Subparagraphs “a” and “b.”

#### XVII. DISBURSEMENT OF SPECIAL ACCOUNT FUNDS

63. Creation of MSC Site Disbursement Special Account and Agreement to Disburse Funds to Principal Settling Defendants. Within 30 days after the Effective Date, EPA shall establish the MSC Site Disbursement Special Account and shall transfer \$5,800,000 from the MSC Site Special Account to the MSC Site Disbursement Special Account. Subject to the terms and conditions set forth in this Section, EPA agrees to make funds in the MSC Site Disbursement Special Account, including the appropriate share of the Interest Earned on the funds in the MSC Site Disbursement Special Account, available for disbursement to Principal Settling Defendants as partial reimbursement for performance of the Work under this Consent Decree. EPA shall disburse funds from the MSC Site Disbursement Special Account to Principal Settling Defendants in accordance with the procedures and milestones for phased disbursement set forth in this Section.

64. Timing, Amount, and Method of Disbursing Funds From the MSC Site Disbursement Special Account. Within 120 days of EPA’s receipt of Principal Settling Defendants’ Cost Summary and Certification, as defined by Paragraph [65.b](#), or if EPA has requested additional information under Paragraph [65.b](#) or a revised Cost Summary and Certification under Paragraph [65.c](#), within 120 days of receipt of the additional information or revised Cost Summary and Certification, and subject to the conditions set forth in this Section, EPA shall disburse the funds from the MSC Site Disbursement Special Account at the completion of the following milestones, and in the amounts set forth below:

<u>Milestone</u>	<u>Disbursement of Funds</u>
1. Completion of All Activities in Phase One of the Work	\$700,00 from the MSC Site Disbursement Special Account
2. Completion of All Activities in Phase Two of the Work	\$2,000,000 from the MSC Site Disbursement Special Account
3. EPA Certification of Completion of the Remedial Action	<p>\$1,800,000 from the MSC Site Disbursement Special Account, plus 71% of the interest accrued on the MSC Site Disbursement Special Account.</p> <p>If, however, the Principal Settling Defendants incur costs greater than \$56,400,000 on the Work, EPA shall disburse from the MSC Site Disbursement Special Account to the Principal Settling Defendants (i) 50% of those costs incurred by Principal Settling Defendants that exceed \$56,400,000 up to an additional disbursement of \$1,300,000, and (ii) the proportionate share of the accrued interest remaining in the Account after the payout of the 71% of the accrued interest.<sup>1</sup> In no event shall EPA disburse more than \$5,800,000, plus interest, to the Principal Settling Defendants.</p>

EPA shall disburse the funds from the MSC Site Disbursement Special Account to Principal Settling Defendants pursuant to instructions for electronic funds transfer, which the Principal Settling Defendants shall provide to EPA no later than the day the Principal Settling Defendants submit their Cost Summary and Certification to EPA.

65. Requests for Disbursement of Special Account Funds.

a. Within 120 days of issuance of EPA's written confirmation that a milestone of the Work, as defined in Paragraph [64](#), has been satisfactorily completed, Principal Settling Defendants shall submit to EPA a Cost Summary and Certification, as defined in Paragraph [65.b](#), covering the Work performed pursuant to this Consent Decree up to the date of completion of that milestone. Principal Settling Defendants shall not include in any submission costs included in a previous Cost Summary and Certification following completion of an earlier milestone of the Work if those costs have been previously sought or reimbursed pursuant to Paragraph [64](#).

b. Each Cost Summary and Certification shall include a complete and accurate written cost summary and certification of the necessary costs incurred and paid by Principal Settling Defendants for the Work covered by the particular submission, excluding costs not eligible for disbursement under Paragraph [66](#). Each Cost Summary and Certification shall contain the following statement signed by the Chief Financial Officer of a Principal Settling Defendant,

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<sup>1</sup> For example, if the Principal Settling Defendants ("PSDs") incur costs of \$58,720,000 on the Work, that would be \$2,320,000 more than \$56,400,000. In addition to the payment of \$1,800,000 triggered by Milestone Number 3, the PSDs would also receive \$1,160,000 (½ of the \$2,320,000). The interest payment on the \$1,160,000 would be 20% of the remaining interest ( $1,160,000 \div 5,800,000 = 0.2$ ).

an Independent Certified Public Accountant, or another independent person acceptable to EPA (in EPA's unreviewable discretion):

To the best of my knowledge, after thorough investigation and review of Principal Settling Defendants' documentation of costs incurred and paid for Work performed pursuant to this Consent Decree [**insert, as appropriate:** "up to the date of completion of milestone 1," "between the date of completion of milestone 1 and the date of completion of milestone 2," "between the date of completion of milestone 2 and the date of completion of milestone 3."] I certify that the information contained in or accompanying this submission is true, accurate, and complete. I am aware that there are significant penalties for knowingly submitting false information, including the possibility of fine and imprisonment.

The Chief Financial Officer of a Principal Settling Defendant, Independent Certified Public Accountant, or other independent person acceptable to EPA (in EPA's unreviewable discretion) shall also provide EPA a list of the documents that he or she reviewed in support of the Cost Summary and Certification. Upon request by EPA, Principal Settling Defendants shall submit to EPA any additional information that EPA deems necessary for its review and approval of a Cost Summary and Certification.

c. If EPA finds that a Cost Summary and Certification includes a mathematical error, costs excluded under Paragraph 66, costs that are inadequately documented, or costs submitted in a prior Cost Summary and Certification, it will notify Principal Settling Defendants and provide them an opportunity to cure the deficiency by submitting a revised Cost Summary and Certification. If Principal Settling Defendants fail to cure the deficiency within 30 days after being notified of, and given the opportunity to cure, the deficiency, EPA will recalculate Principal Settling Defendants' costs eligible for disbursement for that submission and disburse the corrected amount to Principal Settling Defendants in accordance with the procedures in Paragraph 64 of this Section. Principal Settling Defendants may dispute EPA's recalculation under this Paragraph pursuant to Section XX (Dispute Resolution). In no event shall Principal Settling Defendants be disbursed funds from the MSC Site Disbursement Special Account in excess of amounts properly documented in a Cost Summary and Certification accepted or modified by EPA.

66. Costs Excluded from Disbursement. The following costs are excluded from, and shall not be sought by Principal Settling Defendants for, disbursement from the MSC Site Disbursement Special Account: (a) response costs paid pursuant to Section XVI (Payments for Response Costs, NRD, & NRD Assessment Costs); (b) any other payments made by Principal Settling Defendants to the United States pursuant to this Consent Decree, including, but not limited to, any interest or stipulated penalties paid pursuant to Section XXI (Stipulated Penalties); (c) attorneys' fees and costs, except for reasonable attorneys' fees and costs necessarily related to obtaining access or institutional controls as required by Section IX (Access and Institutional Controls); (d) costs of any response activities Principal Settling Defendants perform that are not required under, or approved by EPA pursuant to, this Consent Decree; (e) costs related to Principal Settling Defendants' litigation, settlement, development of potential contribution claims, or identification of defendants; (f) internal costs of Principal Settling Defendants, including but not limited to, salaries, travel, or in-kind services, except for those costs that represent the work of employees of Principal Settling Defendants directly performing the Work; (g) any costs incurred

by Principal Settling Defendants prior to the date of lodging (except that cemetery relocation costs incurred prior to the date of lodging are not excluded from disbursement); or (h) any costs incurred by Principal Settling Defendants pursuant to Section XX (Dispute Resolution).

67. Termination of Disbursements from the Special Account. EPA's obligation to disburse funds from the MSC Site Disbursement Special Account under this Consent Decree shall terminate upon EPA's determination that Principal Settling Defendants: (a) have knowingly submitted a materially false or misleading Cost Summary and Certification; (b) have submitted a materially inaccurate or incomplete Cost Summary and Certification, and have failed to correct the materially inaccurate or incomplete Cost Summary and Certification within 30 days after being notified of, and given the opportunity to cure, the deficiency; or (c) failed to submit a Cost Summary and Certification as required by Paragraph [65](#) within 120 days (or such longer period as EPA agrees) after being notified that EPA intends to terminate its obligation to make disbursements pursuant to this Section because of Principal Settling Defendants' failure to submit the Cost Summary and Certification as required by Paragraph [65](#). EPA's obligation to disburse funds from the MSC Site Disbursement Special Account shall also terminate upon EPA's assumption of performance of any portion of the Work pursuant to Paragraph [103](#), when such assumption of performance of the Work is not challenged by Principal Settling Defendants or, if challenged, is upheld under Section XX (Dispute Resolution). Principal Settling Defendants may dispute EPA's termination of special account disbursements under Section XX (Dispute Resolution).

68. Recapture of Special Account Disbursements. Upon termination of disbursements from the MSC Site Disbursement Special Account under Paragraph [67](#), if EPA has previously disbursed funds from the MSC Site Disbursement Special Account for activities specifically related to the reason for termination, e.g., discovery of a materially false or misleading submission after disbursement of funds based on that submission, EPA shall submit a bill to Principal Settling Defendants for those amounts already disbursed from the MSC Site Disbursement Special Account specifically related to the reason for termination, plus Interest on that amount covering the period from the date of disbursement of the funds by EPA to the date of repayment of the funds by Principal Settling Defendants. Within 30 days of receipt of EPA's bill, Principal Settling Defendants shall reimburse the Hazardous Substance Superfund for the total amount billed. Payment shall be made in accordance with Paragraphs [59.b](#) and [59.c](#). Upon receipt of payment, EPA may deposit all or any portion thereof in the MSC Site Special Account, the MSC Site Disbursement Special Account, or the Hazardous Substance Superfund. The determination of where to deposit or how to use the funds shall not be subject to challenge by Principal Settling Defendants pursuant to the dispute resolution provisions of this Consent Decree or in any other forum. Principal Settling Defendants may dispute EPA's determination as to recapture of funds pursuant to Section XX (Dispute Resolution).

69. Balance of Special Account Funds. After EPA issues its written Certification of Completion of the Remedial Action pursuant to this Consent Decree, and after EPA completes all disbursement to Principal Settling Defendants in accordance with this Section, if any funds remain in the MSC Site Disbursement Special Account, EPA may transfer such funds to the MSC Site Special Account or to the Hazardous Substance Superfund. Any transfer of funds to the MSC Site Special Account or the Hazardous Substance Superfund shall not be subject to challenge by

Principal Settling Defendants pursuant to the dispute resolution provisions of this Consent Decree or in any other forum.

#### XVIII. INDEMNIFICATION AND INSURANCE

70. Principal Settling Defendants' Indemnification of the United States and the State.

a. The United States and the State do not assume any liability by entering into this Consent Decree or by virtue of any designation of Principal Settling Defendants as EPA's authorized representatives under Section 104(e) of CERCLA, 42 U.S.C. § 9604(e). Principal Settling Defendants shall indemnify, save and hold harmless the United States, the State, and their officials, agents, employees, contractors, subcontractors, or representatives for or from any and all claims or causes of action arising from, or on account of, negligent or other wrongful acts or omissions of Principal Settling Defendants, their officers, directors, employees, agents, contractors, subcontractors, and any persons acting on their behalf or under their control, in carrying out activities pursuant to this Consent Decree, including, but not limited to, any claims arising from any designation of Principal Settling Defendants as EPA's authorized representatives under Section 104(e) of CERCLA. Further, Principal Settling Defendants agree to pay the United States and the State all costs they incur including, but not limited to, attorneys' fees and other expenses of litigation and settlement arising from, or on account of, claims made against the United States or the State based on negligent or other wrongful acts or omissions of Principal Settling Defendants, their officers, directors, employees, agents, contractors, subcontractors, and any persons acting on their behalf or under their control, in carrying out activities pursuant to this Consent Decree. Neither the United States nor the State shall be held out as a party to any contract entered into by or on behalf of Principal Settling Defendants in carrying out activities pursuant to this Consent Decree. Neither Principal Settling Defendants nor any such contractor shall be considered an agent of the United States or the State.

b. The United States and the State shall give Principal Settling Defendants notice of any claim for which the United States or the State plans to seek indemnification pursuant to Paragraph [70](#), and shall consult with Principal Settling Defendants prior to settling such claim.

71. Principal Settling Defendants covenant not to sue and agree not to assert any claims or causes of action against the United States and the State for damages or reimbursement or for set-off of any payments made or to be made to the United States or the State, arising from or on account of any contract, agreement, or arrangement between any one or more of Principal Settling Defendants and any person for performance of Work on or relating to the Site, including, but not limited to, claims on account of construction delays. In addition, Principal Settling Defendants shall indemnify and hold harmless the United States and the State with respect to any and all claims for damages or reimbursement arising from or on account of any contract, agreement, or arrangement between any one or more of Principal Settling Defendants and any person for performance of Work on or relating to the Site, including, but not limited to, claims on account of construction delays.

72. No later than 15 days before commencing any on-Site Work, Principal Settling Defendants shall secure, and shall maintain until the first anniversary of EPA's Certification of Completion of the Remedial Action pursuant to Paragraph [51.b](#) of Section XIV (Certification of Completion) commercial general liability insurance with limits of \$5 million dollars, for any one occurrence, and automobile liability insurance with limits of \$2 million dollars, for any one

occurrence, naming the United States and the State as additional insureds with respect to all liability arising out of the activities performed by or on behalf of Principal Settling Defendants pursuant to this Consent Decree. In addition, for the duration of this Consent Decree, Principal Settling Defendants shall satisfy, or shall ensure that their contractors or subcontractors satisfy, all applicable laws and regulations regarding the provision of worker's compensation insurance for all persons performing the Work on behalf of Principal Settling Defendants in furtherance of this Consent Decree. Prior to commencement of the Work under this Consent Decree, Principal Settling Defendants shall provide to EPA and the State certificates of such insurance and a copy of each insurance policy. Principal Settling Defendants shall resubmit such certificates and copies of policies each year on the anniversary of the Effective Date. If Principal Settling Defendants demonstrate by evidence satisfactory to EPA and the State that any contractor or subcontractor maintains insurance equivalent to that described above, or insurance covering the same risks but in a lesser amount, then, with respect to that contractor or subcontractor, Principal Settling Defendants need provide only that portion of the insurance described above that is not maintained by the contractor or subcontractor.

#### XIX. FORCE MAJEURE

73. "Force majeure," for purposes of this Consent Decree, is defined as any event arising from causes beyond the control of Principal Settling Defendants, of any entity controlled by Principal Settling Defendants, or of Principal Settling Defendants' contractors, that delays or prevents the performance of any obligation under this Consent Decree (other than an obligation to pay any sum due for NRD or response costs) despite Principal Settling Defendants' best efforts to fulfill the obligation. The requirement that Principal Settling Defendants exercise "best efforts to fulfill the obligation" includes using best efforts to anticipate any potential force majeure and best efforts to address the effects of any potential force majeure (1) as it is occurring and (2) following the potential force majeure such that the delay and any adverse effects of the delay are minimized to the greatest extent possible. "Force majeure" does not include financial inability to complete the Work or a failure to achieve the Performance Standards.

74. If any event occurs or has occurred that may delay the performance of any obligation under this Consent Decree for which Principal Settling Defendants intend or may intend to assert a claim of force majeure, Principal Settling Defendants shall notify orally EPA's Project Coordinator or, in his or her absence, EPA's Alternate Project Coordinator or, in the event both of EPA's designated representatives are unavailable, the Director of the Superfund Division, EPA Region 6, within 48 hours of when Principal Settling Defendants first knew that the event might cause a delay. Within five days thereafter, Principal Settling Defendants shall provide in writing to EPA and the State an explanation and description of the reasons for the delay; the anticipated duration of the delay; all actions taken or to be taken to prevent or minimize the delay; a schedule for implementation of any measures to be taken to prevent or mitigate the delay or the effect of the delay; Principal Settling Defendants' rationale for attributing such delay to a force majeure; and a statement as to whether, in the opinion of Principal Settling Defendants, such event may cause or contribute to an endangerment to public health or welfare, or the environment. Principal Settling Defendants shall include with any notice all available documentation supporting their claim that the delay was attributable to a force majeure. Principal Settling Defendants shall be deemed to know of any circumstance of which Principal Settling Defendants, any entity controlled by Principal Settling Defendants, or Principal Settling Defendants' contractors knew or



should have known. Failure to comply with the above requirements regarding an event shall preclude Principal Settling Defendants from asserting any claim of force majeure regarding that event, provided, however, that if EPA, despite the late notice, is able to assess to its satisfaction whether the event is a force majeure under Paragraph 73 and whether Principal Settling Defendants have exercised their best efforts under Paragraph 73, EPA may, in its unreviewable discretion, excuse in writing Principal Settling Defendants' failure to submit timely notices under this Paragraph.

75. If EPA, after a reasonable opportunity for review and comment by the State, agrees that the delay or anticipated delay is attributable to a force majeure, the time for performance of the obligations under this Consent Decree that are affected by the force majeure will be extended by EPA for such time as is necessary to complete those obligations. An extension of the time for performance of the obligations affected by the force majeure shall not, of itself, extend the time for performance of any other obligation. If EPA, after a reasonable opportunity for review and comment by the State, does not agree that the delay or anticipated delay has been or will be caused by a force majeure, EPA will notify Principal Settling Defendants in writing of its decision. If EPA, after a reasonable opportunity for review and comment by the State, agrees that the delay is attributable to a force majeure, EPA will notify Principal Settling Defendants in writing of the length of the extension, if any, for performance of the obligations affected by the force majeure.

76. If Principal Settling Defendants elect to invoke the dispute resolution procedures set forth in Section XX (Dispute Resolution), they shall do so no later than 15 days after receipt of EPA's notice. In any such proceeding, Principal Settling Defendants shall have the burden of demonstrating by a preponderance of the evidence that the delay or anticipated delay has been or will be caused by a force majeure, that the duration of the delay or the extension sought was or will be warranted under the circumstances, that best efforts were exercised to avoid and mitigate the effects of the delay, and that Principal Settling Defendants complied with the requirements of Paragraphs 73 and 74. If Principal Settling Defendants carry this burden, the delay at issue shall be deemed not to be a violation by Principal Settling Defendants of the affected obligation of this Consent Decree identified to EPA and the Court.

## XX. DISPUTE RESOLUTION

77. Unless otherwise expressly provided for in this Consent Decree, the dispute resolution procedures of this Section shall be the exclusive mechanism to resolve disputes regarding this Consent Decree. However, the procedures set forth in this Section shall not apply to actions by the United States to enforce obligations of Settling Defendants that have not been disputed in accordance with this Section.

78. Any dispute regarding this Consent Decree shall in the first instance be the subject of informal negotiations between the parties to the dispute. The period for informal negotiations shall not exceed 20 days from the time the dispute arises, unless it is modified by written agreement of the parties to the dispute. The dispute shall be considered to have arisen when one party sends the other parties a written Notice of Dispute.

### 79. Statements of Position.

a. In the event that the parties cannot resolve a dispute by informal negotiations under the preceding Paragraph, then the position advanced by EPA shall be

considered binding unless, within 14 days after the conclusion of the informal negotiation period, Principal Settling Defendants invoke the formal dispute resolution procedures of this Section by serving on the United States and the State a written Statement of Position on the matter in dispute, including, but not limited to, any factual data, analysis or opinion supporting that position and any supporting documentation relied upon by Principal Settling Defendants. The Statement of Position shall specify Principal Settling Defendants' position as to whether formal dispute resolution should proceed under Paragraph [80](#) or Paragraph [81](#).

b. Within 20 days after receipt of Principal Settling Defendants' Statement of Position, EPA will serve on Principal Settling Defendants its Statement of Position, including, but not limited to, any factual data, analysis, or opinion supporting that position and all supporting documentation relied upon by EPA. EPA's Statement of Position shall include a statement as to whether formal dispute resolution should proceed under Paragraph [80](#) or [81](#). Within ten days after receipt of EPA's Statement of Position, Principal Settling Defendants may submit a Reply.

c. If there is disagreement between EPA and Principal Settling Defendants as to whether dispute resolution should proceed under Paragraph [80](#) or [81](#), the parties to the dispute shall follow the procedures set forth in the paragraph determined by EPA to be applicable. However, if Principal Settling Defendants ultimately appeal to the Court to resolve the dispute, the Court shall determine which paragraph is applicable in accordance with the standards of applicability set forth in Paragraphs [80](#) and [81](#).

80. Record Review. Formal dispute resolution for disputes pertaining to the selection or adequacy of any response action and all other disputes that are accorded review on the administrative record under applicable principles of administrative law shall be conducted pursuant to the procedures set forth in this Paragraph. For purposes of this Paragraph, the adequacy of any response action includes, without limitation, the adequacy or appropriateness of plans, procedures to implement plans, or any other items requiring approval by EPA under this Consent Decree, and the adequacy of the performance of response actions taken pursuant to this Consent Decree. Nothing in this Consent Decree shall be construed to allow any dispute by Principal Settling Defendants regarding the validity of the ROD's provisions.

a. An administrative record of the dispute shall be maintained by EPA and shall contain all statements of position, including supporting documentation, submitted pursuant to this Section. Where appropriate, EPA may allow submission of supplemental statements of position by the parties to the dispute.

b. The Director of the Superfund Division, EPA Region 6, will issue a final administrative decision resolving the dispute based on the administrative record described in Paragraph [80.a](#). This decision shall be binding upon Principal Settling Defendants, subject only to the right to seek judicial review pursuant to Paragraphs [80.c](#) and [80.d](#).

c. Any administrative decision made by EPA pursuant to Paragraph [80.b](#) shall be reviewable by this Court, provided that a motion for judicial review of the decision is filed by Principal Settling Defendants with the Court and served on all Parties within fourteen days of receipt of EPA's decision. The motion shall include a description of the matter in dispute, the efforts made by the parties to resolve it, the relief requested, and the schedule, if any, within which the dispute must be resolved to ensure orderly implementation of this Consent Decree. The United States may file a response to Principal Settling Defendants' motion.

d. In proceedings on any dispute governed by this Paragraph, Principal Settling Defendants shall have the burden of demonstrating that the decision of the Superfund Division Director is arbitrary and capricious or otherwise not in accordance with law. Judicial review of EPA's decision shall be on the administrative record compiled pursuant to Paragraph [80.a](#).

81. Formal dispute resolution for disputes that neither pertain to the selection or adequacy of any response action nor are otherwise accorded review on the administrative record under applicable principles of administrative law, shall be governed by this Paragraph.

a. Following receipt of Principal Settling Defendants' Statement of Position submitted pursuant to Paragraph [79](#), the Director of the Superfund Division, EPA Region 6, will issue a final decision resolving the dispute. The Superfund Division Director's decision shall be binding on Principal Settling Defendants unless, within fourteen (14) days of receipt of the decision, Principal Settling Defendants file with the Court and serve on the parties a motion for judicial review of the decision setting forth the matter in dispute, the efforts made by the parties to resolve it, the relief requested, and the schedule, if any, within which the dispute must be resolved to ensure orderly implementation of the Consent Decree. The United States may file a response to Principal Settling Defendants' motion.

b. Notwithstanding Paragraph N (regarding CERCLA Section 113(j) Record Review of ROD and Work) of Section I (Background), judicial review of any dispute governed by this Paragraph shall be governed by applicable principles of law.

82. The invocation of formal dispute resolution procedures under this Section shall not extend, postpone, or affect in any way any obligation of Principal Settling Defendants under this Consent Decree, not directly in dispute, unless EPA or the Court agrees otherwise. Stipulated penalties with respect to the disputed matter shall continue to accrue but payment shall be stayed pending resolution of the dispute as provided in Paragraph [90](#). Notwithstanding the stay of payment, stipulated penalties shall accrue from the first day of noncompliance with any applicable provision of this Consent Decree. In the event that Principal Settling Defendants do not prevail on the disputed issue, stipulated penalties shall be assessed and paid as provided in Section XXI (Stipulated Penalties).

## XXI. STIPULATED PENALTIES

83. With the exception of noncompliance for which a stipulated penalty is due under Paragraph [62](#) (Payments for NRD), Principal Settling Defendants shall be liable for stipulated penalties in the amounts set forth in Paragraphs [84](#) and [85](#) to the United States for failure to comply with the requirements of this Consent Decree, unless excused under Section XIX (Force Majeure). "Compliance" by Principal Settling Defendants shall include completion of all payments and activities required under this Consent Decree, or any plan, report, or other deliverable approved under this Consent Decree, in accordance with all applicable requirements of law, this Consent Decree, the SOW, and any plans, reports, or other deliverables approved under this Consent Decree and within the specified time schedules established by and approved under this Consent Decree.

84. Stipulated Penalty Amounts - Other Than Monthly Progress Reports.

a. The following stipulated penalties shall accrue per violation per day for each failure to complete a deliverable in a timely manner or produce a deliverable of acceptable quality, or for any other non-compliance with this Consent Decree with the exception of monthly progress reports as described in Paragraph 85:

<u>Penalty Per Violation Per Day</u>	<u>Period of Noncompliance</u>
\$1000	1st through 14th day
\$2000	15th through 30th day
\$4000	31st day and beyond

85. Stipulated Penalty Amounts - Monthly Progress Reports. The following stipulated penalties shall accrue per violation per day for failure to submit timely or adequate monthly progress reports pursuant to Paragraph 32:

<u>Penalty Per Violation Per Day</u>	<u>Period of Noncompliance</u>
\$800	1st through 14th day
\$1000	15th through 30th day
\$2000	31st day and beyond

86. In the event that EPA assumes performance of a portion or all of the Work pursuant to Paragraph [103](#) (Work Takeover), Principal Settling Defendants shall be liable for a stipulated penalty in the amount of \$100,000. Stipulated penalties under this Paragraph are in addition to the remedies available under Paragraphs [49](#) (Funding for Work Takeover) and [103](#) (Work Takeover).

87. All penalties shall begin to accrue on the day after the complete performance is due or the day a violation occurs, and shall continue to accrue through the final day of the correction of the noncompliance or completion of the activity. However, stipulated penalties shall not accrue: (a) with respect to a deficient submission under Section XI (EPA Approval of Plans, Reports, and Other Deliverables), during the period, if any, beginning on the 31st day after EPA's receipt of such submission until the date that EPA notifies Principal Settling Defendants of any deficiency; (b) with respect to a decision by the Director of the Superfund Division, EPA Region 6, under Paragraph [80.b](#) or [81.a](#) of Section XX (Dispute Resolution), during the period, if any, beginning on the 21st day after the date that Principal Settling Defendants' Reply to EPA's Statement of Position is received until the date that the Director issues a final decision regarding such dispute; or (c) with respect to judicial review by this Court of any dispute under Section XX (Dispute Resolution), during the period, if any, beginning on the 31st day after the Court's receipt of the final submission regarding the dispute until the date that the Court issues a final decision regarding such dispute. Nothing in this Consent Decree shall prevent the simultaneous accrual of separate penalties for separate violations of this Consent Decree.

88. Following EPA's determination that Principal Settling Defendants have failed to comply with a requirement of this Consent Decree, EPA may give Principal Settling Defendants written notification of the same and describe the noncompliance. EPA may send Principal

Settling Defendants a written demand for the payment of the penalties. However, penalties shall accrue as provided in the preceding Paragraph regardless of whether EPA has notified Principal Settling Defendants of a violation.

89. All penalties accruing under this Section shall be due and payable to the United States within 30 days of Principal Settling Defendants' receipt from EPA of a demand for payment of the penalties, unless Principal Settling Defendants invoke the Dispute Resolution procedures under Section XX (Dispute Resolution) within the 30-day period. All payments to the United States under this Section shall indicate that the payment is for stipulated penalties, and shall be made in accordance with Paragraphs [59.b](#) and [59.c](#) (Payment Instructions).

90. Penalties shall continue to accrue as provided in Paragraph [87](#) during any dispute resolution period, but need not be paid until the following:

a. If the dispute is resolved by agreement of the Parties or by a decision of EPA that is not appealed to this Court, accrued penalties determined to be owed shall be paid to EPA within 60 days of the agreement or the receipt of EPA's decision or order;

b. If the dispute is appealed to this Court and the United States prevails in whole or in part, Principal Settling Defendants shall pay all accrued penalties determined by the Court to be owed to EPA within 60 days of receipt of the Court's decision or order, except as provided in Paragraph [90.c](#);

c. If the District Court's decision is appealed by any Party, Principal Settling Defendants shall pay all accrued penalties determined by the District Court to be owed to the United States into an interest-bearing escrow account within 60 days of receipt of the Court's decision or order. Penalties shall be paid into this account as they continue to accrue, at least every 60 days. Within 15 days of receipt of the final appellate court decision, the escrow agent shall pay the balance of the account to EPA or to Principal Settling Defendants to the extent that they prevail.

91. If Principal Settling Defendants fail to pay stipulated penalties when due, Principal Settling Defendants shall pay Interest on the unpaid stipulated penalties as follows: (a) if Principal Settling Defendants have timely invoked dispute resolution such that the obligation to pay stipulated penalties has been stayed pending the outcome of dispute resolution, Interest shall accrue from the date stipulated penalties are due pursuant to Paragraph [90](#) until the date of payment; and (b) if Principal Settling Defendants fail to timely invoke dispute resolution, Interest shall accrue from the date of demand under Paragraph [89](#) until the date of payment. If Principal Settling Defendants fail to pay stipulated penalties and Interest when due, the United States may institute proceedings to collect the penalties and Interest.

92. The payment of penalties and Interest, if any, shall not alter in any way Principal Settling Defendants' obligation to complete the performance of the Work required under this Consent Decree.

93. Nothing in this Consent Decree shall be construed as prohibiting, altering, or in any way limiting the ability of the United States or the State to seek any other remedies or sanctions available by virtue of Settling Defendants' violation of this Consent Decree or of the statutes and regulations upon which it is based, including, but not limited to, penalties pursuant to Section 122(l) of CERCLA, 42 U.S.C. § 9622(l), provided, however, that the United States shall

not seek civil penalties pursuant to Section 122(l) of CERCLA for any violation for which a stipulated penalty is provided in this Consent Decree, except in the case of a willful violation of this Consent Decree.

94. Notwithstanding any other provision of this Section, the United States may, in its unreviewable discretion, waive any portion of stipulated penalties that have accrued pursuant to this Consent Decree.

## XXII. COVENANTS BY PLAINTIFFS

95. a. Covenants for Principal Settling Defendants, Major Cashout Settling Defendants, and/or Owner Settling Defendant by United States. In consideration of the actions that will be performed and the payments that will be made by or on behalf of Principal Settling Defendants, Major Cashout Settling Defendants, and/or Owner Settling Defendant under this Consent Decree, and except as specifically provided in Paragraphs [97](#), [98](#), [100](#), and [102](#) the United States covenants not to sue or to take administrative action against Principal Settling Defendants, Major Cashout Settling Defendants, and/or Owner Settling Defendant pursuant to Sections 106 and 107(a) of CERCLA, Sections 311(f)(4) and (5) of the FWPCA, and Section 7003 of RCRA relating to the Site. Except with respect to future liability, these covenants shall take effect upon the receipt by EPA of the payments required by Paragraph [55.a](#) (Payments for Past Response Costs) and any Interest or stipulated penalties due thereon under Paragraph [61](#) (Interest) or Section XXI (Stipulated Penalties), and the receipt by NOAA and the FWS of the NRD payments required by, and any stipulated penalties due under, Paragraph [62](#). With respect to future liability, these covenants shall take effect upon Certification of Completion of Remedial Action by EPA pursuant to Paragraph [51.b](#) of Section XIV (Certification of Completion). These covenants are conditioned upon the satisfactory performance by Principal Settling Defendants, Major Cashout Settling Defendants, and Owner Settling Defendant of their obligations under this Consent Decree. These covenants extend only to Principal Settling Defendants, Major Cashout Settling Defendants, and Owner Settling Defendant and do not extend to any other person.

b. Covenants for Principal Settling Defendants, Major Cashout Settling Defendants, and/or Owner Settling Defendant by the State. In consideration of the actions that will be performed and the payments that will be made by or on behalf of Principal Settling Defendants, Major Cashout Settling Defendants, and/or Owner Settling Defendant under this Consent Decree, and except as specifically provided in Paragraphs [97](#), [98](#), [100](#), and [102](#) the State covenants not to sue or to take administrative action relating to the Site against Principal Settling Defendants, Major Cashout Settling Defendants, or Owner Settling Defendant pursuant to Section 107(a) of CERCLA; Sections 311(f)(4) and (5) of the FWPCA; Section 7002 of RCRA; subchapters F–L of the Texas Solid Waste Disposal Act, Tex. Health & Safety Code §§ 361.181–361.345; Texas Water Code §§ 26.261–.267; or state common law. Except with respect to future liability, these covenants shall take effect upon the receipt by the State of the payments required by Paragraph [55.d](#) (Payment by Settling Defendants for Past Response Costs) any Interest or stipulated penalties due thereon under Paragraph [61](#) (Interest) or Section XXI (Stipulated Penalties), and the receipt by the Texas Trustees of the NRD payments required by, and any stipulated penalties due under, Paragraph [62](#). With respect to future liability, these covenants shall take effect upon Certification of Completion of Remedial Action by EPA pursuant to Paragraph [51.b](#) of Section XIV (Certification of Completion). These covenants are conditioned upon the satisfactory performance by Principal Settling Defendants, Major Cashout Settling

Defendants, and Owner Settling Defendant of their obligations under this Consent Decree. These covenants extend only to Principal Settling Defendants, Major Cashout Settling Defendants, and Owner Settling Defendant and do not extend to any other person.

c. Covenant for De Minimis Cashout Settling Defendants by United States. In consideration of the payments that will be made by or on behalf of De Minimis Cashout Settling Defendants under the terms of this Consent Decree, and except as specifically provided in Paragraph [101](#) (Reservation of Rights by United States and State As to De Minimis Cashout Settling Defendants), the United States covenants not to sue or take administrative action against De Minimis Cashout Settling Defendants pursuant to Sections 106 or 107 of CERCLA, Sections 311(f)(4) and (5) of the FWPCA, and Section 7003 of RCRA relating to the Site. This covenant not to sue shall take effect upon receipt of the payment required by Section XVI (Payments for Response Costs, NRD, & NRD Assessment Costs). With respect to each De Minimis Cashout Settling Defendant, individually, this covenant not to sue is conditioned upon:

(i) the satisfactory performance by De Minimis Cashout Settling Defendant of all applicable obligations under this Consent Decree; and

(ii) the accuracy of the information obtained by EPA relating to De Minimis Cashout Settling Defendant's involvement with the Site. In addition, if information is later obtained that indicates that a De Minimis Cashout Settling Defendant contributed 0.6% or more of the total volume of the waste sent to the Site, these covenants not to sue shall no longer be in effect. This covenant not to sue extends only to De Minimis Cashout Settling Defendants and does not extend to any other person.

d. Covenant for De Minimis Cashout Settling Defendants by the State. In consideration of the payments that will be made by or on behalf of De Minimis Cashout Settling Defendants under this Consent Decree, and except as specifically provided in Paragraph [101](#) (Reservation of Rights by United States and State As to De Minimis Cashout Settling Defendants), the State covenants not to sue or to take administrative action relating to the Site against De Minimis Cashout Settling Defendants pursuant to Section 107(a) of CERCLA; Sections 311(f)(4) and (5) of the FWPCA; Section 7002 of RCRA; subchapters F–L of the Texas Solid Waste Disposal Act, Tex. Health & Safety Code §§ 361.181–361.345; Texas Water Code §§ 26.261–.267; or state common law. This covenant not to sue shall take effect upon receipt of the payment required by Section XVI (Payments for Response Costs, NRD, & NRD Assessment Costs). With respect to each De Minimis Cashout Settling Defendant, individually, this covenant not to sue is conditioned upon:

(i) the satisfactory performance by De Minimis Cashout Settling Defendant of all applicable obligations under this Consent Decree; and

(ii) the accuracy of the information obtained by the State relating to De Minimis Cashout Settling Defendant's involvement with the Site. In addition, if information is later obtained that indicates that a De Minimis Cashout Settling Defendant contributed 0.6% or more of the total volume of the waste sent to the Site, these covenants not to sue shall no longer be in effect. This covenant not to sue extends only to De Minimis Cashout Settling Defendants and does not extend to any other person.

96. Covenant for Settling Federal Agencies.

a. Covenant by EPA. In consideration of the payments that will be made by the United States Postal Service and the United States on behalf of Settling Federal Agencies under this Consent Decree, and except as specifically provided in Paragraphs [97](#), [98](#), and [100](#), EPA covenants not to take administrative action against Settling Federal Agencies pursuant to Sections 106 and 107(a) of CERCLA or Section 7003 of RCRA relating to the Site. Except with respect to future liability, EPA's covenant shall take effect upon the issuance of the payment required by Paragraph [57.a](#) (Payments by Settling Federal Agencies – Payment to Principal Settling Defendants) and any Interest due thereon under Paragraph [57](#). With respect to future liability, EPA's covenant shall take effect upon Certification of Completion of Remedial Action by EPA pursuant to Paragraph [51.b](#) of Section XIV (Certification of Completion). EPA's covenant is conditioned upon the satisfactory performance by Settling Federal Agencies of their obligations under this Consent Decree. EPA's covenant extends only to Settling Federal Agencies and does not extend to any other person.

b. Covenant by the State. In consideration of the payments that will be made by the United States Postal Service and the United States on behalf of Settling Federal Agencies under this Consent Decree, and except as specifically provided in Paragraphs [97](#), [98](#), [100](#), and [102](#) the State covenants not to sue or take administrative action relating to the Site against the Settling Federal Agencies pursuant to Section 107(a) of CERCLA; Sections 311(f)(4) and (5) of the FWPCA; Section 7002 of RCRA; subchapters F–L of the Texas Solid Waste Disposal Act, Tex. Health & Safety Code §§ 361.181–361.345; Texas Water Code §§ 26.261–.267; or state common law. Except with respect to future liability, the State's covenant shall take effect upon the receipt by the State of the payment required by Paragraph [57.b](#) (Payments by Settling Federal Agencies – Payment to the State) and any Interest due thereon under Paragraph [57](#), and the receipt by the United States Attorney's Office of the payment required by Paragraph [62.c](#) (Payments for NRD – Payments by Settling Federal Agencies). With respect to future liability, the State's covenant shall take effect upon Certification of Completion of Remedial Action by EPA pursuant to Paragraph [51.b](#) of Section XIV (Certification of Completion). The State's covenant is conditioned upon the satisfactory performance by Settling Federal Agencies of their obligations under this Consent Decree. The State's covenant extends only to Settling Federal Agencies and does not extend to any other person.

97. Pre-certification Reservations.

a. United States' Pre-certification Reservations. Notwithstanding any other provision of this Consent Decree, the United States reserves, and this Consent Decree is without prejudice to, the right to institute proceedings in this action or in a new action, or to issue an administrative order, seeking to compel Principal Settling Defendants and Major Cashout Settling Defendants – and EPA reserves the right to issue an administrative order seeking to compel Settling Federal Agencies – to perform further response actions relating to the Site and/or to pay the United States for additional costs of response if, (a) prior to Certification of Completion of the Remedial Action, (i) conditions at the Site, previously unknown to EPA, are discovered, or (ii) information, previously unknown to EPA, is received, in whole or in part, and (b) EPA determines that these previously unknown conditions or information together with any other relevant information indicates that the Remedial Action is not protective of human health or the environment.



b. State's Pre-certification Reservations. Notwithstanding any other provision of this Consent Decree, the State reserves, and this Consent Decree is without prejudice to, the right to institute proceedings in this action or in a new action, or to issue an administrative order, seeking to compel Principal Settling Defendants and Major Cashout Settling Defendants – and the State reserves the right to sue the Settling Federal Agencies – to perform further response actions relating to the Site and/or to pay the State for additional costs of response if, (a) prior to Certification of Completion of the Remedial Action, (i) conditions at the Site, previously unknown to EPA, are discovered, or (ii) information, previously unknown to EPA, is received, in whole or in part, and (b) EPA determines that these previously unknown conditions or information together with any other relevant information indicates that the Remedial Action is not protective of human health or the environment.

98. Post-certification Reservations.

a. United States' Post-certification Reservations. Notwithstanding any other provision of this Consent Decree, the United States reserves, and this Consent Decree is without prejudice to, the right to institute proceedings in this action or in a new action or to issue an administrative order, seeking to compel Principal Settling Defendants and Major Cashout Settling Defendants – and EPA reserves the right to issue an administrative order seeking to compel Settling Federal Agencies – to perform further response actions relating to the Site and/or to pay the United States for additional costs of response if, (a) subsequent to Certification of Completion of the Remedial Action, (i) conditions at the Site, previously unknown to EPA, are discovered, or (ii) information, previously unknown to EPA, is received, in whole or in part, and (b) EPA determines that these previously unknown conditions or this information together with other relevant information indicate that the Remedial Action is not protective of human health or the environment.

b. State's Post-certification Reservations. Notwithstanding any other provision of this Consent Decree, the State reserves, and this Consent Decree is without prejudice to, the right to institute proceedings in this action or in a new action or to issue an administrative order, seeking to compel Principal Settling Defendants and Major Cashout Settling Defendants – and the State reserves the right to sue the Settling Federal Agencies – to perform further response actions relating to the Site and/or to pay the State for additional costs of response if, (a) subsequent to Certification of Completion of the Remedial Action, (i) conditions at the Site, previously unknown to EPA, are discovered, or (ii) information, previously unknown to EPA, is received, in whole or in part, and (b) EPA determines that these previously unknown conditions or this information together with other relevant information indicate that the Remedial Action is not protective of human health or the environment.

99. For purposes of Paragraph [97](#), the information and the conditions known to EPA will include only that information and those conditions known to EPA as of the date the ROD was signed and set forth in the Record of Decision for the Site and the administrative record supporting the Record of Decision. For purposes of Paragraph [98](#), the information and the conditions known to EPA shall include only that information and those conditions known to EPA as of the date of Certification of Completion of the Remedial Action and set forth in the Record of Decision, the administrative record supporting the Record of Decision, the post-ROD administrative record, or in any information received by EPA pursuant to the requirements of this Consent Decree prior to Certification of Completion of the Remedial Action.

100. General Reservations of Rights. The United States and the State reserve, and this Consent Decree is without prejudice to, all rights against Principal Settling Defendants, Owner Settling Defendant, and Major Cashout Settling Defendants – and EPA, the Trustees, and the State reserve, and this Consent Decree is without prejudice to, all rights against Settling Federal Agencies – with respect to all matters not expressly included within Plaintiffs’ covenants. Notwithstanding any other provision of this Consent Decree, the United States and the State reserve all rights against Principal Settling Defendants, Owner Settling Defendant, and Major Cashout Settling Defendants – and EPA, the Trustees, and the State reserve, and this Consent Decree is without prejudice to, all rights against Settling Federal Agencies – with respect to:

- a. claims based on a failure by Principal Settling Defendants, Owner Settling Defendant, Major Cashout Settling Defendants, or Settling Federal Agencies to meet a requirement of this Consent Decree;
- b. liability arising from the past, present, or future disposal, release, or threat of release of Waste Material outside of the Site;
- c. liability based on the ownership or operation of the Site by Principal Settling Defendants or Major Cashout Settling Defendants when such ownership or operation commences after signature of this Consent Decree (the ownership of the Site by the Owner Settling Defendant and the “control” of the Site by the Principal Settling Defendants referenced in Paragraph 26 commenced before signature of this Consent Decree);
- d. liability based on Principal Settling Defendants’, Major Cashout Settling Defendants’, or Settling Federal Agencies’ transportation, treatment, storage, or disposal, or the arrangement for the transportation, treatment, storage, or disposal of Waste Material at or in connection with the Site, other than as provided in the ROD, the Work, or otherwise ordered by EPA, after signature of this Consent Decree;
- e. criminal liability;
- f. liability for violations of federal or state law which occur during or after implementation of the Work;
- g. liability, prior to Certification of Completion of the Remedial Action, for additional response actions that EPA determines are necessary to achieve and maintain Performance Standards or to carry out and maintain the effectiveness of the remedy set forth in the ROD, but that cannot be required pursuant to Paragraph [14](#) (Modification of SOW or Related Work Plans); and
- h. liability for costs incurred or to be incurred by the Agency for Toxic Substances and Disease Registry regarding the Site.

101. Reservation of Rights by United States and State As to De Minimis Cashout Settling Defendants. The United States and the State reserve, and this Consent Decree is without prejudice to, all rights against the De Minimis Cashout Settling Defendants with respect to all matters not expressly included within the Covenants for De Minimis Cashout Settling Defendants in Paragraphs [95.c](#) and [95.d](#). Notwithstanding any other provisions of this Consent Decree, the United States and the State reserve all rights against each De Minimis Cashout Settling Defendant with respect to:

- a. claims based on a failure by De Minimis Cashout Settling Defendants to meet a requirement of this Consent Decree;
- b. liability arising from the past, present, or future disposal, release, or threat of release of Waste Material outside of the Site;
- c. liability based on the ownership or operation of the Site by De Minimis Cashout Settling Defendants when such ownership or operation commences after signature of this Consent Decree;
- d. liability based on De Minimis Cashout Settling Defendants' transportation, treatment, storage, or disposal, or the arrangement for the transportation, treatment, storage, or disposal of Waste Material at or in connection with the Site, other than as provided in the ROD, the Work, or otherwise ordered by EPA, after signature of this Consent Decree;
- e. criminal liability; or
- f. liability for costs incurred or to be incurred by the Agency for Toxic Substances and Disease Registry regarding the Site.

102. Special Reservation (Re-Opener) of the United States and the Texas Trustees Regarding Natural Resource Damages. Notwithstanding any other provision of this Consent Decree, the United States and the Texas Trustees each reserves, and this Consent Decree is without prejudice to, the right to institute proceedings against Principal Settling Defendants and Major Cashout Settling Defendants in this action or in a new action – and each Trustee reserves, and this Consent Decree is without prejudice to, the right to institute proceedings against Settling Federal Agencies in this action or in a new action – for Natural Resource Damages if:

(i) conditions at the Site, unknown to the Trustees as of the date of the lodging of this Consent Decree, are discovered, or

(ii) information regarding the Site, unknown to the Trustees as of the date of the lodging of this Consent Decree, is received,

and the previously unknown conditions or information, together with any other relevant information, indicates that injuries to natural resources due to releases at or from the Site are of a type or future persistence that was unknown to the Trustees as of the date of the lodging of this Consent Decree. For purposes of this Paragraph, information and conditions known to the Trustees shall consist of any information related to the Site in the files of, or otherwise in the possession of, any one of the individual Trustees or EPA.

103. Work Takeover.

a. In the event EPA determines that Principal Settling Defendants have (1) ceased implementation of any portion of the Work, or (2) are seriously or repeatedly deficient or late in their performance of the Work, or (3) are implementing the Work in a manner that may cause an endangerment to human health or the environment, EPA may issue a written notice (“Work Takeover Notice”) to Principal Settling Defendants. Any Work Takeover Notice issued by EPA will specify the grounds upon which such notice was issued and will provide Principal Settling Defendants a period of thirty (30) days within which to remedy the circumstances giving rise to EPA’s issuance of such notice.

b. If, after expiration of the thirty-day notice period specified in Paragraph [103.a](#), Principal Settling Defendants have not remedied to EPA's satisfaction the circumstances giving rise to EPA's issuance of the relevant Work Takeover Notice, EPA may at any time thereafter assume the performance of all or any portion(s) of the Work as EPA deems necessary ("Work Takeover"). EPA will notify Principal Settling Defendants in writing (which writing may be electronic) if EPA determines that implementation of a Work Takeover is warranted under this Paragraph [103.b](#). Funding of Work Takeover costs is addressed under Paragraph [49](#).

c. Principal Settling Defendants may invoke the procedures set forth in Paragraph [80](#) (Record Review), to dispute EPA's implementation of a Work Takeover under Paragraph [103.b](#). However, notwithstanding Principal Settling Defendants' invocation of such dispute resolution procedures, and during the pendency of any such dispute, EPA may in its sole discretion commence and continue a Work Takeover under Paragraph [103.b](#) until the earlier of (1) the date that Principal Settling Defendants remedy, to EPA's satisfaction, the circumstances giving rise to EPA's issuance of the relevant Work Takeover Notice, or (2) the date that a final decision is rendered in accordance with Paragraph [80](#) (Record Review) requiring EPA to terminate such Work Takeover.

104. Notwithstanding any other provision of this Consent Decree, the United States and the State retain all authority and reserve all rights to take any and all response actions authorized by law.

### XXIII. COVENANTS BY SETTLING DEFENDANTS AND SETTLING FEDERAL AGENCIES

105. Covenant Not to Sue by Settling Defendants. Subject to the reservations in Paragraph [108](#), Settling Defendants covenant not to sue and agree not to assert any claims or causes of action against the United States or the State with respect to the Site and this Consent Decree, including, but not limited to:

a. any direct or indirect claim for reimbursement from the Hazardous Substance Superfund (established pursuant to the Internal Revenue Code, 26 U.S.C. § 9507) through CERCLA Sections 106(b)(2), 107, 111, 112, or 113, or any other provision of law;

b. any claims against the United States, including any department, agency or instrumentality of the United States, or the State under CERCLA Sections 107 or 113, RCRA Section 7002(a), 42 U.S.C. § 6972(a), or state law regarding the Site and this Consent Decree;

c. any claims arising out of response actions at or in connection with the Site, including any claim under the United States Constitution, the Texas Constitution, the Tucker Act, 28 U.S.C. § 1491, the Equal Access to Justice Act, 28 U.S.C. § 2412, as amended, or at common law;

d. any direct or indirect claim for disbursement from the MSC Site Special Account or MSC Site Disbursement Special Account, except as provided in Section XVII (Disbursement of Special Account Funds); or

e. any claim that the State's actions in this case have been frivolous, unreasonable, or without foundation, within the meaning of Tex. Health & Safety Code

§ 361.342, or that its pleadings have been groundless, brought in bad faith, brought for the purpose of harassment, fictitious, or false.

106. Covenant by Settling Federal Agencies. Settling Federal Agencies agree not to assert any direct or indirect claim for reimbursement from the Hazardous Substance Superfund (established pursuant to the Internal Revenue Code, 26 U.S.C. § 9507) through CERCLA Sections 106(b)(2), 107, 111, 112, or 113, or any other provision of law with respect to the Site and this Consent Decree. This covenant does not preclude demand for reimbursement from the Superfund of costs incurred by a Settling Federal Agency in the performance of its duties (other than pursuant to this Consent Decree) as lead or support agency under the National Contingency Plan (40 C.F.R. Part 300).

107. Except as provided in Paragraph [116](#) (Res Judicata and Other Defenses), the covenants in this Section shall not apply if the United States or the State brings a cause of action or issues an order pursuant to any of the reservations in Section XXII (Covenants by Plaintiffs), other than in Paragraphs [100.a](#) and [101.a](#) (claims for failure to meet a requirement of the Decree), [100.e](#) and [101.e](#) (criminal liability), and [100.f](#) (violations of federal/state law during or after implementation of the Work), but only to the extent that Settling Defendants' claims arise from the same response action, response costs, or damages that the United States or the State is seeking pursuant to the applicable reservation.

108. Settling Defendants reserve, and this Consent Decree is without prejudice to, claims against the United States, subject to the provisions of Chapter 171 of Title 28 of the United States Code, and brought pursuant to any statute other than CERCLA or RCRA and for which the waiver of sovereign immunity is found in a statute other than CERCLA or RCRA, for money damages for injury or loss of property or personal injury or death caused by the negligent or wrongful act or omission of any employee of the United States, as that term is defined in 28 U.S.C. § 2671, while acting within the scope of his or her office or employment under circumstances where the United States, if a private person, would be liable to the claimant in accordance with the law of the place where the act or omission occurred. However, the foregoing shall not include any claim based on EPA's selection of response actions, or the oversight or approval of Settling Defendants' plans, reports, other deliverables or activities. Settling Defendants also reserve, and this Consent Decree is without prejudice to, contribution claims against Settling Federal Agencies in the event any claim is asserted by the United States or the State against Settling Defendants pursuant to any of the reservations in Section XXII (Covenants by Plaintiffs) other than in Paragraphs [100.a](#) (claims for failure to meet a requirement of the Decree), [100.e](#) (criminal liability), and [100.f](#) (violations of federal/state law during or after implementation of the Work), but only to the extent that Settling Defendants' claims arise from the same response action, response costs, or damages that the United States or the State is seeking pursuant to the applicable reservation.

109. Nothing in this Consent Decree shall be deemed to constitute preauthorization of a claim within the meaning of Section 111 of CERCLA, 42 U.S.C. § 9611, or 40 C.F.R. § 300.700(d).

110. Claims Against *De Minimis* and Ability-to-Pay Parties. Settling Defendants agree not to assert any claims or causes of action and to waive all claims or causes of action (including but not limited to claims or causes of action under Sections 107(a) and 113 of CERCLA) that they

may have for all matters relating to the Site against any person that has entered or in the future enters into a final CERCLA Section 122(g) *de minimis* settlement, or a final settlement based on limited ability to pay, with EPA with respect to the Site. This waiver shall not apply with respect to any defense, claim, or cause of action that a Settling Defendant may have against any person if such person asserts a claim or cause of action relating to the Site against such Settling Defendant.

111. Claims Against De Micromis Parties. Settling Defendants agree not to assert any claims or causes of action and to waive all claims or causes of action (including but not limited to claims or causes of action under Sections 107(a) and 113 of CERCLA) that they may have for all matters relating to the Site, including for contribution, against any person where the person's liability to Settling Defendants with respect to the Site is based solely on having arranged for disposal or treatment, or for transport for disposal or treatment, of hazardous substances at the Site, or having accepted for transport for disposal or treatment of hazardous substances at the Site, if the materials contributed by such person to the Site containing hazardous substances did not exceed 0.002% of the total volume of waste at the Site. The waiver in this Paragraph shall not apply with respect to any defense, claim, or cause of action that a Settling Defendant may have against any person meeting the criteria in this Paragraph if such person asserts a claim or cause of action relating to the Site against such Settling Defendant.

#### XXIV. EFFECT OF SETTLEMENT; CONTRIBUTION

112. Except as provided in Paragraph 110 (Claims Against *De Minimis* and Ability-to-Pay Parties) and Paragraph 111 (Claims Against De Micromis Parties), nothing in this Consent Decree shall be construed to create any rights in, or grant any cause of action to, any person not a Party to this Consent Decree. Except as provided in Paragraph 110 (Claims Against *De Minimis* and Ability-to-Pay Parties) and Paragraph 111 (Claims Against De Micromis Parties), each of the Parties expressly reserves any and all rights (including, but not limited to, pursuant to Section 113 of CERCLA, 42 U.S.C. § 9613), defenses, claims, demands, and causes of action which each Party may have with respect to any matter, transaction, or occurrence relating in any way to the Site against any person not a Party hereto. Nothing in this Consent Decree diminishes the right of the United States, pursuant to Section 113(f)(2) and (3) of CERCLA, 42 U.S.C. § 9613(f)(2) and (3), to pursue any such persons to obtain additional Natural Resource Damages, response costs, or response action and to enter into settlements that give rise to contribution protection pursuant to Section 113(f)(2).

113. a. The Parties agree, and by entering this Consent Decree this Court finds, that this Consent Decree constitutes a judicially approved settlement for purposes of Section 113(f)(2) of CERCLA, 42 U.S.C. § 9613(f)(2), and that each Principal Settling Defendant, the Owner Settling Defendant, each Cashout Settling Defendant, and each Settling Federal Agency is entitled, as of the Effective Date, to protection from contribution actions or claims as provided by Section 113(f)(2) of CERCLA, or as may be otherwise provided by law, for "matters addressed" in this Consent Decree. The "matters addressed" in this Consent Decree are (i) Natural Resource Damages, and (ii) all response actions taken or to be taken and all response costs incurred or to be incurred, at or in connection with the Site, by the United States or any other person; provided, however, that if the United States exercises rights against Settling Defendants (or if EPA or the State assert rights against Settling Federal Agencies) under the reservations in Section XXII (Covenants by Plaintiffs), other than in Paragraphs 100.a (claims for failure to meet a requirement of the Decree), 100.e (criminal liability), or 100.f (violations of federal/state law during or after

implementation of the Work), the “matters addressed” in this Consent Decree will no longer include those response costs or response actions or Natural Resource Damages that are within the scope of the exercised reservation. The Parties agree that the Administrative Order on Consent among EPA and certain Settling Defendants, EPA Docket No. CERCLA 06-18-03, as amended (“AOC”), shall terminate as of the Effective Date, except that the requirements for storm water management under the AOC shall terminate when EPA approves a plan under this Consent Decree that incorporates requirements for storm water management

b. Contribution Protection under the TSWDA. The Parties agree, and by entering this Consent Decree the Court finds, that this Consent Decree constitutes a settlement agreement with the State that resolves all liability of the Principal Settling Defendants, Owner Settling Defendant, Cashout Settling Defendants, and Settling Federal Agencies to the State as regards the Site, within the meaning of Tex. Health & Safety Code § 361.277(b), and therefore the Principal Settling Defendants, Owner Settling Defendant, Cashout Settling Defendants, and Settling Federal Agencies are released from liability to other persons who may have incurred response costs at the Site, as described in Tex. Health & Safety Code § 361.344(a), for cost recovery, contribution, or indemnity regarding a matter addressed in this Consent Decree, as provided by Tex. Health & Safety Code § 361.277(b).

114. Each Settling Defendant shall, with respect to any suit or claim brought by it for matters related to this Consent Decree, notify the United States and the State in writing no later than 60 days prior to the initiation of such suit or claim.

115. Each Settling Defendant shall, with respect to any suit or claim brought against it for matters related to this Consent Decree, notify in writing the United States and the State within ten days of service of the complaint on such Settling Defendant. In addition, each Settling Defendant shall notify the United States and the State within ten days of service or receipt of any Motion for Summary Judgment and within ten days of receipt of any order from a court setting a case for trial.

116. Res Judicata and Other Defenses. In any subsequent administrative or judicial proceeding initiated by the United States or the State for injunctive relief, recovery of response costs, Natural Resource Damages, or other appropriate relief relating to the Site, Settling Defendants (and, with respect to a State action, Settling Federal Agencies) shall not assert, and may not maintain, any defense or claim based upon the principles of waiver, res judicata, collateral estoppel, issue preclusion, claim-splitting, or other defenses based upon any contention that the claims raised by the United States or the State in the subsequent proceeding were or should have been brought in the instant case; provided, however, that nothing in this Paragraph affects the enforceability of the covenants not to sue set forth in Section XXII (Covenants by Plaintiffs).

## XXV. ACCESS TO INFORMATION

117. Except as provided by Paragraph [118](#), Principal Settling Defendants shall provide to EPA and the State, upon request, copies of all records, reports, documents, and other information (including records, reports, documents, and other information in electronic form) (hereinafter referred to as “Records”) within their possession or control or that of their contractors or agents relating to activities at the Site or to the implementation of this Consent Decree, including, but not limited to, sampling, analysis, chain-of-custody records, manifests, trucking

logs, receipts, reports, sample traffic routing, correspondence, or other documents or information regarding the Work. Principal Settling Defendants shall also make available to EPA and the State, for purposes of investigation, information gathering, or testimony, their employees, agents, or representatives with knowledge of relevant facts concerning the performance of the Work.

118. Business Confidential and Privileged Documents.

a. Principal Settling Defendants may assert business confidentiality claims covering part or all of the Records submitted to the United States under this Consent Decree to the extent permitted by and in accordance with Section 104(e)(7) of CERCLA, 42 U.S.C. § 9604(e)(7), and 40 C.F.R. § 2.203(b). Records determined to be confidential by EPA will be afforded the protection specified in 40 C.F.R. Part 2, Subpart B. If no claim of confidentiality accompanies Records when they are submitted to EPA, or if EPA has notified Principal Settling Defendants that the Records are not confidential under the standards of Section 104(e)(7) of CERCLA or 40 C.F.R. Part 2, Subpart B, the public may be given access to such Records without further notice to Principal Settling Defendants.

b. Principal Settling Defendants may assert that certain Records are privileged under the attorney-client privilege, the attorney-work product doctrine, or any other privilege recognized by federal law (or Texas state law, as to any Records sought by the State). If Principal Settling Defendants assert such a privilege in lieu of providing Records, they shall provide Plaintiffs with the following: (1) the title of the Record; (2) the date of the Record; (3) the name, title, affiliation (e.g., company or firm), and address of the author of the Record; (4) the name and title of each addressee and recipient; (5) a description of the contents of the Record; and (6) the privilege asserted by Principal Settling Defendants. If a claim of privilege applies only to a portion of a Record, the Record shall be provided to the United States, or the State, respectively, in redacted form to mask the privileged portion only. Principal Settling Defendants shall retain all Records that they claim to be privileged until the United States, or the State, respectively, has had a reasonable opportunity to dispute the privilege claim and any such dispute has been resolved in the Principal Settling Defendants' favor.

c. No Records created or generated pursuant to the requirements of this Consent Decree shall be withheld from the United States or the State on the grounds that they are privileged or confidential.

d. Records submitted to the State shall be subject to the confidentiality and public access requirements of the Texas Public Information Act, Tex. Gov't Code § 552.001 *et seq.*

119. No claim of confidentiality or privilege shall be made with respect to any data, including, but not limited to, all sampling, analytical, monitoring, hydrogeologic, scientific, chemical, or engineering data, or any other information evidencing conditions at or around the Site.

## XXVI. RETENTION OF RECORDS

120. Until ten years after Principal Settling Defendants' receipt of EPA's notification pursuant to Paragraph [52.b](#) of Section XIV (Certification of Completion), each Principal Settling Defendant shall preserve and retain all non-identical copies of Records (including Records in electronic form) now in its possession or control or which come into its possession or control that



relate in any manner to its liability under CERCLA with respect to the Site, provided, however, that Principal Settling Defendants who are potentially liable as owners or operators of the Site must retain, in addition, all Records that relate to the liability of any other person under CERCLA with respect to the Site. Each Principal Settling Defendant must also retain, and instruct its contractors and agents to preserve, for the same period of time specified above all non-identical copies of the last draft or final version of any Records (including Records in electronic form) now in its possession or control or which come into its possession or control that relate in any manner to the performance of the Work, provided, however, that each Principal Settling Defendant (and its contractors and agents) must retain, in addition, copies of all data generated during the performance of the Work and not contained in the aforementioned Records required to be retained. Each of the above record retention requirements shall apply regardless of any corporate retention policy to the contrary.

121. The United States acknowledges that each Settling Federal Agency (a) is subject to all applicable Federal record retention laws, regulations, and policies; and (b) has certified that it has fully complied with any and all EPA and State requests for information pursuant to Sections 104(e) and 122(e) of CERCLA, 42 U.S.C. §§ 9604(e) and 9622(e), and Section 3007 of RCRA, 42 U.S.C. § 6927.

122. At the conclusion of this record retention period, Principal Settling Defendants shall notify the United States and the State at least 90 days prior to the destruction of any such Records, and, upon request by the United States, Principal Settling Defendants shall deliver any such Records to EPA. Principal Settling Defendants may assert that certain Records are privileged under the attorney-client privilege or any other privilege recognized by federal law. If Principal Settling Defendants assert such a privilege, they shall provide Plaintiffs with the following: (a) the title of the Record; (b) the date of the Record; (c) the name, title, affiliation (e.g., company or firm), and address of the author of the Record; (d) the name and title of each addressee and recipient; (e) a description of the subject of the Record; and (f) the privilege asserted by Principal Settling Defendants. If a claim of privilege applies only to a portion of a Record, the Record shall be provided to the United States in redacted form to mask the privileged portion only. Principal Settling Defendants shall retain all Records that they claim to be privileged until the United States has had a reasonable opportunity to dispute the privilege claim and any such dispute has been resolved in the Principal Settling Defendants' favor. However, no Records created or generated pursuant to the requirements of this Consent Decree shall be withheld on the grounds that they are privileged or confidential.

123. Each Settling Defendant certifies individually that, to the best of its knowledge and belief, after thorough inquiry, it has not altered, mutilated, discarded, destroyed or otherwise disposed of any Records (other than identical copies) relating to its potential liability regarding the Site since the earlier of notification of potential liability by the United States or the State or the filing of suit against it regarding the Site and that it has fully complied with any and all EPA requests for information pursuant to Sections 104(e) and 122(e) of CERCLA, 42 U.S.C. §§ 9604(e) and 9622(e), and Section 3007 of RCRA, 42 U.S.C. § 6927.

## XXVII. NOTICES AND SUBMISSIONS

124. Whenever, under the terms of this Consent Decree, written notice is required to be given or a report or other document is required to be sent by one Party to another, it shall be

directed to the individuals at the addresses specified below, unless those individuals or their successors give notice of a change to the other Parties in writing. All notices and submissions shall be considered effective upon receipt, unless otherwise provided. Written notice as specified in this Section shall constitute complete satisfaction of any written notice requirement of the Consent Decree with respect to the United States, EPA, Settling Federal Agencies, the State, and Settling Defendants, respectively. Notices required to be sent to EPA, and not to the United States, under the terms of this Consent Decree should not be sent to the U.S. Department of Justice. Notices required to be sent to the "United States" shall be sent to both the U.S. Department of Justice and EPA. Notices required to be sent to "EPA" shall be sent only to EPA.

As to the United States: Chief, Environmental Enforcement Section  
Environment and Natural Resources Division  
U.S. Department of Justice  
P.O. Box 7611  
Washington, D.C. 20044-7611  
Re: DJ # 90-11-2-07465/4  
Or re: DJ # 90-11-2-07465/2 if NRD-related

and: Chief, Environmental Defense Section  
Environment and Natural Resources Division  
U.S. Department of Justice  
P.O. Box 23986  
Washington, D.C. 20026-3986  
Re: DJ # 90-11-6-17120

As to EPA: Director, Superfund Division  
United States Environmental Protection Agency  
Region 6  
1445 Ross Avenue  
Dallas, TX 75202

and: Charles David Abshire  
EPA Project Coordinator  
United States Environmental Protection Agency  
Region 6  
1445 Ross Avenue  
Dallas, TX 75202

As to the EPA Financial Management Officer: Chrisna Tan, Attorney-Advisor  
U.S. Environmental Protection Agency  
Office of Site Remediation Enforcement  
Room 4232J Ariel Rios South (MC 2272A)  
1200 Pennsylvania Ave. NW  
Washington, D.C. 20460  
Phone: (202) 564-4272 Fax: (202) 501-0269  
E-mail: [tan.chrisna@epa.gov](mailto:tan.chrisna@epa.gov)

As to the State: notices concerning NRD claims or payments should be sent to the State officials identified in Paragraphs 62.a and b, above. All other notices required to be given to the State of Texas should be sent to both the Office of the Attorney General (“OAG”) and to the TCEQ. Notices required to be given only to the TCEQ should not be sent to the OAG.

As to the OAG:

Chief  
Environmental Protection Division  
(Attn: Thomas Edwards, Asst. Atty. Gen.)  
Texas Attorney General’s Office (066)  
P.O. Box 12548  
Austin, TX 78711-2548

Or deliver to:

Wm. P. Clements State Office Bldg.  
300 W. 15th St., Fl. 10  
Austin, TX 78701-1649  
Phone: (512) 463-2012  
Fax: (512) 320-0052; and

As to the TCEQ:

Fay Duke  
State Project Coordinator - Malone Site  
Texas Comm. on Env’tl. Quality (MC-136)  
P.O. Box 13087  
Austin, TX 78711-3087

Or deliver to:

Bldg. D, Rm. 200-21N  
12100 Park 35 Circle  
Austin, TX 78753

As to Settling Defendants:

Bob Piniewski  
Settling Defendants’ Project Coordinator  
Project Navigator, Ltd.  
10497 Town and Country Way, Suite 830  
Houston, TX 77024  
Phone: 919-435-0934  
Cell: 919-539-1928  
Email: [bobp@projectnavigator.com](mailto:bobp@projectnavigator.com)

## XXVIII. RETENTION OF JURISDICTION

125. This Court retains jurisdiction over both the subject matter of this Consent Decree and Settling Defendants for the duration of the performance of the terms and provisions of this Consent Decree for the purpose of enabling any of the Parties to apply to the Court at any time for such further order, direction, and relief as may be necessary or appropriate for the construction or modification of this Consent Decree, or to effectuate or enforce compliance with its terms, or to resolve disputes in accordance with Section XX (Dispute Resolution).

#### XXIX. APPENDICES

126. The following appendices are attached to and incorporated into this Consent Decree:

“Appendix A” is the ROD.

“Appendix B” is the SOW.

“Appendix C” is the description and/or maps of the Site.

“Appendix D” is the complete list of Principal Settling Defendants.

“Appendix E” is the performance guarantee.

“Appendix F” is the complete list of Major Cashout Settling Defendants.

“Appendix G” is the complete list of De Minimis Cashout Settling Defendants.

#### XXX. COMMUNITY RELATIONS

127. If requested by EPA or the State, Principal Settling Defendants shall participate in community relations activities pursuant to the community relations plan to be developed by EPA. EPA will determine the appropriate role for Principal Settling Defendants under the Plan. Principal Settling Defendants shall also cooperate with EPA and the State in providing information regarding the Work to the public. As requested by EPA or the State, Principal Settling Defendants shall participate in the preparation of such information for dissemination to the public and in public meetings which may be held or sponsored by EPA or the State to explain activities at or relating to the Site. Costs incurred by the United States under this Section, including the costs of any technical assistance grant under Section 117(e) of CERCLA, 42 U.S.C. § 9617(e), shall be considered Future Response Costs that Principal Settling Defendants shall pay pursuant to Section XVI (Payments for Response Costs, NRD, & NRD Assessment Costs).

#### XXXI. MODIFICATION

128. Except as provided in Paragraph [14](#) (Modification of SOW or Related Work Plans), material modifications to this Consent Decree, including the SOW, shall be in writing, signed by the United States and a duly authorized representative of the Principal Settling Defendants, and shall be effective upon approval by the Court. Except as provided in Paragraph [14](#) (Modification of SOW or Related Work Plans), non-material modifications to this Consent Decree, including the SOW, shall be in writing and shall be effective when signed by duly authorized representatives of the United States and Principal Settling Defendants. All modifications to the Consent Decree, other than the SOW, also shall be signed by the State, or a duly authorized representative of the State, as appropriate. A modification to the SOW shall be considered material if it fundamentally alters the basic features of the selected remedy within the meaning of 40 C.F.R. § 300.435(c)(2)(ii). Before providing its approval to any modification to the SOW, the United States will provide the State with a reasonable opportunity to review and comment on the proposed modification.

129. Modifications (non-material or material) that do not affect the obligations of or the protections afforded to Cashout Settling Defendants may be executed without the signatures of the Cashout Settling Defendants.

130. Nothing in this Consent Decree shall be deemed to alter the Court’s power to enforce, supervise, or approve modifications to this Consent Decree.

### XXXII. LODGING AND OPPORTUNITY FOR PUBLIC COMMENT

131. This Consent Decree shall be lodged with the Court for a period of not less than 30 days for public notice and comment in accordance with Section 122(d)(2) of CERCLA, 42 U.S.C. § 9622(d)(2), 28 C.F.R. § 50.7, and Tex. Water Code § 7.110. The United States and the State reserve the right to withdraw or withhold their consent if the comments regarding the Consent Decree disclose facts or considerations which indicate that the Consent Decree is inappropriate, improper, or inadequate. Settling Defendants consent to the entry of this Consent Decree without further notice.

132. If for any reason the Court should decline to approve this Consent Decree in the form presented, this agreement is voidable at the sole discretion of any Party and the terms of the agreement may not be used as evidence in any litigation between the Parties.

### XXXIII. SIGNATORIES/SERVICE

133. Each undersigned representative of a Settling Defendant to this Consent Decree and the Assistant Attorney General for the Environment and Natural Resources Division of the Department of Justice and the Attorney General of Texas for the State certifies that he or she is fully authorized to enter into the terms and conditions of this Consent Decree and to execute and legally bind such Party to this document.

134. Each Settling Defendant agrees not to oppose entry of this Consent Decree by this Court or to challenge any provision of this Consent Decree unless the United States has notified Settling Defendants in writing that it no longer supports entry of the Consent Decree.

135. Each Settling Defendant shall identify, on the attached signature page, the name, address and telephone number of an agent who is authorized to accept service of process by mail on behalf of that Party with respect to all matters arising under or relating to this Consent Decree. Settling Defendants agree to accept service in that manner and to waive the formal service requirements set forth in Rule 4 of the Federal Rules of Civil Procedure and any applicable local rules of this Court, including, but not limited to, service of a summons. Settling Defendants need not file an answer to any complaint in this action unless or until the Court expressly declines to enter this Consent Decree.

XXXIV. FINAL JUDGMENT

136. This Consent Decree and its appendices constitute the final, complete, and exclusive agreement and understanding among the Parties regarding the settlement embodied in the Consent Decree. The Parties acknowledge that there are no representations, agreements, or understandings relating to the settlement other than those expressly contained in this Consent Decree.

137. Upon entry of this Consent Decree by the Court, this Consent Decree shall constitute a final judgment between and among the United States, the State, and Settling Defendants. The Court finds that there is no just reason for delay and therefore enters this judgment as a final judgment under Fed. R. Civ. P. 54 and 58.

SO ORDERED THIS 24<sup>th</sup> DAY OF September, 2012.

A handwritten signature in black ink, appearing to read "M. Costa", is written over a horizontal line.

United States District Judge

# Record of Decision

**Malone Service Company Superfund Site  
Texas City, Texas**

**September 2009**



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 6**

APPENDIX A

Consent Decree re the Malone Service Company



9109310

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# **PART 1: THE DECLARATION**

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## **A. SITE NAME AND LOCATION**

The Malone Service Company, Inc. (MSC) Superfund Site (hereinafter "the Site") is located on Campbell Bayou Road in Texas City, Galveston County, Texas (see Figure 1 - Site Location Map). The National Superfund Database Identification Number is TXD980864789. The Site is an inactive waste disposal facility on the shores of Swan Lake and Galveston Bay.

During operations by the Malone Service Company, approximately 75 acres of the 150-acre Site were developed for storage, processing and disposal of industrial hazardous wastes. For the purposes of the Remedial Investigation (RI), the Site was divided into three study areas: source material (sludge), soils, and ground water. This Record of Decision (ROD) addresses all areas and media within the Site, including the sludge, soils, and ground water, as one Operable Unit (OU).

## **B. STATEMENT OF BASIS AND PURPOSE**

This decision document presents the selected remedy for the MSC Superfund Site in Texas City, Texas, which was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 United States Code §§ 9601, et seq., as amended, and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 Code of Federal Regulations (CFR) Part 300, as amended.

This decision was based on the Administrative Record for this Site, which has been developed in accordance with Section 113(k) of CERCLA, 42 U.S.C. § 9613(k), and which is available for review at the Moore Memorial Public Library in Texas City, Texas, and at the Texas Commission on Environmental Quality in Austin, Texas. The Administrative Record Index (Appendix A to the ROD) identifies each of the items comprising the Administrative Record upon which the selection of the remedial action is based.

The State of Texas, acting through the Texas Commission on Environmental Quality (TCEQ), concurs with the selected remedy.

## **C. ASSESSMENT OF THE SITE**

The response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment. Past operations at this facility have resulted in the release of hazardous substances, pollutants and contaminants to Site soils and ground water, and source material (oily sludge) remains present in the Site Earthen Impoundment, American Petroleum Institute (API) separators, above-ground storage tanks (ASTs), and in subsurface soils. If not addressed, the sludge, contaminated soils, and contaminated ground water pose an unacceptable risk to human health and the environment.

## **D. DESCRIPTION OF THE SELECTED REMEDY**

This ROD sets forth the selected remedy for the Site to address sludge, soil and ground water contamination resulting from past operations at the facility. The remedy for the Site oily sludge, which is

the principal threat source material at the Site, includes use of a technology, solidification, that permanently reduces the toxicity, mobility, and/or volume of hazardous substances present at the Site. The solidified sludge will be consolidated into a Resource Conservation and Recovery Act (RCRA) Subtitle C equivalent cell, removing or minimizing exposure to human and ecological receptors. The remedy also includes remediation of Site soils, because the Site risk assessment identified soils as a potential threat to human health and the environment. The contaminated soils also will be consolidated into the RCRA Subtitle C equivalent cell. The contaminated shallow ground water plumes at the Site originate from the source areas; the shallow ground water is non-potable (non-drinking water), the contaminated plumes appear to remain on-site, and the risk posed is only from potential inhalation of vapors from the ground water. The remedy for the ground water is monitoring to detect if there is off-site migration or migration to uncontaminated aquifers above the TCEQ Class 3 Protective Concentration Levels (PCL; 30 Texas Administrative Code [TAC], Chapter 350, Subchapter D) for commercial/industrial and background levels (specifically for metals). If EPA determines that a contaminated ground water plume has the potential to migrate off-site or to an uncontaminated aquifer, an active remedy, such as containment or a treatment remedy may be required. Institutional controls will be used to mitigate risks of vapor inhalation from the contaminated ground water.

The major components of the selected remedy, which are summarized below and further described in Section 2.12 (Selected Remedy), are:

- **Sludge (Principal Threat Waste):** Remove Site sludge, including all sludge from the Earthen Impoundment (which includes the Sludge Pit and Oil Pit), API separators, ASTS (tanks), and source material located in other areas of the Site below ground surface (in subsurface soils), and solidify. Transfer and consolidate solidified sludge into an on-site, aboveground Resource Conservation and Recovery Act (RCRA) Subtitle C equivalent cell.
- **Soil:** Remove and consolidate soils with contamination exceeding the Site remediation levels into the RCRA Subtitle C equivalent cell. Backfill excavated areas to ground surface with clean soil.
- **Ground Water:** Install ground water monitoring wells to monitor Site ground water and the RCRA Subtitle C equivalent cell. Ground water monitoring of contaminated ground water plumes will document if natural attenuation (NA) is effective in degrading the plumes, and will detect any off-site migration or migration to uncontaminated aquifers of contaminants in ground water above the TCEQ Class 3 Groundwater PCLs and metals concentrations greater than TCEQ PCLs and background levels. If the U.S. Environmental Protection Agency (EPA) determines that contaminants in ground water are migrating to a Site boundary monitoring well, and potentially off-site, or migrating to an aquifer not currently known to be contaminated, an active remedy (e.g., extraction, containment) may be required. Monitoring will be required for a minimum of 30 years, or until the ground water is found to be uncontaminated. The location of additional monitoring wells to achieve the remedial action objectives will be determined during the remedial design. It may be determined during the remedial action that additional monitoring wells are needed.
- **Institutional Controls (ICs):** ICs such as a notification, information device, deed restriction and/or easement, will be placed on the Site property to protect the integrity of the remedy and to prevent exposure to hazardous substances. The ICs will be prepared and recorded in the appropriate land records office and will show the location and concentrations of Contaminants of Concern (COCs) present in the ground water underlying the Site. For the IC component for ground water, information on the nature and extent of ground water contamination will be updated annually. ICs, such as prohibiting construction of buildings in areas impacted by contaminated ground water, will be used to prevent inhalation exposure from vapor intrusion. The ICs will restrict any excavation or drilling to

ground water, and will also prohibit disturbance of the on-site cap. ICs will provide long-term protection by reducing the potential risk for people to be exposed.

The selected remedy has an estimated present value cost of approximately \$56.4 million dollars. It is estimated that it will take 18 months to complete the design phase and 48 months to implement the remedy. The RCRA Subtitle C equivalent cell will remain for as long as the contained waste remains hazardous.

The Site Feasibility Study assumes that the future use of the Site will be as a nature conservancy, and the selected remedy will reduce the concentration of hazardous substances present in the Site soils to levels allowing for limited reuse of the property as a natural preservation area or conservancy. This assumption was made because the Malone Cooperating Parties (MCP), a group of private companies who committed to perform the RI/FS, reached a court-approved settlement agreement in November 2007 with the former Site owner. The court-approved settlement enables the MCP to impose an institutional control (IC) on the property prohibiting residential, commercial, and industrial development. The settlement further requires that the land eventually be transferred to an environmental non-profit organization or, if such a transfer cannot be completed, requires that the land be used in the future only to complete the response action and for purposes not inconsistent with final use as a natural preservation or conservation area.

## **E. STATUTORY DETERMINATIONS**

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to the remedial action, and is cost effective. It utilizes permanent solutions and treatment technologies to the maximum extent practicable. The selected remedy complies with the statutory preference for treatment as a principal element (i.e., it reduces the toxicity, mobility, or volume of hazardous substances through treatment) because solidification of the Site source material (the sludge) will reduce the mobility of hazardous substances.

Because the selected remedy will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure (UU/UE), statutory five-year reviews will be conducted beginning five years after initiation of the remedial action to ensure that the remedy continues to be protective of human health and the environment (42 U.S.C. § 9621(c)). Subsequent reviews will occur every five years thereafter.

## **F. DATA CERTIFICATION CHECKLIST**

The following information is included in the Decision Summary section of this ROD (Part 2). Additional information can be found in the Administrative Record file for this Site.

- COCs and their respective concentrations (Section 2.5.6, page 2-20)
- Source materials constituting principal threat wastes which have been identified at this Site (Section 2.5.5, page 2-19)
- Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of ground water used in the Baseline Human Health Risk Assessment and ROD (Section 2.6, page 2-27)
- Baseline risk represented by the COCs (Section 2.7, pages 2-28 to 2-45)

- Remediation (cleanup) levels established for COCs and the basis for these levels (Section 2.8, pages 2-45 to 2-49)
- How source materials constituting principal threats are addressed (Section 2.11, page 2-71 and Section 2.13.5, pages 2-76)
- Potential land and ground water use that will be available at the Site as a result of the selected remedy (Section 2.12.4, page 2-73 to 2-74)
- Estimated capital, annual operation and maintenance (O&M), and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected (Section 1.D, page 1-2 and Section 2.12.3, page 2-73)
- Key factor(s) that led to selection of the final remedial alternative (Section 2.12.1, page 2-71 to 2-72)

## G. AUTHORIZING SIGNATURE

This Record of Decision documents the selected remedy for source material, contaminated soils, and contaminated ground water at the Malone Service Company Superfund Site. This remedy was selected by the EPA with the concurrence of the TCEQ. The Director of the Superfund Division, Region 6, has been delegated the authority to approve and sign this Record of Decision.

U.S. Environmental Protection Agency (Region 6)

Samuel Coleman, P.E.  
Director, Superfund Division

9-30-09  
Date

CONCURRENCE PAGE  
RECORD OF DECISION FOR OPERABLE UNIT 1  
MALONE SERVICE COMPANY SUPERFUND SITE

\_\_\_\_\_  
Charles David Abshire  
Remedial Project Manager

09/21/09  
Date

\_\_\_\_\_  
Anne Foster

9/28/09  
Date

\_\_\_\_\_  
I-Jung Chiang  
Attorney, Office of Regional Counsel

9-28-09  
Date

\_\_\_\_\_  
Carlos Sanchez  
Section Chief, Arkansas/Texas Section

9/28/09  
Date

\_\_\_\_\_  
Don Williams  
Deputy Associate Director, Remedial Branch

9/28/09  
Date

\_\_\_\_\_  
Charles Faultry  
Associate Director, Remedial Branch

9/28/09  
Date

\_\_\_\_\_  
Mark Peycke  
Chief, Superfund Branch, Office of Regional Counsel

09/28/09  
Date

\_\_\_\_\_  
Pamela Phillips  
Deputy Director, Superfund Division

9-30-09  
Date

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# ACRONYMS AND ABBREVIATIONS

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AOC	Area of Contamination
ARAR	Applicable or Relevant and Appropriate Requirement
AST	Aboveground Storage Tank
ASTM	American Society for Testing and Materials
ATSDR	Agency for Toxic Substances and Disease Registry
AUF	Area-Specific Use Factor
BERA	Baseline Ecological Risk Assessment
bgs	Below Ground Surface
BHHRA	Baseline Human Health Risk Assessment
CDI	Chronic Daily Intake
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CFR	Code of Federal Regulations
CIP	Community Involvement Plan
cm/sec	Centimeters Per Second
COC	Contaminant of Concern
COPC	Chemical of Potential Concern
CPT	Cone Penetrometer Testing
CSM	Conceptual Site Model
DNAPL	Dense Non-Aqueous Phase Liquid
DPT	Direct Push Technology
E&E	Ecology and Environment
ELCR	Excess Lifetime Cancer Risk
EPA	U.S. Environmental Protection Agency Region 6
EPC	Exposure Point Concentration
ESD	Explanation of Significant Differences
°F	Degrees Fahrenheit
FEMA	Federal Emergency Management Agency
FRL	Federal Register Listing
FS	Feasibility Study
GCL	Geosynthetic Clay Liner
GCWDA	Gulf Coast Waste Disposal Authority
GBNEP	Galveston Bay National Estuary Program
GSI	Groundwater Services, Inc.
GWBU	Ground Water Bearing Unit
HDPE	High-Density Polyethylene
HEAST	Health Effects Assessment Summary Tables
HI	Hazard Index
HQ	Hazard Quotient
HAS	Hollow Stem Auger
HW	Hazardous Waste
IC	Institutional Control
IRIS	Integrated Risk Information System
Kg	Kilograms
LDR	Land Disposal Restrictions
LOAEL	Lowest Observable Adverse Effect Level
m <sup>3</sup> /day	Cubic Meters Per Day

MCL	Maximum Contaminant Level
MCP	Malone Cooperating Parties
mg/kg	Milligrams Per Kilogram
mg/kg-day	Milligrams Per Kilogram Per Day
mg/L	Milligrams Per Liter
MNA	Monitored Natural Attenuation
MRL	Minimal Risk Level
MSC	Malone Service Company, Inc.
msl	Mean Sea Level
MSSL	Medium-Specific Screening Level
NA	Natural Attenuation
NAPL	Non-Aqueous Phase Liquid
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NOAEL	No Observable Adverse Effect Level
NPL	National Priorities List
O&M	Operations and Maintenance
OU	Operable Unit
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCDD	Polychlorinated Dibenzo-Dioxin
PCDF	Polychlorinated Dibenzo-Furan
PCE	Tetrachloroethene
PCL	Protective Concentration Level
PEF	Particle Emission Factor
PID	Photoionization Detector
PMZ	Plume Management Zone
POE	Point of Exposure
ppb	Parts Per Billion
ppm	Parts Per Million
PPRTV	Provisional Peer Reviewed Toxicity Values
PR	Preliminary Review
PRAER	Preliminary Remedial Alternatives Evaluation Report
PRG	Preliminary Remediation Goal
PRP	Potentially Responsible Party
PSCR	Preliminary Site Characterization Report
psi	Pounds Per Square Inch
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RA	Remedial Action
RAO	Remedial Action Objective
RfC	Reference Concentration
RfD	Reference Dose
RI	Remedial Investigation
RME	Reasonable Maximum Exposure
ROD	Record of Decision
S/S	Solidification/Stabilization
SARA	Superfund Amendments and Reauthorization Act
SF	Slope Factor
Site	Malone Service Company, Inc. Superfund Site
SLERA	Screening Level Ecological Risk Assessment

SPLP	Synthetic Precipitation Leaching Procedure
SSI	Screening Site Inspection
SVOC	Semivolatile Organic Compound
SWL	Southwest Laboratories
SWMP	Storm Water Management Plan
SWMU	Solid Waste Management Unit
TAC	Texas Administrative Code
TCDD	Tetrachlorodibenzo-P-Dioxin
TCE	Trichloroethene
TCEQ	Texas Commission on Environmental Quality
TCLP	Toxicity Characteristic Leaching Procedure
TDS	Total Dissolved Solids
TEQ	Toxic Equivalent
TNRCC	Texas Natural Resource Conservation Commission (predecessor agency of TCEQ)
TRV	Toxicity Reference Value
UCL	Upper Confidence Limit
UCS	Unconfined Compressive Strength
UF	Uncertainty Factors
UIC	Underground Injection Control
USACHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
VOC	Volatile Organic Compound
VSI	Visual Site Inspection
yd <sup>3</sup>	Cubic Yards
µg/m <sup>3</sup>	Micrograms Per Cubic Meter

# GLOSSARY OF TERMS

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***Applicable or Relevant and Appropriate Requirements (ARARs)*** – Generally, any Federal, State, or local requirements or regulations that would apply to a Remedial Action if it were not being conducted under CERCLA, or that, while not strictly applicable, are relevant in the sense that they regulate similar situations or actions, and are appropriate during implementation of a particular Remedial Action. These requirements may vary among sites and alternatives.

***Cap*** – A layer of clay or other impermeable material installed over the top of a closed cell/landfill to prevent entry of rainwater, minimize leachate, and prevent wind dispersal of waste materials. Caps can be composed of natural materials (clay), or geosynthetic clay liners [GCLs]), or artificial substances (high-density polyethylene [HDPE], or linear low-density polyethylene [LLDPE]).

***Class 3 Ground Water*** – non-potable ground water; not used as a drinking water source due to a saline or total dissolved solids content of greater than 10,000 parts per million (TAC Title 30, Part 1, Chapter 350, Rule §350.52).

***Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)*** – Also known as Superfund. CERCLA is a Federal law passed in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act. The Acts created a special tax that goes into a Trust Fund, commonly known as Superfund, to investigate and clean up abandoned or uncontrolled hazardous waste sites. Under the program, EPA can either: (1) pay for site cleanup when parties responsible for the contamination cannot be located or are unwilling or unable to perform the work; or (2) take legal action to force parties responsible for site contamination to clean up the site or pay back the Federal government for the cost of cleanup.

***Contaminant of Concern (COC)*** – A contaminant at a Superfund site that is considered among the most abundant and/or the most toxic chemicals. When a contaminant of concern is targeted for cleanup, other chemicals that may be present typically will also be removed.

***Ecological Risk Assessment (ERA)*** – The application of a formal framework, analytical process, or model to estimate the effects of human actions(s) on a natural resource and to interpret the significance of those effects in light of the uncertainties identified in each component of the assessment process. Such analysis includes initial hazard identification, exposure and dose-response assessments, and risk characterization.

***Feasibility Study (FS)*** – A detailed evaluation of alternatives for cleaning up a site.

***Ground Water*** – Water found beneath the ground surface that fills the pores between soil, sand, and gravel particles to the point of saturation. When it occurs in a sufficient quantity and quality, ground water can be used as a water supply.

***Hazard Quotient (HQ)*** – The ratio of estimated site-specific exposure to a single chemical from a site over a specified period to the estimated daily exposure level at which no adverse health effects are likely to occur.

***Human Health Risk Assessment (HHRA)*** – Estimates the current and possible future risk if no action were taken to clean up a site. EPA's Superfund risk assessors determine how threatening a hazardous waste site is to human health and the environment. They seek to determine a safe level for each

potentially dangerous contaminant present (e.g., a level at which ill health effects are unlikely and the probability of cancer is very small).

***Institutional Controls (ICs)*** – Administrative and/or legal instruments that reduce the potential for human exposure to contaminated soil, soil vapor, or ground water by placing restrictions on the use or development of land and ground water within a defined area. IC instruments include restrictive covenants, deed notices, ordinances, zoning restrictions, building and excavation permits, easements, well drilling prohibitions, or the like, or any combination thereof. The selection of IC instruments must be mutually acceptable to the TCEQ and the EPA.

***Cell/Landfill*** – (1) Sanitary landfills are disposal sites for non-hazardous solid wastes spread in layers, compacted to the smallest practical volume, and covered by material applied at the end of each operating day. (2) Secure chemical landfills are disposal sites for hazardous waste, selected and designed to minimize the chance of release of hazardous substances into the environment.

***Leachate*** – Water that collects contaminants as it trickles through wastes, pesticides, or fertilizers. Leaching may occur in farming areas, feedlots, and landfills, and may result in hazardous substances entering surface water, ground water, or soil.

***Leachate Collection System*** – A system that gathers leachate and pumps it to the surface for treatment.

***Liner*** – A relatively impermeable barrier designed to keep leachate inside a landfill. Liner materials can be composed of natural materials (clay or geosynthetic clay liners [GCLs]) or artificial substances (high density polyethylene [HDPE] or linear low density polyethylene [LLDPE]).

***Maximum Contaminant Level (MCL)*** – MCLs are established under the Safe Drinking Water Act and are protective levels set for human exposure to a chemical in a drinking water source.

***Monitoring*** – Monitoring is the ongoing collection of information about the environment that helps gauge the effectiveness of a cleanup action. Monitoring wells and probes installed at different locations/depths/levels at a site are used to detect the presence of COCs in ground water and soil.

***National Oil and Hazardous Substances Pollution Contingency Plan (NCP)*** – The NCP is the Federal regulation that guides determination of the sites to be corrected under both the Superfund program and the program to prevent or control spills into surface waters or elsewhere.

***National Priorities List (NPL)*** – EPA's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term Remedial Action under Superfund. A site must be on the NPL to receive money from the Trust Fund for Remedial Action.

***Natural Attenuation (NA)*** – NA refers to the natural degradation processes that achieve site-specific remedial objectives. The natural attenuation processes that are at work in such a remedial approach include a variety of physical, chemical, and/or biological processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in soil and ground water. These *in situ* processes include biodegradation, dispersion, dilution, sorption, volatilization, and chemical or biological stabilization, transformation, or destruction of contaminants. Under the proper conditions, natural attenuation can contribute significantly to remediation of COCs.

***Non-Aqueous Phase Liquids (NAPL)*** – A NAPL is an organic substance that is relatively insoluble in water and may be lighter or heavier than water. “Light” NAPL tend to float on the water table, while “dense” NAPL tend to sink.

***Operable Unit*** – An operable unit is a discrete action that comprises an incremental step toward comprehensively addressing site contamination.

***Point of Compliance*** – As a general definition, the point of compliance for ground water is where a facility should monitor ground water quality and/or achieve Ground Water Standards to meet specific goals (definition at 40 CFR 264.95). The regulations require facilities to take action, if necessary, to achieve cleanup or containment levels within the volume of contaminated ground water at and beyond the point of compliance. Regulated Units are defined in 40 CFR 264.90 as surface impoundments, waste piles, land treatment units, and landfills. If the final ground water cleanup objective is to contain a plume rather than to return the ground water to its maximum beneficial use, the point of compliance should generally be located at and, if appropriate, beyond the boundary of the containment zone.

***Preliminary Remediation Goal (PRG)*** – PRGs are upper concentration limits for individual chemicals in environmental media and land use combinations that are anticipated to protect human health or the environment. For clarity, in the process of screening a soil against a certain contaminant, we define the health-risk-based preliminary remediation goal (PRG) as the contaminant concentration above which some remedial action may be required. Thus, PRG is the first standard (or guidance) for judging a site. The PRG levels developed for this Site subsequently became the remediation levels for the Site.

***Principal Threat Wastes*** – Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur. Wastes that generally will be considered to constitute principal threats include, but are not limited to, the following: (1) Liquid Source Material – waste contained in drums, lagoons or tanks, free product in the subsurface containing contaminants of concern; (2) Mobile Source Material – surface soil or subsurface soil containing high concentrations of COCs that are (or potentially are) mobile due to wind entrainment, volatilization (e.g., volatile organic compounds [VOCs]), surface runoff, or subsurface transport; (3) Highly-Toxic Source Material – buried drummed non-liquid wastes, buried tanks containing non-liquid wastes, or soils containing significant concentrations of highly toxic materials.

***RCRA Subtitle C Equivalent Cell (Landfill) and Cap*** – Generally, a cell (e.g., landfill) constructed to prevent movement of solids or liquids into or from the cell. During construction, the cell is lined on all sides and below with natural and synthetic (man-made) materials, and a leachate collection system is installed. Once the waste material has been placed into the cell, the cell is capped with a RCRA Subtitle C-compliant cap, which is a combination of natural and synthetic layers which prevent moisture from entering the waste area of the cell. The leachate collection and removal systems are installed to collect and convey liquids/leachate which may be released from the overlying waste and control the depth of leachate above the liner. A leak detection system is designed to detect leachate that may have escaped the primary liner.

***Record of Decision (ROD)*** – A ROD is a public document that provides the justification for the remedial action (cleanup) chosen at a National Priority Listed (Superfund) site. It also contains site history, site description, site characteristics, community participation, enforcement activities, past and present activities, contaminated media, the contaminants present, and the scope and role of the response action.

***Remedial Action*** – The actual construction or implementation phase of a Superfund site cleanup that follows Remedial Design.

**Remedial Action Objective (RAO)** – Objective established for CERCLA remedial actions that define the extent to which sites require cleanup to meet the objective of protecting human health and the environment.

**Remedial Design** – A phase of Remedial Action that follows the Remedial Investigation/Feasibility Study and includes development of engineering drawings and specifications for a site cleanup.

**Remedial Investigation (RI)** – The collection and assessment of data to determine the nature and extent of contamination at a site.

**Remediation Levels** – Remediation levels establish acceptable exposure levels (i.e., contaminant concentration levels) that are protective of human health and the environment, and are developed considering applicable, relevant, and appropriate requirements (ARARs), as specified in the NCP. The remediation levels for the Site are the same as the PRGs established in the FS. The term “remediation level” is used in order to make clear that the selected remedy establishes binding requirements to ensure that RAOs are satisfied. Remediation levels are the basis for defining the areas and volumes of environmental media subject to remedial action; the lower of the human health or ecological remediation level will be used in this determination.

**Resource Conservation and Recovery Act (RCRA)** – The Federal act that established a regulatory system to track hazardous wastes from the time they are generated to their final disposal. RCRA also provides for safe hazardous waste management practices and imposed standards for transporting, treating, storing, and disposing of hazardous waste.

**Screening Criteria** – Values or concentrations used with very conservative assumptions of risk (1<sup>st</sup> Tier checking of environmental data); do not include site-specific information.

**Source Material** – A source material is material that includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for migration of contamination to ground water, surface water, or air, or acts as a source for direct exposure.

**Sources of Contamination** – EPA typically describes sources as contaminated material that acts as a reservoir for the continued migration of contamination to surrounding environmental media (i.e., soil, ground water, surface water, sediment, or air), or provides a direct threat to a receptor.

**Texas Commission on Environmental Quality (TCEQ)** – The State of Texas regulatory entity responsible for environmental matters for the State including the permitting and cleanup of the Site. TCEQ includes and is used interchangeably in this ROD with its predecessor agencies including the Texas Natural Resource Conservation Commission (TNRCC), the Texas Water Commission (TWC), the Texas Department of Water Resources (TDWR), and the Texas Water Quality Board (TWQB).

**Vapor Intrusion** – Vapor phase migration of volatile organic and/or inorganic compounds into occupied buildings from underlying contaminated ground water and/or soil. Vapor Intrusion issues are addressed in EPA guidance documents, including but not limited to, OSWER – EPA530-D-02-004, November 2002.

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# **PART 2: THE DECISION SUMMARY**

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This Decision Summary provides a description of the site-specific factors and analyses that led to the selection of the sludge, contaminated soil, and ground water remedy for the Site. It includes background information about the Site, the nature and extent of contamination observed in environmental media, the assessment of human health and environmental risks associated with potential exposure to the contaminants present in environmental media, and the identification and evaluation of remedial action alternatives for the Site.

## **2.1 SITE NAME, LOCATION, AND BRIEF DESCRIPTION**

The Malone Service Company, Inc. (MSC) Superfund Site (the Site), which operated from approximately 1964 to 1996, is a former waste disposal facility and reclamation plant for waste oils and chemicals. The National Superfund Database Identification Number is TXD980864789. The former facility consisted of approximately 150 total acres, with approximately 75 acres developed for operations. The Site is located on Campbell Bayou Road in Texas City, Galveston County, Texas (Figure 1). The Site is bordered to the east by Galveston Bay and to the northeast by Swan Lake, which is an embayment of Galveston Bay. The closed Solutia South 20 Site borders the Site on the southwest. The land directly north and west (approximately 200 acres) is owned by Gulf Coast Waste Disposal Authority (GCWDA); GCWDA provides landfill disposal of non-hazardous wastes to area industrial facilities. The former Texas City Municipal Landfill is located adjacent to and north of the GCWDA property, and northwest of the Site. Undeveloped marsh and wetlands owned by Scenic Galveston, a non-profit land trust and conservation organization, border the southern portions of the Site; Scenic Galveston owns the remaining 1,500-acre property surrounding GCWDA and the Site, and controls access to the Site.

The MSC Site is enclosed by a storm surge levee with an average elevation of 18 feet and a maximum elevation inside the levee of approximately 5 feet above sea level. All precipitation which falls on the Site is collected in hazardous waste management units or in site drainage ditches. While the access road is gated, the Site is otherwise unfenced.

The facility is approximately two miles south of the Texas City Industrial Complex, which includes several oil refineries, oil tank farms, chemical plants, loading docks, shipyards, and municipal and hazardous waste landfills. The geographic coordinates are latitude 29° 19' 59" north and longitude 94° 54' 18" west. The nearest residential center to the Site is Bayou Vista, approximately 1.5 miles to the west. No public water supply or domestic drinking water wells were identified within a 1-mile radius of the Site. GCWDA has one active industrial well on-site; the well is screened from 260 to 280 feet. Water from this well is not used for drinking water, but the well is connected to a shower and sink.

The Site was operated by the Malone Service Company (MSC) as a permitted waste disposal facility for more than thirty years. The MSC facility was permitted as a commercial storage, processing, and disposal facility authorized to store and process industrial solid waste and hazardous wastes. The facility was also permitted in 1970 to dispose of liquid hazardous and non-hazardous waste by means of deep well injection. The permit authorized the discharge of storm water runoff. The State of Texas revoked the facility permits on May 6, 1997, due to repeated permit violations.

Contaminants of concern (COCs) identified at the Site include metals, semivolatile organic compounds (SVOCs), volatile organic compounds (VOCs), dioxin, and polychlorinated biphenyls (PCBs). Contaminants exist in sludge, soil, and ground water. The COCs in soil and sludge are presented on Tables 1 and 2. A more complete description of the Site can be found in Section 1.0 of the Remedial

Investigation Report (URS 2006a). The U.S. Environmental Protection Agency (EPA) was the lead agency during the RI/FS and for the preparation of the Record of Decision (ROD); the TCEQ is the support agency. There are potentially responsible parties (PRPs) identified for the Site; a group of PRPs, known as the Malone Cooperating Parties, funded and conducted the Remedial Investigation/Feasibility Study (RI/FS) pursuant to an administrative order on consent with EPA.

## **2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES**

This section of the ROD provides the history of the Site and a brief summary of TCEQ's, MSC's, EPA's, and the Malone Cooperating Parties' (MCP's) investigation work, as well as TCEQ's and EPA's enforcement efforts.

### **2.2.1 History of Site Operations/Activities**

MSC began operating the Site in 1964 as a reclamation plant and disposal facility for waste oils and chemicals. Six storage and disposal pits, reclaiming tanks, and a burning pit were permitted. The facility was permitted to dispose of liquid hazardous and non-hazardous waste by means of deep well injection; two injection wells were used—WDW-73 (permitted 1970) and WDW-138 (permitted 1977). The MSC facility was permitted as a commercial storage, processing, and disposal facility authorized to store and process industrial waste under a Texas Natural Resources Conservation Commission (TNRCC – predecessor agency of TCEQ) Hazardous Waste (HW) permit on September 14, 1984. The permit authorized the receipt of Class 1 (hazardous) and Class 2 (non-hazardous) industrial solid waste, and authorized the discharge of storm water runoff.

MSC received a variety of waste products from surrounding industries, including acids and caustics; contaminated residues and solvents; spent drilling fluids; acids containing heavy metals, inorganic slurries, gasoline and crude oil tank bottoms; contaminated earth and water from chemical spill cleanups; general industrial plant wastes; phenolic tars; and waste oils. The recent RI Report documented that the COCs at the Site include metals, SVOCs, VOCs, as well as dioxin and PCBs (Tables 1 and 2).

The identified operating areas at the Site included the Earthen Impoundment (Sludge Pit and Oil Pit); the Unit 100 API Separator; the Unit 1200 Separator; the WDW-138 injection well; the WDW-73 injection well; the Unit 900 Distillation Area; and the Unit 300, Unit 400, Unit 700, and Unit 800 tanks. Non-operating areas at the Site include the surface water features, the drainage ditch system, the Cemetery Area, and the Laydown Area. In addition, other portions of the Site, designated as Unused Area 1, Unused Area 2, and the Borrow Area, are included in the non-operating areas (Figure 2).

The liquids injected into the two deep wells included wastewater submitted to the facility for disposal; storm water from the Sludge Pit, the Oil Pit, and the separators; and decontamination water collected in the separators. During MSC operations, waste materials accumulated in the Earthen Impoundment, API separators, and tanks.

### **2.2.2 Enforcement Actions/Activities**

The State of Texas ordered MSC to take the Earthen Impoundment (i.e., the Sludge Pit and Oil Pit) out of service in 1979. MSC began closure of the impoundment as a unit not subject to Resource Conservation and Recovery Act (RCRA) regulations in 1983. A synthetic cover/liner and sand were placed in one portion of the impoundment and a leachate collection system was installed around the perimeter of the impoundment. The Oil Pit portion of the Earthen Impoundment was capped with soil.

The State of Texas filed suit against MSC alleging improper waste disposal and waste permit violations. Based upon a jury finding that MSC seriously violated its permits, judgment was entered against MSC on August 14, 1989, and became final in 1993. In May 1997, the TNRCC revoked MSC's hazardous waste storage and injection well permits. In January 1996, prior to the final Order revoking the permits, all waste shipments to the Site ceased (TNRCC 1998).

In July 1998, the TNRCC and the State of Texas Office of the Attorney General filed to force MSC into involuntary Chapter 7 bankruptcy. Subsequently, the property was auctioned in Federal Bankruptcy Court and was awarded to Southeast Texas Environmental LLC in September 1999. The MSC Site was proposed for placement on the National Priorities List (NPL) on August 24, 2000. The Final NPL Listing was effective on July 16, 2001. The Site was subsequently acquired by Regor Properties in December 2001.

On September 29, 2003, EPA entered into an Administrative Order on Consent (Order No. 06-18-03) with the MCP to conduct an RI/FS. The MCP is composed of private companies who committed to perform the RI/FS. The MCP assumed storm water management activities at the Site from EPA in 2004; the Order was amended on July 19, 2004, to document this transfer of responsibilities.

In November 2007, the MCP reached a court-approved settlement agreement with the former Site owner, which requires that the land eventually be transferred to an environmental non-profit organization or, if such a transfer cannot be completed, requires that the land be used in the future only to complete the response action and for purposes not inconsistent with final use as a natural preservation or conservation area.

### **2.2.3 History of Federal and State Investigations**

Historic investigations were conducted by MSC and predecessor agencies of TCEQ. MSC conducted a ground water assessment for the closure of the Earthen Impoundment in May 1982 (Law 1982). Results of the assessment were submitted to the TWC. The assessment consisted of exploratory soil borings for stratigraphy data and geotechnical parameters, and collection of water quality samples from piezometers (wells) and the deep water supply well.

EPA conducted a preliminary review (PR) of the available site information followed by a visual site inspection (VSI) in August 1988 (Kearney et. al. 1989). The purpose of these activities was to identify releases or potential releases requiring investigation at hazardous waste management facilities. Solid waste management units (SWMUs) and other areas of concern were identified during the inspection. The histories of the SWMUs and waste handling activities were documented in the PR/VSI report submitted to EPA (Kearney et. al. 1989).

The TNRCC conducted a Screening Site Inspection (SSI) in January 1997. SSI activities included on-site and off-site reconnaissance, record searches, on-site and off-site sample collection, and interviews with site representatives (TNRCC 1998). The EPA Region 6 Response and Prevention Branch conducted removal assessment activities at the Site in 1999.

EPA and the MCP (the PRPs) conducted several investigations from 2004 to 2008. Historic documents were reviewed to develop an understanding of Site operations and Site soils and ground water contamination. The Preliminary Site Characterization Report (PSCR) (URS 2004a) and the Preliminary Remedial Alternatives Evaluation Report (PRAER) (URS 2004b) documents were developed following the review. The MCP began active sampling of the Site in July 2005 through 2007 to define nature and

extent of contamination in soils and ground water, and define the risks to human health and ecological receptors. The documents developed in this period were the RI Report (URS 2006a), which determined the nature and extent of contamination; the Baseline Human Health Risk Assessment (BHHRA) Report (URS 2007a); and the Baseline Ecological Risk Assessment (BERA) Report (URS 2007b). The Stabilization/Solidification Treatability Study Report (Shaw 2008) was completed to determine effective reagents, which would solidify the sludge for placement in a RCRA Subtitle C or D cell (landfill). The FS Report (URS 2008) was developed to present potential remedies for Site wastes.

## **2.2.4 History of CERCLA Removal Actions**

The EPA Region 6 Response and Prevention Branch conducted removal assessment activities at the Site between July and October 1999. Objectives of the assessment included: (1) identify the quality of actual and potential runoff from the Site; (2) determine the available freeboard of on-site containment; (3) evaluate the condition of on-site tanks and characterize tank contents; (4) inventory facility laboratory contents; (5) inventory and characterize on-site drums, buckets, and containers; (6) evaluate and characterize the two API separators; (7) perform preliminary inspection of settling basin (sludge pit) impoundment containment, and (8) evaluate the condition of the two on-site Class 1 injection wells.

Following the removal assessment activities, the EPA Region 6 Response and Prevention Branch conducted an emergency response action in April and May 2000 (Ecology and Environment [E&E] 2000). Approximately 1,767,196 gallons of material were removed from the tanks with approximately 1,987,807 gallons of solids and sludge remaining in the tanks. Approximately 918,024 gallons of oil were sent to recyclers and cement kilns (E&E 2000). In addition, underground injection well WDW-138 was rehabilitated during November 1999 to receive hazardous liquids during the response action. Water that accumulated in the surface impoundments and tank containment areas during rain events was pumped to the WDW-138 injection well. Approximately 3,227,867 gallons of tank liquids and storm water were disposed of in WDW-138 between December 1999 and May 2000.

Following the September 29, 2003, Administrative Order on Consent (the Order) agreement between EPA and the MCP, the MCP agreed to an Order amendment (signed July 19, 2004), whereby the MCP assumed storm water management activities from the EPA Region 6 Response and Prevention Branch. To date, the MCP continues management of storm water. The Storm Water Management Plan (SWMP) – Deep Well Operations and Maintenance Plan (URS 2005a), sets forth the requirements to manage the storm water runoff from the Site pursuant to Paragraph 34 of the Administrative Order on Consent (Order Number 06-18-03), as amended. Storm water management activities include: (1) the management of precipitation that falls on the Site, but not in hazardous waste management units, to be directed to the surface discharge point to Galveston Bay via drainage ditches; prior to discharge the storm water is sampled, following analytical parameters in the SWMP, and discharged off-site into Galveston Bay; (2) precipitation which falls within the hazardous waste management units, and requires extraction to maintain freeboard, is pumped from the bermed containment areas to the on-site injection well for disposal following injection well disposal parameters in the SWMP.

The EPA approved a request from the MCP to remove tank liquid contents; the Addendum No. 1 to the SWMP (URS 2007c) was approved by EPA in November 2007. To enhance the storm water management program, the MCP removed oil and water-phase liquids from deteriorated tanks located at the Site from October through December 2007. The purpose of the removal was to reduce fluid levels, consisting of varying amounts of oil and water, within the tanks and thereby lessen the potential for uncontrolled releases within the Site. Tanks on the Site contained varying amounts of oil, water, and sludge. Oil consisted of the residual oil remaining after the EPA removal action in 2000 (E&E 2000). Water in the tanks consisted of rainwater accumulated over time through holes in the tank roofs. Residual

sludge in the tanks included a thick oily residue and non-pumpable oil/water emulsion and solids. Approximately 169,100 gallons (4,025 barrels) of oil were recycled off-site. Approximately 461,251 gallons (10,892 barrels) of water were disposed in the on-site injection well, WDW-138. Approximately 43,680 gallons (1,040 barrels) of water were placed in the separators for future disposal into the on-site injection well. The action was completed on January 10, 2008. The residual sludge remaining in the tanks includes a thick oily residue and non-pumpable oil/water emulsion and solids, which will be managed during the Remedial Action (RA) phase of the project.

### **2.2.5 Site Listed to NPL**

The EPA published a proposed rule on August 24, 2000 (Federal Register Listing [FRL] 6856-7, Vol. 65, No. 165, pages 51567-51572), to add the Malone Service Company Site to the NPL of Superfund sites. The Site was added to the NPL in a final rule published on June 14, 2001 (FRL 6994-4, Vol. 66, No. 115, pages 32235-32242). The effective date of the amendment to the NCP listing the Site on the NPL was July 16, 2001.

## **2.3 COMMUNITY PARTICIPATION**

Following the Site's NPL listing, EPA has kept the community informed on Site activities through informational meetings, public meetings, issuance of Fact Sheets, maintenance of a public website (<http://www.epa.gov/earth1r6/6sf/pdffiles/0602922.pdf>), as well as meetings and communications with Texas City officials. Specific information on community participation is summarized in the following subsections.

### **2.3.1 Community Involvement Plan**

A Community Involvement Plan (CIP) (U.S. EPA 2005a) was prepared to facilitate two-way communication between the local community and EPA and to encourage community involvement in Site activities. EPA utilizes the CIP to ensure that residents are informed and provided with opportunity to participate in Site decisions. A copy of the CIP, dated May 1, 2005, is provided in the Administrative Record.

### **2.3.2 Community Participation Activities**

Community participation to date has included the following activities:

- Fact sheets sent to citizens on the Site mailing list;
- Meetings with citizens and Texas City representatives; and
- Public Meeting following issuance of the Proposed Plan.

A Fact Sheet was distributed to the community to announce the availability of the Proposed Plan. The Proposed Plan for the Site was made available to the public in May 2009 and can be found in the Administrative Record maintained with the TCEQ, EPA Region 6, and at the Moore Memorial Public Library in Texas City. The notice of the availability of the Proposed Plan was published in the *Galveston County Daily News* on May 20, 2009. A public comment period was held from May 22 to June 22, 2009. In addition, a public meeting was held in Texas City on June 9, 2009, to present the Proposed Plan to the community. At this meeting, representatives from EPA and the TCEQ answered questions about the Site and the remedial alternatives presented in the Proposed Plan. EPA's responses to the comments received

during the public comment period for the Proposed Plan are included in the Responsiveness Summary (Part 3) of this ROD.

### **2.3.3 Local Site Repository**

The purpose of the local Site Repository is to provide the public a location near the community to review and copy background and current information about the Site. The Site's repositories are located at:

#### **EPA Region 6**

7<sup>th</sup> Floor Reception Area  
1445 Ross Avenue, STE 12D13  
Dallas, TX 75202-2733  
Toll free: 1-800-533-3508 or (214) 665-6597  
Monday – Friday, 7:30 – 11:00 a.m./1:00 – 4:00 p.m.

#### **Texas Commission on Environmental Quality**

Records Management Center  
Technical Park Center Bldg. E., 1<sup>st</sup> Floor  
12100 Park Circle  
Austin, TX 78753  
Toll free: 1-800 633-9363 or (512) 239-9363  
Monday – Friday, 8:00 a.m. – 5:00 p.m.

#### **Moore Memorial Public Library, Texas City**

1701 9<sup>th</sup> Avenue N.  
Texas City, TX 77590  
(409) 643-5979  
Monday – Wednesday, 9:00 a.m. – 9:00 p.m.  
Thursday – Friday, 9:00 a.m. – 6:00 p.m.  
Saturday, 10:00 a.m. – 4:00 p.m.

## **2.4 SCOPE AND ROLE OF RESPONSE ACTION**

EPA has chosen to address Site contamination with only one operable unit for this Site; the selected RA addresses all contaminated environmental media (sludge, soil, and ground water) in this operable unit. This response action is the final Site remedy and is intended to address fully the threats to human health and the environment posed by the conditions at this Site.

The selected remedy was developed by combining components of different source control and management of migration alternatives to obtain a comprehensive approach for Site remediation. The purpose of this response action is to implement a site-wide strategy to: (1) reduce risks to human health and ecological receptors from the Site sludge (the principal threat waste/source material) and contaminated soils by solidifying the sludge and placing the solidified material, as well as unsolidified contaminated soils, in an on-site RCRA Subtitle C equivalent cell (landfill); and (2) monitor ground water for degradation of chemical constituents and to detect and mitigate any off-site migration of ground water above the TCEQ Class 3 Groundwater Protective Concentration Levels (30 Texas Administrative Code [TAC], Chapter 350, Subchapter D) for commercial/industrial settings, and prevent exposure to contaminated ground water onsite through institutional controls. This RA will remediate the Site to levels

appropriate for reuse as a preserve or conservancy. The remedial methods can be found in Section 2.9 of this ROD.

TCEQ Class 3 PCL values are greater than the MCL values because Class 3 ground water is non-potable; in contrast, MCLs address drinking water aquifers. The TCEQ, as partner with EPA Region 6, uses its “Tier 1 Groundwater PCLs” to address Class 2 and 3 ground water. The TCEQ PCLs for Class 3 ground water values will be used to define the plume concentrations, above which, the plume cannot migrate off-site. Off-site migration must be addressed with action levels because a surface water discharge point is not known.

## **2.5 SITE CHARACTERISTICS**

This section of the ROD provides a brief description of the Site’s characteristics, and the RI sampling strategy and results. This section also presents the Conceptual Site Model (CSM), which illustrates contaminant sources, release mechanisms, exposure pathways, migration pathways, and potential receptors. Detailed information on the Site’s characteristics and RI findings can be found in the RI Report (URS 2006a). Section 2.0 of the FS contains an overview of the RI (URS 2008). The significant findings of the RI are summarized below.

### **2.5.1 Conceptual Site Model**

The CSM is a three-dimensional “picture” of site conditions that illustrates contaminant sources, release mechanisms, exposure pathways, migration routes, and potential human and ecological receptors. It documents current and potential future site conditions and shows what is known about human and environmental exposure through contaminant release and migration to potential receptors. The risk assessment and response action for the sludge, contaminated soil, and ground water is based on this CSM. The CSM for the site is presented in the BHHRA and BERA, which relate to specific media and investigative areas of the Site (see Figure 2 – Investigative Areas).

The primary identified sources of contamination at the Site are oily sludge located in the Earthen Impoundment, the Unit 100 APU Separator, the Unit 1200 API Separator, and Aboveground Storage Tanks (ASTs). Estimates for the total sludge volume range from approximately 184,000 to 246,000 cubic yards (yd<sup>3</sup>) with an average of 215,000 yd<sup>3</sup>. The other sources of oily sludge are buried pits and source material which has migrated into subsurface soils.

The primary release mechanisms leading to ground water contamination include the 5-acre Sludge Pit and 0.5-acre Small Oil Pit in the Earthen Impoundment area, both of which are 37 feet deep and extend into the paleochannel aquifer. An earthen berm surrounds the pits, and approximately 23 feet of the pits are below the original ground surface. Additional release mechanisms include leaks and spills from ASTs, two API oil/water separators, and two buried pits containing a soil-sludge mixture, all of which add some subsurface contamination.

Secondary sources of contamination are contaminated soils, which exist due to general Site operations, such as spills from stockpiling of materials and equipment, and construction of shallow pits used for burning or short-term storage. Leaching to ground water is a potential secondary release mechanism from the contaminated soils. VOCs may partition into the vapor phase from the dissolved-phase ground water.

Class 3 ground water contaminant concentrations appear to be relatively minor but constant, with the ground water plume remaining near the specific source areas (Figure 3). Ground water contamination has

been documented in some parts of the shallow paleochannel aquifer, with minor contamination in the floodplain silts (overbank material), which exist along both sides of the paleochannel. A more detailed analysis of the hydrogeology of the Site is given below. No public or private off-site wells exist within one mile of the Site.

Potentially sensitive populations, such as residential receptors, are not expected for the Site because it is an isolated facility in an industrial area. Long-term continuous exposure to Site conditions is also not expected. However, complete exposure pathways to surface soil, subsurface soil and ground water were identified for construction workers, industrial workers, and recreational bird watchers, and a complete exposure pathway to surface water was identified for recreational waders, fishers or swimmers (BHHRA Report). Full detail of the potential exposure pathways for each area are contained in the BHHRA.

The only feature on the Site which may be considered an archaeological or historic feature is a cemetery dating to the 1800s (approximately 75 feet by 75 feet).

### **Site Hydrogeology**

The dominant hydrogeologic unit beneath the MSC Superfund Site is the paleochannel. A secondary distributary channel bifurcates from the main channel in the area between the Freshwater Pond and Earthen Impoundment.

The vadose zone (the unsaturated zone above the water table) is fairly uniform across the Site. The vadose zone in the vicinity of the plume areas ranges in thickness from 10 to 12 feet, and consists of predominantly clays with some minor silty clay lenses (Figures 4 and 5); due to the overlying clays, the shallow paleochannel aquifer and associated floodplain silts are confined.

Shallow ground water beneath the MSC Superfund Site is primarily restricted to the fine silty sands in the buried paleochannel. Three additional transmissive or potentially transmissive zones have also been identified outside the paleochannel (the -10 zone, the -20 zone, and the -40 zone). These zones generally consist of interbedded silty clay, silty and clayey to silty sand layers. Beneath some parts of the Site, these transmissive or potentially transmissive zones are laterally continuous, whereas they are thin or absent in other areas. In areas where the paleochannel is present, the upper part of the paleochannel may coincide with the -10 zone, and may be continuous into the underlying -20 zone. The -40 zone is underlain by a thick clay to at least 80 feet below ground surface.

Considering the confined nature of the shallow paleochannel aquifer, infiltration of contaminants to ground water from surface soils is assumed to be minor; the primary source of contaminants to ground water appears to be from pits excavated through the shallow clays into the paleochannel or floodplain silts, as evidenced on Figures 5, 6, and 7. The saturated paleochannel varies in thickness from approximately 14 to 20 feet, and consists of unconsolidated sands and silty sands; the associated floodplain silts are approximately 2 to 4 feet thick.

Ground water at the Site was evaluated site-wide. Using the TCEQ Ground Water Resource Classification Logic Diagram, the applicable ground water classification for the contaminated shallow ground water is Class 3; Class 3 ground water resources are not considered usable as drinking water and are not subject to drinking water criteria. The shallow aquifer or Ground Water Bearing Unit (GWBU), at the Site does not meet the requirements to be designated as Class 1, because the affected ground water is greater than 1 mile from a public water supply well; the GWBU is shallower than 800 feet; and the water is saline (total dissolved solids [TDS] greater than 10,000 milligrams per liter [mg/L]). In addition, the GWBU does not meet the Class 2 criteria of a production zone within 0.5 mile of the Site that is used for human consumption, agriculture, or other exposure that could result in human or ecological exposure.



Class 3 ground water is non-potable; however, Class 3 ground water contaminant levels are applicable. Concentrations of benzene, 1,2-dichloroethane, and trichloroethene have been detected in ground water in excess of the TCEQ Class 3 Groundwater Protective Concentration Levels (PCLs). The contaminated shallow ground water is localized near three areas of former operations. Because the ground water is not usable as drinking water, the potential risk was evaluated in the BHHRA based on inhalation of volatile emissions from impacted ground water.

Twenty-two site monitoring wells (four are duals) were completed in the late 1970s and early 1980s; an additional seven monitoring wells were completed in 2006. Several historic ground water gauging periods have documented that ground water flow is at times in to the Site or out to Galveston Bay. It appears that tidal effect, at times, redirects the flow of ground water from and into the Site. Although ground water flow velocity could be calculated, the values would be inaccurate and the data would be unusable in a numerical transport model due to the change in ground water gradient – flow direction. Regardless of the flow direction, ground water flow is along the center of the paleochannel, which consists of one channel entering at the west corner of the site, bifurcating at the center of the Site, with each bifurcated channel exiting east and south of the Site (Figure 7). The apparent stable nature of the contaminant plumes, based on available historic analytical data, is possibly due to one or a combination of low contaminant source dissolution, relatively rapid degradation rates, and/or low mobility/transport velocity due to tidal affect on ground water.

The Site is enclosed by an 18-foot-high storm surge levee; all precipitation which falls on the Site is collected in hazardous waste management units or in site drainage ditches. Water within hazardous waste units is pumped to the injection well for disposal; all remaining storm water is redirected by the drainage ditches to a sump, and is discharged to Galveston Bay if storm water samples meet the SWMP parameters.

## 2.5.2 Site Overview

The Site encompasses approximately 150 acres, with the former MSC operations occupying approximately 75 acres (Figure 1). The Site is located within the Texas City limits, but in a remote location southeast of the City. The Census Bureau estimated in 2006 that Texas City is home to approximately 45,070 residents. The city is approximately 167.2 square miles in size, of which 62.4 square miles are land and 104.9 square miles are water (some sections of water within the Texas City limits are within Chambers County), and has a population density of approximately 665 persons per square mile. The nearest residential center to the Site is Bayou Vista, approximately 1.5 miles to the west.

The climate for the Texas City area is characterized by high humidity and mild climate. Average temperatures in winter are 55 degrees Fahrenheit (°F) and 82°F in summer (U.S. Department of Agriculture [USDA] 1988). The average annual rainfall from 1964 to 2002 was 50.6 inches, with heavy rains in winter and early spring. The annual lake surface evaporation rate for the same period was 48.0 inches. Since 1964, several major tropical storms and hurricanes have passed through or near the Galveston-Houston area. The 24-hour rainfall record (43 inches) for the continental United States was recorded in Alvin, Texas during Tropical Storm Claudette in 1979. A maximum storm surge of 22 feet was recorded during Hurricane Carla in 1961 (URS 2006a).

The Site is located adjacent to marsh land and the west bank of Galveston Bay. The topography of the Site is generally flat. The Virginia Point 7.5-minute, topographic quadrangle map shows the Site land surface averaging about 5 feet above mean sea level (msl). The waste management facilities were

constructed inside the 18-foot-high flood protection levee, which completely surrounds the Site, are at elevations ranging from approximately 5 to 8 feet above msl (U.S. Geological Survey [USGS] 1994).

The Site is approximately 2 miles south of the Texas City Industrial Complex. No public water supply or domestic drinking water wells were identified within a 1-mile radius of the Site. There are no known or suspected surface water drinking intakes located in the Lower Galveston Bay segment.

### 2.5.3 Site Features

Site features can be found on Figure 2. The key Site facility components are:

Earthen Impoundment (Sludge Pit and Oil Pit)	Distillation Unit
Other Pits	Injection Wells
Freshwater Pond	Buildings, Utilities, and Wells
Unit 100 API Separator	Decanning Area
Unit 1200 API Separator	Cemetery
ASTs	Laydown Area
Sumps	

Of these, the former operating areas at the Site include the Earthen Impoundment (the Sludge Pit and the Oil Pit), the Unit 100 API Separator, the Unit 1200 Separator, the WDW-138 injection well, the WDW-73 injection well, the Unit 900 Distillation Area, and the Unit 300, Unit 400, Unit 700, and Unit 800 tanks. The primary locations of residual waste materials at the MSC Superfund Site are the Earthen Impoundment (the Sludge Pit and the Oil Pit), the Unit 100 API Separator, the Unit 1200 API Separator, and the ASTs, all of which contain oily sludge. Oily sludge has been found in soils in the Maintenance Area, near the Tank 800 Area, and in the Cemetery Area, discussed below.

Non-operating areas at the Site include the surface water features, the drainage ditch system, the Cemetery Area, and the Laydown Area. In addition, other portions of the Site, designated as Unused Area 1, Unused Area 2, and the Borrow Area for the purposes of the RI, are included in the non-operating areas. While these areas are called “non-operating,” significant contamination has been identified in at least two of these areas, the Cemetery Area and the Laydown Area; subsurface soils in the Cemetery Area also contain source material. Surface water features at the Site include the drainage ditches and the Freshwater Pond; the off-site surface feature investigated during the RI is the Marsh Area, northeast of the Site, between the levee and Swan Lake, which received storm water discharge from the Site.

The following is a description of the operating and non-operating areas of the Site. These areas are depicted on Figure 2.

#### 2.5.3.1 Non-Operating Areas

##### *Laydown Area*

MSC used the Laydown Area for storage of miscellaneous equipment, debris, and concrete rubble that remains on-site. There is no evidence of waste disposal activities in the Laydown Area, but the miscellaneous equipment, debris, and concrete rubble may have contained waste materials. Soil surfaces in some portions of the Laydown Area contain asphaltic-like materials and sulfur. Visual observations demonstrate the discharge/runoff from on-site drainage ditches was (and is currently) channeled to the Freshwater Pond and the Laydown area.

### *Cemetery Area*

The Campbell Bayou Cemetery is located on the property, between Unit 900 and the Oil Pit, and is part of the investigative area referred to as the Cemetery Area. The cemetery, which served the settlers of Campbell Bayou, is mentioned on a historical marker located near Interstate 45. Reportedly, James and Mary Campbell settled on a one-third league of land (1,476 acres) on Campbell's Bayou at Swan Lake in 1838. The Campbells and other residents of Campbell Bayou are reportedly buried in the Campbell Bayou Cemetery.

Sludges and releases of hazardous substances exist in the cemetery area, but the area contains debris and rubble. Additional pre- and post-construction activities will be needed to address the presence of the cemetery at the Site. Pre-construction activities include an archaeological survey of the cemetery area. To afford placement of the cell in the proposed location as depicted on Figure 9, potential relocation of the cemetery may be required. This potential need is being discussed with all relevant local, State, and Federal authorities, and relatives of those buried in the cemetery. If the cemetery cannot be relocated, the relocation of the proposed RCRA Subtitle C equivalent cell will be required.

### *Unused Areas*

Unused Area 1 is located between the Freshwater Pond and the hurricane levee adjacent to the closed Solutia South 20 Site (Figure 2). There is no evidence that wastes were disposed of or stored in Unused Area 1. The Earthen Impoundment soils area is located southeast of the bermed Sludge Pit (Figure 2). Unused Area 1 and the Earthen Impoundment soil areas were combined for the risk assessments because soil chemical of potential concern (COPC) concentrations were similar and land usage by current and future receptors would be similar.

Unused Area 2 is located between the operating areas, the Borrow Area, and the closed Solutia South 20 Site (Figure 2). Unused Area 2 includes the Unit 1200 Separator and the WDW-138 injection well. Most of the waste that entered the plant was treated in the Unit 100 API separator; the Unit 1200 API separator served as a backup. The Unit 1200 API Separator is currently operated as a settlement basin for the storm water management program (URS 2005a; URS 2005b). Injection Well WDW-138 is located in the east corner of Unused Area 2 and was part of the Unit 1100 waste disposal area. Wastewater is injected for disposal into the Miocene sands at a subsurface interval between 3800 and 5300 feet. WDW-138 has passed the most recent mechanical integrity tests (Sandia 2005). The well is currently operated to manage Site storm water under a TCEQ and EPA approved Storm Water Management Plan and Operations and Maintenance Plan (URS 2005a, URS 2005b). One 2,200-gallon concrete-lined sump is located in Unit 1100 adjacent to WDW-138.

### *Borrow Area, Office, and Wells*

The Borrow Area is located south of the main operating area and is separated from the main facility by an interior hurricane levee (Figure 2). The Borrow Area is undeveloped and there is no information demonstrating that the area has ever been used for handling or storage of waste.

An office building containing a garage and laboratory are located near the entrance to the Site. Across from the laboratory is the weigh room. One septic tank is located adjacent to the office on the west side, and three laboratory waste holding tanks are located on the west side of the laboratory.

A non-potable water well is located in Unit 700; the well is screened from 183 to 198 feet below ground surface (bgs). According to available information, this well was not used as a drinking water source during facility operations and is currently not used as a drinking water source. GCWDA has one active

industrial well on its property; the well is screened from 260 to 280 feet. Water from this well is not used for drinking water, but the well is connected to a shower and sink in a bathroom (Eckenrod 2005). No public water supply or domestic drinking water wells were identified within a 1-mile radius of the MSC Superfund Site.

### **2.5.3.2 Operating Areas**

#### *Earthen Impoundment*

MSC reportedly operated the Earthen Impoundment from 1964 to 1979. The impoundment consists of two pits; the large pit is termed the “Sludge Pit,” and the small pit is termed the “Oil Pit.” MSC used the Sludge Pit as a waste receiving/treatment unit for the separation of oil, water, and solids from a variety of industrial waste streams. Volume estimates for the Sludge Pit range from 150,000 to 190,000 yd<sup>3</sup> (URS 2008). Most of the volume variation is due to the differences in estimating the depth of the earthen impoundments (dikes), which is approximately 37 to 40 feet below the crest of the approximate 15-foot-high levee/berm, which surrounds the pit. The Oil Pit is approximately 33 feet deep from the top of the berm. Volume estimates for the Oil Pit range from 20,000 to 39,000 yd<sup>3</sup> (URS 2008).

#### *Maintenance Area*

The Maintenance Area consists of the Unit 300, Unit 400, Unit 700 and Unit 900 series aboveground storage tanks, the maintenance shop building, and former pits areas. In addition, the area includes the Former Backwash Pit and five oil/water pits (slop oil pits), which are described further below.

#### *Backwash Pit*

MSC reportedly operated a Backwash Pit from 1970 to 1982. The Backwash Pit was located approximately 100 feet south of the Unit 700 area and directly east of the Oil Pit. The pit volume was approximately 465 cy<sup>3</sup> (50 feet by 50 feet by 5 feet). MSC used the pit to dispose of the Unit 700 (WDW-73) filter backwash water. In 1982 (or later), MSC excavated the pit until the natural clay was visible. No confirmatory sampling was performed. Excavated soils were reportedly placed in the Sludge Pit and the Backwash Pit was backfilled and returned to the original surface grade.

#### *Other Pits*

A 1969 aerial photograph of the Site shows five oil/water pits (slop oil pits) near the Sludge Pit. The location of one pit appears to be under the paved area behind the shop and north of the Earthen Impoundment, and two pits were located in the current Tank 300 area. The other two pits were located in a cleared area north of the Tank 300 area and east of the 400 series tanks. The pits do not appear on a 1978 aerial photograph. Closure records for these pits have not been located.

#### *Drainage Ditches and Freshwater Pond*

The drainage ditch system throughout the facility discharged into the Freshwater Pond located on the west side of the MSC Superfund Site. The drainage system collected storm water and any spills that escaped the containment areas in the plant process areas. The Freshwater Pond is an excavated pit with a volume of approximately 20,000,000 gallons (267,000 cubic feet).

#### *Unit 100 API Separator*

The Unit 100 API separator is an in-ground, concrete unit consisting of four separate basins and a system of baffles and/or weirs. MSC used the separator for the equalization of various waste streams and separation into aqueous, organic, and solid phases. The oil fraction was removed from the surface of the separator and pumped or trucked to the oil blending tanks for reclamation. The aqueous phase was ultimately pumped to one of the injection wells for disposal. Solids were removed with a backhoe to a solids handling area on the far side of Basin A or to the Solids Mixing Bin. Reportedly, acid neutralization, caustic neutralization, and flocculation also occurred in the separator. The volume of the Unit 100 API separator was estimated by EPA as 23,150 yd<sup>3</sup>. The separator is approximately 6 feet deep, and located above the main distributary paleochannel that crosses beneath the MSC Superfund Site.

#### *Unit 1200 API Separator*

MSC operated one additional concrete lined separator, designated as the Unit 1200 API separator (Figure 2). This separator, installed in 1987, served the same purpose as the Unit 100 API separator. The volume of the separator is approximately 5,630 yd<sup>3</sup>. A sludge profile generated during the 1999 removal assessment showed the sludge depths to be approximately 1 to 6.8 feet. During facility operations, sludge was mixed with fly ash and gypsum in the solids treatment area using a small front-end loader. The solidified solids from the Unit 100 API separator were also placed in the solids treatment area. After solidification, solids were loaded into dump trucks and reportedly hauled off-site for disposal.

#### *Distillation Unit*

The distillation unit (Unit 900) was constructed in 1978 to treat incoming oil wastes by distillation. The unit was reportedly only used once, in 1985, when crude oil was distilled into light (naphtha and kerosene) and heavy fractions. The unit consisted of two distillation columns, one boiler, and 13 tanks (901 – 913). The unit is located on a concrete pad and is surrounded by a three-foot-high concrete wall.

#### *Injection Wells*

MSC operated two deep hazardous waste injection wells (WDW-138 and WDW-73). Injection well WDW-138 is located in the northeast corner of the plant process area and was part of the Unit 1100 waste disposal area. This well was the facility's primary injection well, disposing of most of the wastewater treated at the plant. Wastewater was injected for disposal into the Miocene sands at a subsurface interval between 3,800 and 5,300 feet. A concrete-lined 2,200-gallon capacity sump was located directly east of the wellhead. Two wastewater tanks, Tanks 1102 and 1103, stored wastewater prior to injection. The tanks were located on the Unit 1100 concrete pad, which was surrounded by a 3-foot-high concrete wall. The concrete pad drained to the Unit 1100 sump. The well is currently operated to manage Site storm water under a TCEQ and EPA approved Storm Water Management Plan and Operations and Maintenance Plan (URS 2005a, URS 2005b).

Injection well WDW-73 is part of the Unit 700 area. Filtered wastewater was injected for disposal at a subsurface interval of 4,650 to 5,300 feet in the Miocene Sands. This injection well is inoperable due to a tubing leak (E&E 1999). The unit contained a concrete-lined transfer sump at Tank 700. The sump collected spilled material during transfers in and out of Tank 700. The capacity of the sump was approximately 100 gallons. Five storage tanks were associated with the unit: tanks 700, 704, 705, 709 and 710.

#### *ASTs*

Numerous ASTs were constructed at the facility. Tanks located in Unit 300, Unit 400, and Unit 800 accepted oils pumped or transported by vacuum truck from the Unit 100 or Unit 1200 separators. The

Unit 300 Tank Farm contained 46 tanks. Tanks 301 – 336 (36 tanks) were used to store/blend reclaimed oil. These tanks are within the same secondary concrete containment berm. Two tanks (Tanks 337 and 339) were used as final product storage for reclaimed oil. These tanks are within the same secondary earthen containment berm. Tanks 338 and 340 were reportedly unused because of unstable soil conditions at the proposed tank locations. Six tanks (Tanks 341 – 346) stored materials used in the plant processes such as brine water and barite.

The Unit 400 Tank Farm contained six tanks (Tanks 401 – 406) that were used to blend reclaimed oils. Only Tanks 405 and 406 remain at the Site and are within a secondary concrete containment berm. A transfer sump for the Unit 400 Tank Farm collected spilled material during transfers in and out of the tanks. The sump capacity was approximately 100 gallons.

The Unit 800 tank farm consisted of six ASTs (Tanks 801 – 806). The tanks were used to store and blend reclaimed fuel oil. Three transfer sumps were located approximately 200 feet apart on the southern border of the Unit 800 Tank Farm. The capacity of each sump was approximately 100 gallons.

### *Sumps*

Five “transfer” sumps were located around the inlet and outlet pump lines of several tanks. These sumps were reportedly used to collect any spills from pumping oil or wastewater in or out of these tanks. Three sumps were located in the Unit 800 Tank Farm, one at Tank 700, and one at the southern end of the Unit 400 Tank Farm. An unused sump (identified in 1988 during the EPA PR/VSI) was located at the north end of the Unit 400 Tank Farm. In addition, two 2,200-gallon concrete-lined sumps were located at the wastewater disposal areas (Units 700 and 1100). Materials collected in the sumps were reportedly pumped into a vacuum truck and taken back to the Unit 100 API separator.

Storm water collected from the undeveloped areas was reportedly routed through drainage ditches to a control retention area then discharged through gravity flow outside the flood protection levee to Galveston Bay. EPA and the MCP continue to manage storm water in waste management units and un-impacted/undeveloped areas in this manner; however, storm water discharged to Galveston Bay is sampled to meet EPA SWMP parameters prior to discharge. Two storm water discharge sumps are located on the northern side of the facility. Each sump contains a plate that can be lowered to block the discharge. The sumps are connected to the storm water outlet that discharges through the flood protection levee into the Marsh Area between the MSC Superfund Site and Swan Lake. Storm water discharge from the sumps is currently managed under a TCEQ and EPA approved Storm Water Management Plan (URS 2005a).

### *Decanning Area*

In August 1981, MSC notified the TCEQ of its intent to process approximately one million gallons of Silvex by shredding the containers, allowing the Silvex to flow into a surge tank prior to transfer to a bulk storage tank. The decanning process area was designated in the northeast portion of the facility, east of the Tank 800 area and north of Unit 1100. The 1996 Notice of Registration lists three tanks (105 through 107) as decanning unit tanks. It is unknown whether the decanning process was ever constructed or operational.

## **2.5.4 Sampling Strategy**

The nature and extent of contamination at the Site was defined by using screening criteria. The screening criteria were included in the Quality Assurance Project Plan (QAPP) developed for the Site RI (URS

2005c) and are referred to as the QAPP screening criteria. These screening criteria are not intended as target remediation criteria. Rather, the screening criteria are used to determine the need for additional sampling activities in areas with analyte concentrations exceeding these conservative criteria and therefore may present a risk to ecological or human receptors. In addition these screening criteria are used to determine those analytes that would be carried forward into the BHHRA and the Screening Level Ecological Risk Assessment (SLERA).

The RI field activities, conducted in 2005, were performed using standard sampling techniques. Contaminants in the environmental media were analyzed using both field screening and laboratory definitive analyses. The nature and extent of contamination were characterized by representative sampling of the various environmental media including surface and subsurface soils, ground water, on-site and off-site sediment, and on-site and off-site surface water. Soil sample locations were placed across each area with approximately one sample per acre, using professional judgment to determine the field sample locations while maintaining the approximately one sample per acre grid spacing. Within the grid spacing, sample locations were placed at or near potential sources, such as stained areas, equipment, piping, etc. Representative samples of waste materials also were collected for the treatability study (to evaluate solidification of sludge) and limited chemical characterization. Given the history of permit violations by the facility operators, and given the amount of contamination found in ‘non-operating’ areas, however, it is possible additional soil contamination exists at the Site which is not specifically identified in the RI. Additional sampling during the remedial design is often required to define volumes of contaminated media and conduct a cost-effective remedial response. The project involved sampling environmental media using standard sampling tools and techniques including:

- Stratigraphic characterization using cone penetrometer testing (CPT);
- Surface soil sampling using a direct push technology (DPT);
- Subsurface soil sampling by hollow stem auger (HSA) or DPT;
- Ground water sampling by pumps;
- Sediment sampling by trowel, bucket auger, or push core;
- Surface water sampling by dip sampler or pump; and
- Waste sampling with pumps, push cores, bailers, or thieves.

The following subsections describe the sampling and discuss the area and media investigated, and the sampling approach used.

#### **2.5.4.1 Sampling Strategy – Sludge**

Sludge samples were collected with a double-walled pond-bottom sludge sampler (designed for semi-solid sludge) from seven locations within the Sludge Pit. The double-walled pond-bottom sludge sampler did not penetrate more than 25 feet below the water surface. Sludge from each location was composited and submitted to the contract chemical laboratory for analyses. Additional samples were collected from the Sludge Pit using a portable drill rig mounted on a pontoon boat. Sampling was to approximately the 38-foot depth where clay bottom was encountered. Approximately 12 to 15 gallons of sludge were removed from each location. Approximately 70 gallons of sludge samples were submitted to the treatability laboratory for compositing. The composited sludge sample was used for the various treatability studies as described in the Treatability Study Work Plan (URS 2005d). During sampling and compositing activities, ambient air was monitored using an 11.7-eV photoionization detector (PID) in accordance with the procedures described in the project Health and Safety Plan.

The Oil Pit was sampled as described in the Field Sampling Plan (URS 2005e). A HSA drilling platform installed a 4-inch boring until the underlying clay was encountered (as evaluated from the drill cuttings).

The ambient air and drill cuttings were monitored with an 11.7-eV PID. As the HSA was removed from the boring, sludge was consolidated from the auger flights into a 5-gallon plastic bucket. This procedure was repeated for each sample location. Approximately 25 gallons of sludge were submitted to the treatability study laboratory.

Sludge samples were collected from the API-100 and API-1200 separators. Samples were collected with a double-walled pond-bottom sludge sampler. Sludge from each separator was composited into 5-gallon plastic buckets for shipment to the treatability study laboratory. In addition, one sample was collected from the Unit 100 API Separator sludge for analyses of selected chemical parameters. Ambient air above the sludge containers was monitored using an 11.7-eV PID in accordance with the procedures described in the project Health and Safety Plan.

Each AST was surveyed and the results compared to the tank inventory prepared by E&E (URS 2004a). The tanks were accessed with either a ladder or a mobile platform with a telescoping boom and man lift basket. First, the atmosphere in the tank was measured with a four-gas (oxygen, carbon monoxide, hydrogen sulfide, and hydrocarbon) monitor. Second, the atmosphere in the tank was field monitored with an organic vapor monitor. If the atmospheric monitoring demonstrated that it was safe, the tank was visually inspected for the presence of liquids or sludge. If the liquid or sludge was accessible, a small sample was obtained for treatability studies. Tanks 700, 801, 803, 804, 805, and 806 were sampled. If a sufficient amount of sludge was present, a representative sludge sample was also collected from each remaining tank series (100, 300, 400, 600, 700, 900, and 1100). If the tanks contained unpumpable liquids, a composite sample was collected. No attempts were made to collect samples from tanks with a small amount of sludge or liquids.

#### **2.5.4.2 Sampling Strategy – Ground Water**

Twenty-five monitoring wells were installed between 1976 and 1984. These monitoring wells were evaluated for structural integrity prior to well development and sampling, and refurbished if necessary. Seven new monitoring wells, MW-26 through MW-32, were completed at the Site by the PRPs in December 2005 to augment the existing monitoring well network. Information for the on-site monitoring wells is located in Table 3.

Monitoring wells at the Site were purged and sampled in order to obtain accurate ground water chemical data for current Site conditions. Sampling began at the monitoring well with the lowest historical contamination and proceeded systematically to the monitoring well with the highest contamination. Field parameters (pH, specific conductance, temperature, dissolved oxygen, and redox potentials) were measured, to obtain stable parameter readings, during well purging and before the collection of ground water samples. After stabilization, the monitoring well was immediately sampled.

Historical lithologic and hydrogeologic information for the MSC Superfund Site was limited to the upper 50 feet bgs. The CPT investigation was designed to provide subsurface lithologic information to enhance the hydrogeologic understanding at the Site.

The CPT is a direct push tool which measures the tip resistance and sleeve friction, and electrical conductivity of the soil to collect lithologic data. The objectives of the CPT investigation included: (1) verifying the lateral extent of the paleochannel, (2) identifying and verifying the existence and extent of distributary sand channels, and (3) verifying the lateral continuity of the upper clay unit beneath the Site.

CPT borings were placed at locations identified as being outside the buried paleochannel. If these CPT borings were pushed to the target depth without encountering the buried paleochannel, CPT step-out



locations (approximately 75 to 100 feet) were placed in the predicted direction of the channel. The additional step-out CPT borings for delineation of the buried paleochannel had a target depth of 50 feet bgs.

CPT borings were placed in locations to identify distributary sand channels and to delineate their lateral extent. The primary objective for this area was to determine whether the sand layers were isolated overbank flood deposits, or whether the sand layers were smaller distributary sand channels bifurcating from the main buried paleochannel. The target depth for these borings was 50 feet bgs. CPT data and lithologic data from soil borings drilled during the subsurface soils investigation were used to verify the existence and to delineate this sand layer.

Perimeter CPT borings were installed in areas CPT-1 through CPT-5 to correlate the subsurface lithologic information from the GCWDA to the west and to provide deeper lithologic information beneath the Site. The target depth for the perimeter borings was 80 feet bgs.

Seven additional permanent monitoring wells were installed to augment the existing monitoring well network. Appendix F of the RI Report (URS 2006a) contains the logs for the monitoring wells installed in December 2005. Summary information for the on-site monitoring wells is located in Table 3.

### **2.5.4.3 Sampling Strategy – Soil**

The soils investigation focused on the vertical and horizontal delineation of impacted soils. The Site was divided in similar areas (investigation units) based on operational history, evidence of a release, and risk before or after implementation of a preliminary remedial alternative. The facility investigation areas are presented on Figure 2.

The objectives of the soils investigation were to:

- Collect sufficient soil analytical data to answer the critical questions for the respective investigation units;
- Obtain chemical data meeting the level of required performance to evaluate whether analyte concentrations exceed site-specific human health and ecological screening levels;
- Determine the vertical and horizontal extent of analyte concentrations to the level necessary to evaluate the preliminary remedial alternatives; and
- Collect subsurface lithologic data to support a site-wide geologic and hydrologic model.

Surface soil is defined by EPA as the soil interval ranging from 0 to 2 feet bgs for human health risk and 0 to 0.5 foot bgs for ecological risk. The sampling strategy used soil borings to collect samples to evaluate human health and ecological risk. Sample locations were placed across each area with approximately one sample per acre. Professional judgment was used to determine the field sample locations while maintaining the approximately one sample per acre grid spacing.

Surface and subsurface soil samples were collected from the soil cores. The samples were placed in glass containers with appropriate preservatives for submittal to the contract analytical laboratory. Geotechnical samples were collected in Shelby tubes or securely wrapped with foil for submittal to the geotechnical laboratory.

## **Shallow Soil Borings**

Typically, the shallow soil samples were collected from soil cores obtained using or DPT or from HSA drilling equipment. Due to access limitations, a limited number of surface soil samples were collected using a hand auger. The shallow soil borings were field monitored for organic vapors using an 11.7-eV PID. One surface soil sample was collected from both the 0- to 0.5-foot and the 1- to 2-foot depth interval in the shallow borings.

## **Deep Soil Borings**

Deeper soil borings (to approximately 20 feet bgs) were drilled to obtain lithologic information, to obtain geotechnical samples, and to evaluate vertical extent of impacted soils for potential for migration to ground water and for the extent of remedial action. Appendix G of the RI Report (URS 2006a) contains the soil boring logs. These deeper soil borings were drilled using HSA drilling equipment. Soil cores from each borehole were examined and described by a qualified field geologist. The deeper soil borings were continuously logged for lithology from the surface to the target depth and field monitored for organic vapors using an 11.7-eV PID. Surface and subsurface soil samples were collected from the soil cores. A maximum of five soil samples, including both the 0- to 0.5-foot and the 1- to 2-foot sample, were collected from the deeper soil borings based on visual observations, field monitoring, or other criteria. Intervals for the collection of subsurface soil samples included:

- Interval with the highest organic vapor meter reading;
- Interval directly below an interval of obvious or apparent visual soil impact;
- Bottom of the soil boring if no PID reading above background or other indications of impacted soils (visual/olfactory) was encountered; and/or
- Interval directly above saturated zone.

### **2.5.4.4 Sampling Strategy - Sediment**

Sediment samples were collected from areas of the Site that could provide habitat for ecological receptors: drainage ditches, the Freshwater Pond, and the Marsh Area between the levees and Swan Lake. The Drainage Area consists of drainage ditches surrounding the operating areas that channel discharge/runoff from the undeveloped areas to the Freshwater Pond, the Laydown Area, or through the storm water discharge outfall to Swan Lake. The Freshwater Pond is located in the northwest part of the MSC Superfund Site and was constructed by excavating the sands from the paleochannel. The Freshwater Pond is hydraulically connected with the paleochannel and receives storm water runoff/discharge from the undeveloped areas routed through the Drainage Area ditches. The transitional zone (Marsh Area) is located outside the MSC Superfund Site hurricane levee and separates the Site from Swan Lake. Shallow drainage channels have incised into the Marsh Area from storm water discharge from the MSC Superfund Site and from tidal action in Swan Lake.

Appendix H of the RI Report (URS 2006a) contains the sampling report for the July 2005 sediment sampling events. Sediment sample locations in the drainage ditches were accessed by carefully wading into the shallow drainage ditch and collecting the sediment samples using a trowel or a Ponar dredge. Sediment samples from the Freshwater Pond and the transitional zone (Marsh Area) between the hurricane levee and Swan Lake were collected from a sampling boat in accordance with a Ponar dredge. The sediments were transferred into glass sample containers.

#### **2.5.4.5 Sampling Strategy – Surface Water**

Surface water samples were collected by compositing the surface water column at each sample location in the Freshwater Pond and the transitional zone (Marsh Area) between the hurricane levee and Swan Lake. Prior to the collection of these surface water samples, water quality data were collected. These surface water samples were collected from a boat using a peristaltic sampling pump and dedicated tubing. Appendix H of the RI Report contains the sampling report for the July and August 2005 surface water sampling in the Freshwater Pond and the Marsh Area.

Surface water samples from the Sludge Pit were collected from the side of a boat using a dip sampler. Field personnel waded into the ditch and collected surface water samples using a dip sampler. Samples were then transferred to appropriate containers.

#### **2.5.4.6 Analytical Parameters**

During the Phase I RI conducted in July and August 2005, samples were analyzed for the metals, VOC, and SVOC analytes listed in the QAPP (URS 2005c). Ground water samples were also analyzed for TDS. Soil samples were screened in the field using SiteLab® UV-fluorescence kits for total polycyclic aromatic hydrocarbons (PAHs). The soil sample from each investigation unit with the highest total PAH reading was chosen for extended analyses of hexavalent chromium, pesticides, PCBs, and polychlorinated dibenzo-dioxins / polychlorinated dibenzo-furans (PCDDs/PCDFs). One sediment and surface sample from the Freshwater Pond and one ground water sample were arbitrarily chosen for extended analyses. In addition to metals, VOCs, and SVOCs, the sediments from the Marsh Area were analyzed for pesticides and PCBs. One sediment sample from the Marsh Area was arbitrarily chosen for hexavalent chromium and PCDD/PCDF analyses. One surface water samples from the Marsh Area was arbitrarily chosen for extended analyses.

During the Phase II RI conducted in December 2005, soil samples were analyzed for metals, VOCs, and SVOCs. Surface (0-0.5 foot) soils in the Laydown Area were also analyzed for PCBs. Sediment samples from the drainage ditches were analyzed for metals, VOCs, and SVOCs. Sediment samples from the Freshwater Pond and Marsh Area were analyzed for selected parameters as necessary to augment the understanding of impacts to these areas. Ground water samples from the January 2006 sample event were analyzed for monitored natural attenuation parameters (ferrous iron, sulfate, and nitrate) as well as metals, VOCs, and SVOCs.

### **2.5.5 Sources of Contamination**

The primary source (source with the largest volume of impacted media) of contamination identified at the Site is the sludge in the Earthen Impoundment (the Sludge Pit and the Oil Pit), the Unit 100 API Separator, the Unit 1200 API Separator, and the aboveground tanks. Sludge has also been found in buried pits and where source material has migrated to subsurface soils. Miscellaneous potential sources (sources which may have released contaminants to soils and ground water) including the Former Backwash Pit, the Laydown Area, the distillation unit, ancillary piping, the filters and pumps associated with the injection wells, the laboratory sumps, and the proposed decanning area may have contributed to impacted soil and ground water, but the current data are inadequate to make a determination.

Figure 3 shows the location of primary and potential sources of contamination at the Site. During the 1999 START removal action, E&E collected samples from potential sources, including the API separators and the tanks. During the MCP RI field activities, composite samples were collected from the Sludge Pit portion of the Earthen Impoundment and from the Unit100 API Separator. Table 15 of the RI

Report (URS 2006a) summarizes the analytes from the START removal action and RI samples that exceeded the soil QAPP screening criteria.

An estimated volume of 260,000 yd<sup>3</sup> of sludge (to account for over-excavation of impacted soils), and approximately 160,000 yd<sup>3</sup> of contaminated soil, was used for screening technologies, cost estimates, and alternatives analysis. Sludge (source) areas, as outlined below, are depicted on Figure 3.

Source	Minimum (yd <sup>3</sup> )	Average (yd <sup>3</sup> )	Maximum (yd <sup>3</sup> )	Estimated Volumes (yd <sup>3</sup> )
1 - Sludge Pit	150,000	172,000	190,000	200,000
1 - Oil Pit	20,000	28,000	39,000	40,000
1 - Unit 100 API Separator	1,500	2,200	3,000	5,000
1 - Unit 1200 API Separator	2,500	2,900	3,500	5,000
22 - Aboveground Storage Tanks (96 total tanks)	9,800	10,000	10,200	10,000
Sums (Rounded)	184,000	215,000	246,000	260,000

## 2.5.6 Types of Contamination

The COCs at the Site are toxic, mobile, carcinogenic, and non-carcinogenic. The COCs in sludge and soil are presented on Tables 1 and 2. These tables include the remediation levels which are discussed in Section 2.7.

Metals concentrations, such as antimony, arsenic, barium, cadmium, chromium, cobalt, copper, lead, mercury, nickel, selenium, silver, thallium, vanadium, and zinc, exceeded QAPP screening criteria for soil in at least one source sample. Barium was not listed as detected in the tank and container samples, since it was not included on the removal action (E&E 1999) analyte list. However, barium was reported as present in the 21 samples analyzed for toxicity characteristic leaching procedure (TCLP) metals.

The SVOCs detected in the source areas (sludge) included PAHs, phenolic compounds, and phthalate esters. The most frequently detected SVOCs were naphthalene, 2-methylnaphthalene, bis(2-ethylhexyl)phthalate, phenol, phenanthrene, 1,2,4-trichlorobenzene, and acenaphthene. VOCs detected in the impoundments, separators, and tanks included the aromatic and chlorinated hydrocarbons. The most frequently detected VOCs were total xylenes, ethylbenzene, tetrachloroethene, toluene, 1,1,1-trichloroethane, styrene, trichloroethene, and benzene.

As shown in Table 15 of the RI Report, the SVOCs in the source areas that exceeded soil screening criteria included PAHs, phenolic compounds, hexachlorobenzene, hexachlorobutadiene, and phthalate esters. Aromatic and chlorinated hydrocarbons VOCs such as benzene, trichloroethene, vinyl chloride, and styrene also exceeded soil screening criteria. Concentrations of five pesticides (alpha- and gamma-chlordane, beta-BHC, dieldrin, and heptachlor) and one Aroclor (Aroclor 1260) exceeded soil screening criteria in the samples analyzed from the Sludge Pit and Unit 100 API Separator for pesticides and PCBs. The 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) toxic equivalent (TEQ) (mammal) concentrations were 1.33E-03 and 1.60E-03 milligrams per kilogram (mg/kg) for the Earthen Impoundment and API 100 separator sludge samples, respectively. These concentrations exceed the EPA Human Health Medium-Specific Screening Level (U.S. EPA 2005b) for an industrial outdoor worker of 1.80E-05 mg/kg.

## 2.5.7 Location of Contamination

Sludge (principal threat waste/source material), and contaminated soil and ground water exist on-site (see Figure 3). Sludge exists in the earthen impoundment (Sludge Pit and Oil Pit), API separators (API-100 and API-1200), and ASTs. Source material exists in subsurface soils in the Cemetery Area, the Maintenance Area, and near the Tank 800. Data demonstrate that releases of hazardous substances to soils have occurred in the western portion of the Laydown Area, the Cemetery Area, the Maintenance Area where slop oil/water pits and landfarming activities occurred, the Maintenance Area around MASS17, the Tank 800 Area, and the Oil Pit surface soils (see Figure 3 for contamination areas identified through the RI). Typically, the contaminants that exceeded screening criteria were 1,2-dichloroethane, benzene, trichloroethene, tetrachloroethene, hexachlorobenzene, hexachlorobutadiene, PAHs, and PCBs.

The contaminated shallow ground water is non-potable (Class 3 ground water – non-drinking water); historic and recent ground water analytical data appears to support stable plumes and indicate that the ground water plumes remain on-site. Ground water is contaminated in areas where source material has been managed (sludge pits and API separators). There are other localized areas, which appear to be non-operational areas, where source material has entered the subsurface soils and contaminated ground water with dissolved constituents, whereby a plume has developed. The highest concentrations of contaminants are detected in the wells adjacent to the Earthen Impoundment (MW-04, MW-25, MW-12U, MW-12D, and MW-09), in a well installed outside the former Unit 900 distillation area (MW-08) and in a monitoring well installed in the Maintenance Area (MW-32). Benzene, 1,2-dichloroethane, and vinyl chloride concentrations exceeded the screening criteria in these wells. Ground water has been contaminated with dissolved constituents only; there is no direct evidence of source material (NAPL) in ground water.

## 2.5.8 Hydrogeology

The following sections discuss the regional and site hydrogeology.

### 2.5.8.1 Regional Hydrogeologic Setting

The MSC Superfund Site is located in the Gulf Coastal Plain of Southeast Texas (Aronow and Barnes 1982). The stratigraphic units that underlie the Texas coastal plain and form the principal hydrologic units from oldest to youngest (Jorgensen 1975) include:

- The Fleming Formation of Miocene age;
- The Goliad Sand of Pliocene age;
- The Willis Sand, Bentley Formation, Montgomery Formation, and Beaumont Formation of Pleistocene age; and
- The alluvium of Quaternary age.

Collectively, these sediments attain a thickness in excess of several thousand feet along the coastline and consist primarily of interbedded sands and clays with subordinate beds of silt and gravel. The lithologic similarity of the post-Miocene age sediments makes delineation of the stratigraphic and hydrologic sections difficult in the subsurface. Regionally, these stratigraphic units dip toward the Gulf of Mexico and tend to thicken and occur progressively deeper basinward (Baker 1986).

Surface outcrops in southeast Texas generally parallel the coastline, with older formations found progressively inland. The Site is located on outcrops of the Beaumont Formation that covers most of Galveston County (Figure 8). The Beaumont Formation consists of fluvial and deltaic sediments including low permeability clays interbedded with more permeable discontinuous silt and sand lenses. These sediments include stream channel and point bar, natural levee, backswamp, and, to a lesser extent, coastal marshes and mud flat deposits (Aronow and Barnes 1982).

Growth faults are common structural features associated with the coastal plain in Texas. These growth faults tend to have gradual rather than episodic movements and show only minor surface expression. Historically, the Houston-Galveston area has undergone subsidence due to over-pumping of the underlying aquifers (Gabrysch 1984). This subsidence has resulted in increased ground movement across the faults (Kreitler 1976). Regulations enforced by the Harris-Galveston Coastal Subsidence District limiting the installation of new water wells and ground water withdrawal has greatly reduced the rate of subsidence in the Houston-Galveston area.

No known surface faults or subsurface faults have been extrapolated to the surface across the Site. The nearest surface fault is reported approximately one-half mile north of the MSC Superfund Site trending in a northeasterly direction and traversing the northern part of Swan Lake (MSC 1994).

### **2.5.8.2 Site Aquifers**

The subsurface is comprised of approximately 15 feet of clay and silty clay, and a shallow Class 3 (non-potable – non-drinking water) paleochannel aquifer (sand) that extends from approximately 15 feet to approximately 30 feet bgs (see Figure 5). The contaminated paleochannel aquifer, and associated overbank silts, is confined due to the approximate 15 feet of clay overlying it. Three additional minor silty-sandy clay members exist below the paleochannel sand and silt members to a depth of approximately 55 feet. RI borings were drilled 30 feet into the lower clay member (below the paleochannel and silt member), which exists at approximately 50 feet bgs.

The RI investigation provided subsurface lithologic information to a maximum depth of 80 feet bgs. The RI noted that “[v]ertical migration of the potential COCs to the next transmissive zone will be influenced by the thickness of the clay and the permeability of the non-transmissive zone.” The RI also stated that the “potential for vertical migration was evaluated by characterization of the stratigraphy to determine if a substantial, competent clay stratum, such as that observed at MOTCO and GCWDA exists beneath the MSC Superfund Site.” However, the RI presented no conclusions regarding vertical migration of contamination at the Site. A comparison of the Site hydrogeology to that of the MOTCO Superfund site (approximately 1.5 miles away) and the GCWDA site (immediately adjacent to the Site to the west) suggests that the next underlying permeable zone (GCWDA - 4 feet thick mixed silt and sand zone at 88 feet bgs) may be just below the depth of the Malone Site investigation (80 bgs). At the MOTCO site, deep wells confirm that the next underlying permeable unit (approximately 15 feet thick) after the three shallow geologic units is generally found between 90 to 105 feet below msl and is the uppermost permeable zone of the Chicot aquifer (identified at the MOTCO site as unit UC-1). UC-1 is underlain by a clay unit to a depth of approximately 150 feet below msl, where the next significant sand unit is encountered, the UC-2. At the GCWDA site, the shallow ground water is underlain by uniform gray clay to a depth of approximately 88 feet below ground surface (bgs) before the next significant permeable zone is encountered (four feet thick silt and sand zone at 88 feet bgs).

The RI notes that one ground water supply well was reportedly drilled at the Site in 1975 to a depth of 200 feet bgs and screened across a sand interval between 185 and 198 feet bgs. Information from the Malone Service Company regarding this well indicates that a thick clay interval more than 100 feet thick

reportedly separates the buried paleochannel sand aquifer from the lower sand aquifer (MSC 1994b). The one non-potable well found on-site during the RI, located on the northwest portion of the MSC Site in Unit 700, was not logged for natural gamma counts to verify this report. The RI relied instead on correlation borings and CPT data to address the deeper stratigraphy for the Site. Based on this information, EPA may require subsequent subsurface investigations to document the thickness of the clay below the silt and sand zones within the Site.

### 2.5.8.3 Site Hydrogeology

During the RI, additional subsurface investigations (in addition to the historic information) were conducted at the MSC Superfund Site to enhance the understanding of the Site stratigraphy, ground water flow directions, and for delineation of impacted ground water. These subsurface investigations included:

- CPT investigation to define the paleochannel boundary and to provide subsurface lithologic information to a maximum depth of 80 feet bgs; including perimeter CPT borings with a target depth of 80 feet bgs.
- Shallow soil borings for the collection of soil samples for chemical analysis and shallow subsurface lithology (depth of up to 2 feet for surface and shallow soil samples, with deeper soil borings to approximately 20 feet deep);
- Correlation soil borings adjacent to five CPT locations to verify CPT interpreted lithology (with a target depth of 50 feet bgs); and
- Soil borings drilled during the installation of seven monitoring wells for subsurface lithology (to a maximum depth of 35 feet).

Previous subsurface investigations, as well as information collected in the 2005-2006 RI, have shown that the shallow hydrogeology in the vicinity of the Site is dominated by the southeasterly meandering, buried paleochannel that crosses beneath the GCWDA facility west of the Site, forms a wide arch and bifurcates beneath the Site, and continues to the south beneath the closed Solutia South 20 Site (GCWDA 1999; Groundwater Services, Inc. [GSI] 1999; Law 1982; Law 1992; MSC 1994). A distributary channel bifurcates from the main channel beneath the Site and extends east-southeast toward Swan Lake (Figure 7). The locations of the existing monitoring wells, CPT borings, and subsurface soil borings are shown on Figure 4.

Lithologic data collected during the RI demonstrate the presence of three additional transmissive or potentially transmissive zones in the upper 50 to 60 feet bgs that were not previously documented in historic documents for the Site.

The existence of the paleochannel has been well documented beneath the GCWDA facility to the west of the Site (GCWDA 1999; GCWDA 2003), beneath the Site (Southwest Laboratories [SWL] 1979; Law 1982; MSC 1994), and beneath the closed Solutia South 20 Site to the southeast (Law 1992; GSI 1999; GSI 2000). Descriptions and test results tend to be rather consistent, showing the paleochannel to consist of 20 to 30 feet of tan to light gray silty sand with hydraulic conductivity values ranging from about  $10^{-5}$  to  $10^{-3}$  centimeters per second (cm/sec). The results from the RI investigations are generally consistent with the results from the previous investigations. Beneath the Site, the top of the paleochannel is generally found at depths ranging from 8 to 12 feet bgs, with the base of the channel sitting on top of stiff, reddish brown clay between 30 and 35 feet bgs. The upper part of the channel often shows a fining upward trend into 1 to 5 feet of sandy clay. Thin sandy clay or silty sand seams are also common in the lower part of the channel.

Outside the paleochannel, the subsurface lithology generally consists of upper silty clay overlying three potentially transmissive zones separated by reddish brown clay or silty clay (Figure 6). A sample of the upper silty clay from a depth of 10 to 12 feet bgs in the Borrow Area (Table 4) had a coefficient of permeability of  $1.38 \times 10^{-7}$  cm/sec. Samples of the reddish brown clay underlying the -10 zone at 20 to 21.5 feet bgs and the -20 zone at 40 to 42 feet bgs have coefficient of permeability values of  $2.6 \times 10^{-7}$  cm/sec and  $1.5 \times 10^{-7}$  cm/sec, respectively (Table 4). These coefficients of permeability values are consistent with those reported for the fine-grained sediments outside the paleochannel ranging from  $10^{-9}$  to  $10^{-6}$  cm/sec (MSC 1994).

The presence of the transmissive or potentially transmissive zones identified during the CPT investigation was verified by drilling correlation soil borings adjacent to specific CPT locations. These transmissive or potentially transmissive zones are identified based on their relative depth as the -10 zone, the -20 zone, and the -40 zone (Figure 6).

The -10 zone is typically found between 0 and -10 feet msl. This zone is thin or absent in the northern part of the Site and has a maximum thickness of about 7 feet near the center of the Site. The CPT stratigraphic columns demonstrate that the -10 zone consists primarily of thin interbeds of sand/silt/clay. At some CPT locations, individual sand layers up to about 1-foot thick are included in the -10 zone. Field observations on soil cores collected near the center of the Site demonstrate that the -10 zone consists primarily of silty to sandy clay, clayey sand, and silt. The coarser-grained intervals are typically about 0.5 feet thick and are very moist to saturated; the finer-grained layers are slightly thicker.

In areas where the paleochannel is present, the upper part of the paleochannel may coincide with the -10 zone, and may be continuous into the underlying -20 zone. This is evident along the eastern part of the Site adjacent to the marsh area, where the -10 zone and the -20 zone appear as a single unit with very minor amounts of clay between about 0 and -28 feet msl. The RI notes that potential COCs have migrated vertically to the shallow ground water from source areas in the potentially transmissive zones outside the paleochannel boundary.

The -20 zone is typically found between -16 and -29 feet msl and is separated from the overlying -10 zone by 10 to 15 feet of stiff, reddish brown clay. The laboratory coefficient of permeability measurement for a sample of this clay from MW-29 at 20 to 21.5 foot was  $2.6 \times 10^{-7}$  cm/sec. It typically consists of either a single transmissive unit ranging from about 6 to 8 feet thick (CPT-12W1 and correlation boring CB-02), or several thin transmissive layers separated by several feet of clay (CPT-05). These coarser-grained transmissive or potentially transmissive layers are saturated. In the northern part of the Site, the log for CPT-02 shows the -20 zone consists of a 4-foot sand unit overlying a 2-foot-thick sand/silt/clay unit that is continuous to the south towards the paleochannel. The correlation boring at this location shows the -20 zone consisting of about 1 foot of silty sand overlying 2 feet of sandy clayey silt and 2 feet of silty clay. The -20 zone may underlie the paleochannel as observed in the logs for CPT-11E2 and CPT-17N2; it may be continuous with the lower part of the paleochannel as observed in the log for CPT-19; or it may be absent as observed in the log for CPT-01. In general, it appears that the -20 zone becomes slightly deeper toward the southern part of the Site (CPT-04W1 and correlation boring CB-04).

The -40 zone, typically found between -34 and -48 feet msl, is the most heterogeneous of the potential transmissive zones. The CPT logs show the -40 zone to generally consist of thin interbeds of clay/silt/sand mixtures with minor thin sand seams. These thin sand seams appear to be laterally discontinuous and generally cannot be correlated between CPT locations. In some CPT borings, the -40 zone is totally absent or relatively thin (on the order of 1 to 2 feet). The -40 zone was encountered in all the deeper 80-foot CPT perimeter borings at depths of between -36 and -38 feet msl and was fully penetrated. The maximum thickness of the -40 zone was about 13 feet in CPT-02, CPT-05, and CPT-20.



The -40 zone consists of thin, gradational interbedded layers of silty to very silty clay and clayey silt. At some locations, the interbedded layers of the -40 zone are slightly moist to moist, but at other locations these layers are saturated. It appears that the amount of coarser-grained sediments is less in the -40 zone than is observed in the overlying -10 zone or -20 zone. Based on the CPT data from the deeper 80-foot CPT perimeter borings, the -40 zone is underlain by a clay member at least 30 feet thick.

Outside the paleochannel boundary, limited information is available regarding the lithology across which many of the monitoring wells are screened. It appears that some monitoring wells may be screened only across the -10 zone (e.g., MW-02), across the -20 zone (e.g., MW-03), across both the -10 and -20 zones (e.g., MW-06) or across all three transmissive or potentially transmissive zones (e.g., MW-10, MW-11, and MW-20). Seven new monitoring wells, MW-26 through MW-32, were completed at the MSC Superfund Site in December 2005. Monitoring wells MW-26 through MW-28 and MW-30 were completed and screened across the silty sands in the paleochannel. Monitoring wells MW-29, MW-31 and MW-32 were completed outside the boundary of the paleochannel. Monitoring wells MW-29 and MW-32 were screened across the -10 zone and monitoring well MW-31 was screened across both the -10 and -20 zones.

#### **2.5.8.4 Ground Water Flow**

Twenty-two Site monitoring wells (four are duals) were completed in the late 1970s and early 1980s; an additional seven monitoring wells were completed in 2006 during the RI. The greater volume of shallow ground water flow beneath the Site is primarily restricted to the fine silty sands in the paleochannel. Ground water flow in the paleochannel has been shown to be variable, primarily controlled by the recharge or evaporation pattern in the Freshwater Pond. Additional hydraulic boundary conditions potentially influencing ground water movement include liquid and sludge stored in the Earthen Impoundment and tidal influences from Swan Lake/Galveston Bay. It exits the Site to the southeast at the closed Solutia South 20 Site. A secondary distributary channel bifurcates from the main channel in the area between the Freshwater Pond and Earthen Impoundment. The distributary channel has a minimum width of about 125 feet where it bifurcates from the main channel, and an apparent maximum width of about 400 feet adjacent to the Marsh Area. Flow in the secondary distributary channel is generally to the northeast from monitoring well MW-05 toward Swan Lake. The RI states that the distributary channel appears to exit the Site into the Marsh Area in the Borrow Area.

Analytical results for the ground water samples collected during the RI (Section 4.3, URS 2006a), indicate that significant contaminant migration has not occurred away from the source areas along the axis of the buried paleochannel or into the transmissive or potentially transmissive zones along the buried paleochannel. Generally, ground water flow is to the northeast and south along the bifurcated paleochannel. It is unclear whether the transmissive zones are viable and continuous preferential pathways, because beneath some parts of the Site, these transmissive or potentially transmissive zones are laterally continuous, whereas they are thin or absent in other areas. The RI does not document information regarding off-site ground water to surface water discharge points.

All borings, CPTs, and monitor well observations document that no non-aqueous phase liquid (NAPL) (free product/source) exists in the shallow ground water bearing zones in those locations. Borings and CPTs document the on-site or near-site thickness and the permeability of the clay beneath the paleochannel. The closed Solutia South 20 Site and GCWDA data demonstrate thick lower confining clay under the paleochannel. Vertical migration of the COCs to the next/deeper sand/aquifer will be influenced by the thickness of the lower confining clay and the permeability of that clay.

## 2.5.9 Surface Hydrology

Swan Lake and the western shore of Lower Galveston Bay are separated by a series of north-south trending islands (now supplemented with intermittent rock jetties as part of the Tex-Tin Superfund Site OU-4 Remedy) that are contiguous and connected through Campbell Bayou. Swan Lake and the western shore of Lower Galveston Bay are part of the Galveston Bay System. Lower Galveston Bay is designated as Texas Water Quality Segment 2439 of the Texas Bays and Estuaries. The Lower Galveston Bay Segment is connected with Texas Water Quality Segment 2421 (Galveston Bay), Segment 2422 (Trinity Bay), Segment 2423 (East Bay), Segment 2424 (West Bay), and the Gulf of Mexico (TNRCC 2000). The Galveston Bay system constitutes the seventh largest estuary in the United States and is designated as a National Estuary as part of the National Estuary Program (Galveston Bay National Estuary Program [GBNEP] 1992).

A flood protection levee completely surrounds the Site (and the waste management units); the levee has an average crest elevation of 18 feet above msl. Three potential off-site surface water migration routes from the Site were identified. Two of the potential routes are the vehicle access gates located at the northwest and southwest corners of the facility. These gates were constructed to allow vehicular traffic to access the facility, but were to be closed during periods of extreme floods to prevent inundation of the facility. The vehicle access gate in the northwest part of the Site has been permanently closed by GCWDA. The gate structure for the vehicle access gate in the southwest part of the Site is missing. The other surface water migration route is through the storm water discharge outfall on the northeast side of the Site. This outfall has large hand-screw operated flapper-gates that can be closed manually to prevent water flow in either direction.

During facility operations, rainfall runoff collected within the waste management areas was reportedly disposed through deep well injection. Storm water collected from the undeveloped areas was reportedly routed through drainage ditches to a control retention area then discharged through gravity flow, through the storm water discharge outfall, outside the flood protection levee to Galveston Bay (MSC 1994b). EPA and the MCP continue to manage storm water in waste management units and un-impacted/undeveloped areas in this manner; however, storm water discharged to Galveston Bay is sampled to meet EPA Storm Water Management Plan (URS 2005a) parameters prior to discharge. Some of the undeveloped areas drain toward the Freshwater Pond in the northwest part of the MSC Superfund Site. The Freshwater Pond was excavated into and believed to be hydraulically connected to the uppermost aquifer beneath the Site, and water level variations in the pond appear to influence ground water flow in the aquifer (MSC 1994b). The Freshwater Pond appears to be the only direct surface water to ground water path on-site; however, the ground water plumes exist below source areas and support that rainwater infiltrates through the source material and delivers dissolved constituents to ground water.

E&E conducted a flooding potential evaluation for the MSC Superfund Site using elevation survey data, historical storm-total rainfall extreme values, and rainfall runoff estimates (E&E 1999). E&E concluded that a maximum storm surge and associated high winds comparable to those observed during Hurricane Carla in 1961 could result in breaching of the flood protection levee and inundation of the Site. Predicted flood volume estimates based upon rainfall amounts comparable to known storm events demonstrate that a 10-inch rainfall event would inundate most of the western and southern parts of the MSC Superfund Site. A rainfall event comparable to the historical rainfall of 43 inches observed at Alvin, Texas would inundate the entire MSC Superfund Site within the flood protection levee.

The Federal Emergency Management Agency (FEMA) Flood Rate Insurance Map for Texas City, Texas shows the area south of Texas City and east of Highway Loop 197 located within the 100-year floodplain. The Site and the area south to Virginia Point are designated as V19 (base elevations ranging from 14 to

16 feet), corresponding to areas of 100-year coastal flood with velocity (wave action). The areas north and northeast of the Site are designated as A-14, corresponding to areas of 100-year flood (FEMA 2004).

## **2.6 CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES**

Waste operations at the MSC facility ceased in 1996, prior to the State's revocation of the facility's permits in 1997. The land surrounding the facility, from Interstate 45 north to Texas City is zoned for heavy industry (Texas City 2006). The facility is approximately 2 miles south of the Texas City Industrial Complex, which includes several oil refineries, oil tank farms, chemical plants, loading docks, shipyards, and municipal and hazardous waste landfills. The GCWDA, which is located adjacent to and northwest of the Site, provides landfill disposal of non-hazardous wastes to area industrial facilities. The former Texas City Municipal Landfill is located northwest of the GCWDA. The closed Solutia South 20 Site is adjacent to the Site to the southeast. Two Federal Superfund sites, the Tex-Tin Superfund Site and the MOTCO Superfund Site, are located approximately 1.5 miles to the northwest of the Site. Scenic Galveston, Inc., a nature conservancy, owns the remaining 1,500-acre property surrounding GCWDA and the Site.

The nearest residential center to the Site is Bayou Vista, approximately 1.5 miles to the southwest across Interstate 45 along State Highway 6. The population of Bayou Vista in 2000 was 1,664. The Tiki Island residential area is located approximately 2 miles to the southwest of the Site. A residential section of Texas City and Galveston Island are approximately 4 miles from the Site.

### **2.6.1 Land and Ground Water Use**

The Site was operated by the Malone Service Company as a commercial storage, processing, and waste disposal facility, and ceased operations in 1997. The Site was acquired by Regor Properties in December 2001; however, no operations were conducted by Regor Properties. In November 2007, the MCP reached a court-approved settlement agreement with the Site owner. The court-approved settlement enables the MCP to impose on the property an institutional control prohibiting residential, commercial, and industrial development. The settlement further requires that the land eventually be transferred to Scenic Galveston or a similar environmental non-profit organization or, if such a transfer cannot be completed, requires that the land be used in the future only to complete the response action and for purposes not inconsistent with final use as a natural preservation or conservation area.

There are no anticipated uses for the shallow ground water. Ground water is classified as Class 3 (non-potable) due to salinity and is not a drinking water source. Ground water contamination remains on-site and is localized; therefore, an institutional control (restriction) will be placed on the property which will restrict access to ground water. No public water supply or domestic drinking water wells were identified within a one-mile radius of the Site. There are no known or suspected surface water drinking intakes located in the Lower Galveston Bay segment.

A non-potable water well is located on-site in Unit 700. The well is screened from 185 to 198 feet bgs, below the shallow contaminated ground water zones (i.e., the paleochannel aquifer and associated silt members). According to available information, this well was not used as a drinking water source during facility operations and is currently not used for drinking water or equipment cleaning; this well will be properly plugged and abandoned during the remedial action. GCWDA, located adjacent to and north of the Site, has one active industrial well on-site; the well is screened from 260 to 280 feet bgs; the well is connected to a shower and sink and is not used for drinking water.

## 2.7 SUMMARY OF SITE RISKS

Under the NCP, 40 CFR § 300.430, the role of the baseline risk assessment is to quantify the risk associated with potential exposure to hazardous substances at a site in the absence of any remedial action or control, including institutional controls. A baseline risk assessment was performed to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminants associated with the Site assuming no remedial action was taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. This section of the ROD summarizes the baseline human health risk assessment (BHHRA) and baseline ecological risk assessment performed for the Site (URS 2007a, 2007b).

### 2.7.1 Baseline Human Health Risk Assessment

As part of the RI, a BHHRA was conducted to evaluate the current and future effects of contaminants on human health.

#### 2.7.1.1 Summary of Baseline Human Health Risk Assessment Approach

The BHHRA was performed based on scenarios that estimated the reasonable maximum exposure (RME) to human health. The RME is defined as the highest contaminant exposure that is reasonably expected to occur at a site. The RME is estimated for individual exposure pathways. If a population is exposed by more than one pathway, the combination of exposures across multiple pathways also represents the RME. The intent of the RME is to develop a conservative (i.e., safe) estimate of exposure that is still within the range of possible exposures.

A four-step process was utilized for assessing human health risks in the BHHRA, these steps included:

- Identification of COCs – Contaminants of Potential Concern (COPCs) are those contaminants that are carried forward through the BHHRA. COCs are a subset of the COPCs that are identified in the RI/FS as needing to be addressed by the response action proposed in the ROD.
- Exposure Assessment – estimates the magnitude of actual and/or potential human exposures, the frequency and duration of these exposures, and the pathways (e.g., ingestion of contaminated soil) by which humans are potentially exposed.
- Toxicity Assessment – determines the types of adverse health effects associated with chemical exposures, and the relationship between the magnitude of exposure (dose) and severity of adverse effects (response).
- Risk Characterization (including the uncertainty analysis) – summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of health risks.

With the completion of this four-step risk assessment process, those exposure pathways and site-related COCs determined to pose actual or potential threats to human health are identified for remedial action.

#### **Identification of COCs**

The selection of COPCs in the BHHRA was based primarily on information regarding the source(s) of the release and the detection of released contaminants in soil, sediment, surface water, sludge, and ground water samples. Given that there were many sources of contamination, a wide range of COPCs was

evaluated in the BHHRA. From this, a subset of the chemicals were identified in the FS as presenting a significant current or future risk and are referred to as the COCs.

EPA defines COCs as those chemicals that pose an Excess Lifetime Cancer Risk (ELCR) to human health greater than 1 cancer case in 1,000,000 individuals ( $1 \times 10^{-6}$ ), have a non-carcinogenic hazard index (HI) greater than ( $>$ ) 1, or are found in Site ground water at concentrations that exceed drinking water Maximum Contaminant Levels (MCLs). However, ground water at the Site is classified as Class 3 (non-potable) due to salinity. Therefore, ground water is not a drinking water source and MCLs are not applicable to the Site.

COCs identified at the Site included metals, SVOCs, and VOCs as presented in Table 5. There are numerous COCs for the Site because the facility received multiple waste streams and the Site was evaluated in multiple exposure areas. Table 5 also contains the exposure point concentrations used to evaluate the RME scenario in the BHHRA.

### **Exposure Assessment**

The objectives for the exposure assessment are to evaluate potential current and future human exposures to COPCs in all media of concern. In the exposure assessment part of the BHHRA, a detailed evaluation was completed for each potential exposure scenario at the Site. This evaluation included identification and characterization of contaminant sources and release mechanisms, transport media, exposure points, exposure routes, and human receptors. Exposure pathways and receptors are illustrated in the conceptual exposure models presented in Attachment 1- BHHRA Figures.

#### *Receptors*

The current and potential future human receptors were determined by the Site's geography, land and water use, and activity patterns. Receptors were identified for both current and potential future site conditions.

The Site was previously considered industrial, due to its past usage. In addition, future use of the Site included the option for recreational reuse. Therefore, the BHHRA characterized risk for a future on-site industrial worker, a future on-site construction worker, a future on-site recreational bird watcher, and a current off-site recreational bird watcher. Since there are no schools, residential areas, or day care centers within 1.5 miles of the Site, risk to child receptors was not evaluated.

After the BHHRA was completed, stakeholders were concerned that the recreational bird watcher scenario was not protective enough for future reuse as a natural preserve or conservation area. Therefore, remediation levels were developed to be protective of a conservancy worker.

#### *Exposure Pathways*

The BHHRA identified potential exposure pathways and in each case, determined whether a complete exposure pathway exists. In a BHHRA, exposure pathways are means by which hazardous substances move through the environment from a source to a point of contact with human receptors. To be complete an exposure pathway must have four parts: (1) a source of contamination; (2) a mechanism for transport of a substance from the source to the air, surface water, ground water, and/or soil; (3) a point where human receptors come in contact with contaminated air, surface water, ground water, or soil (the exposure point); and (4) a route of entry into the body. Routes of entry can be eating or drinking contaminated materials (ingestion), breathing contaminated air (inhalation), or absorbing contaminants through the skin (dermal contact). Risks are assessed only when an exposure pathway is complete. If any part of an exposure pathway is absent, the pathway is said to be incomplete and no exposure or risk is possible.

In some cases, although a pathway is complete, the likelihood that significant exposure will occur is very small. Risk assessments include a "pathway analysis" to identify those pathways that are complete and most likely to produce significant exposure. Potentially complete exposure pathways quantitatively addressed in the BHHRA included:

- Soil Exposure Pathways – Included incidental ingestion, dermal contact, and inhalation of particulates and VOCs.
- Surface Water Pathways – Included dermal contact and volatile emissions (recreational scenarios only).
- Sediment Exposure Pathways – Included incidental ingestion and dermal contact during wading and/or recreation.
- Sludge Exposure Pathways – Included incidental ingestion, dermal contact, and inhalation of particulates and VOCs.
- Ground Water Exposure Pathways – Included inhalation of volatile emissions.

Chemical intakes and associated risks have been quantified for complete exposure pathways. The conservancy worker exposure scenario was not evaluated in the BHHRA. Nevertheless, the exposure pathways for the nature conservancy worker are the same as for the on-site recreational receptor.

#### *Exposure Point Concentrations*

The exposure assessment also includes calculation of the exposure point concentrations (EPCs) which are based on measured or modeled COPC concentrations present at the Site. The EPC used in the BHHRA for the RME scenario is the maximum detected concentration in each exposure area. EPCs are presented for COCs in Table 5.

#### *Exposure Parameters*

Tables 6.A through 6.E present the variables used in estimating doses and the assumptions (exposure parameters) which are used in the risk assessment calculations. These parameters include: daily ingestion rate of water, exposure duration, and body weight. In general, the exposure parameters that were used are standard values recommended by national and EPA Region 6 guidance. Regardless of the exposure route, the intake is presented as an estimated daily dose in units of milligrams of chemical per kilogram of body weight per day (mg/kg-day).

The conservancy worker exposure scenario was not evaluated in the BHHRA. Nevertheless, the exposure parameters for the nature conservancy worker are the same as for the on-site recreational birdwatcher receptor except the particle emission factor (PEF) was set to 150 acres (site-wide) and the exposure frequency was set to 150 days.

### **Toxicity Assessment**

The toxicity assessment determines the relationship between the magnitude of exposure to a COPC and the adverse health effects (both carcinogenic and non-carcinogenic). The BHHRA evaluated COPCs for carcinogenic and non-carcinogenic systemic toxicity. Toxicity for carcinogenic (slope factors) and non-carcinogenic (reference dose) COCs are presented in Tables 7.A and 7.B.

## *Carcinogenic Toxicity Values*

Information and toxicity values used to evaluate carcinogenic effects include the following:

- Weight of Evidence Classification and Hazard Descriptors under the EPA's Guidelines for Carcinogenic Risk Assessment;
- Slope factor in units of  $(\text{mg}/\text{kg}\text{-day})^{-1}$ ; and
- Inhalation unit risk in units of  $(\mu\text{g}/\text{m}^3)^{-1}$ .

The weight of evidence classification is an EPA classification system for characterizing the extent to which the available data indicate that an agent is a human carcinogen. To determine the carcinogenic potential of a chemical, EPA classifies the chemical into one of the following groups according to the weight of evidence from epidemiological studies and animal studies:

- Group A: Human carcinogen (sufficient evidence of carcinogenicity in humans);
- Group B: Probable human carcinogen (B1 – limited evidence of carcinogenicity in humans; B2 – sufficient evidence of carcinogenicity in animals with inadequate or lack of evidence in humans);
- Group C: Possible human carcinogen (limited evidence of carcinogenicity in animals and inadequate or lack of human data);
- Group D: Not classifiable as to human carcinogenicity (inadequate or no evidence); or
- Group E: Evidence of non-carcinogenicity for humans (no evidence of carcinogenicity in adequate studies).

EPA's Guidelines for Carcinogen Risk Assessment emphasizes the importance of weighing all of the evidence in reaching conclusions about the human carcinogenic potential of agents and promote the use of hazard descriptors as well as establishing the mode of action and emphasizing epidemiological data to facilitate clarity in describing carcinogenic conclusions. The following five descriptors are discussed in the guidelines:

- Carcinogenic to Humans;
- Likely to be Carcinogenic to Humans;
- Suggestive Evidence of Carcinogenic Potential;
- Inadequate Information to Assess Carcinogenic Potential; and
- Not Likely to be Carcinogenic in Humans.

EPA performs quantitative carcinogenic risk assessments for constituents that are carcinogenic to humans or likely to be carcinogenic to humans on a case-by-case basis for constituents with suggestive evidence of carcinogenic potential.

Slope factors for some constituents have been derived for oral and/or inhalation exposure since the carcinogenic potential of a constituent can be dependent on the route of exposure. The inhalation unit risk is the quantitative estimate of incremental risk in terms of risk per microgram per cubic meter ( $\mu\text{g}/\text{m}^3$ ) air breathed. The inhalation unit risk estimates, in units of  $(\mu\text{g}/\text{m}^3)^{-1}$ , are converted to inhalation slope factors, in units of  $(\text{mg}/\text{kg}\text{-day})^{-1}$ , assuming that a 70-kilogram (kg) person breathes at a rate of 20 cubic meters per day ( $\text{m}^3/\text{day}$ ).

### *Non-Carcinogenic Toxicity Values*

Toxicity values used to evaluate non-carcinogenic effects (effects other than cancer) include the following:

- Oral reference doses (RfD) in units of mg/kg-day; and
- Inhalation reference concentrations (RfC) in units of  $\mu\text{g}/\text{m}^3$ .

Chronic oral RfDs and inhalation RfCs are estimates (with uncertainty spanning perhaps three orders of magnitude) of the daily exposure to the human population (including sensitive subgroups) likely to be without an appreciable risk of deleterious effects during a lifetime. Chronic RfDs and RfCs are specifically developed to be protective for long-term exposure to a constituent. Chronic RfDs and RfCs are preferentially used to evaluate all exposure scenarios; subchronic RfDs and RfCs are used when chronic RfDs and RfCs are not available.

Reference doses have been developed by EPA and they represent a level to which an individual may be exposed that is not expected to result in deleterious effect. RfDs are derived from epidemiological or animal studies and incorporate uncertainty factors to help ensure that adverse health effects will not occur.

### *Sources of Toxicity Values*

The following sources of information, in order of priority, were used to identify toxicity values for COPCs with potential for human exposure:

- EPA's Integrated Risk Information System (IRIS) – IRIS is updated regularly, provides verified reference doses, reference concentrations, slope factors (SFs), and unit risk factors, and is the agency's preferred source of toxicity information;
- EPA's Provisional Peer Reviewed Toxicity Values (PPRTVs) – The Office of Research and Development/National Center for Environmental Assessment/Superfund Health Risk Technical Support Center develops PPRTVs on a chemical-specific basis when requested by EPA's Superfund program staff;
- Provisional or interim toxicity values recommended by EPA's National Center for Environmental Assessment, as published in the EPA Region 6 Medium-Specific Screening Level (MSSL) tables;
- Agency for Toxic Substances and Disease Registry (ATSDR) Minimal Risk Levels (MRLs) are peer-reviewed estimates of the daily human exposure to a hazardous substance that is likely to be without appreciable risk of adverse non-cancer health effects over a specified duration of exposure; and
- EPA's Health Effects Assessment Summary Tables (HEAST) – HEAST provides information on interim (not yet verified by EPA workgroups) RfDs and SFs.

If toxicity values from these sources were not available for a constituent detected at a site, and an alternative toxicity value is not justifiable, the lack of toxicity values is discussed in the uncertainty assessment.

Route-to-route extrapolations from oral toxicity values to derive inhalation values, and vice versa, are not made. For example, if there is an oral RfD for a constituent, but an inhalation RfC is not available, then only the oral routes of exposure were quantitatively evaluated in the BHHRA.



Dermal toxicity values are not available in IRIS or HEAST. For evaluating risk/hazard from dermal routes of exposure, the most recent EPA dermal guidance was followed (U.S. EPA 2004). This guidance recommends adjusting oral toxicity values using gastrointestinal absorption factors to evaluate dermal exposure routes for some constituents. The oral-to-dermal adjustment is not required for other constituents.

### **Risk Characterization**

The risk characterization portion of the BHHRA combines the outputs of the exposure and toxicity assessments to quantify the health risks associated with the Site. The BHHRA organized the types of risk at the Site according to various exposure scenarios. Each exposure scenario specifies the type of human receptor (e.g., industrial worker), the exposure pathway (e.g., ingestion), and the COC. If a contaminant or exposure scenario is found to produce a risk which will require a remedial action (based on either the carcinogenic risk or the non-cancer hazard index) that contaminant or exposure scenario is said to "drive the risk" or "drive" the need for action. A remediation level is set for site-related COCs that drive risk.

Risk characterization also considers the nature of and weight of evidence supporting the estimates, as well as the magnitude of uncertainty surrounding such estimates. Although the risk assessment produces numerical estimates of risk, these numbers do not predict actual health outcomes. The estimates are calculated to overestimate risk, and thus any actual risks are likely to be lower than these estimates, and may even be zero.

#### *Carcinogens*

For carcinogenic COCs, risks are generally expressed as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to the carcinogen. ELCR is calculated from the following equation:

$$\text{ELCR} = \text{CDI} \times \text{SF}$$

Where:

ELCR = a unitless probability (e.g.,  $2 \times 10^{-5}$ ) of an individual developing cancer

CDI = chronic daily intake averaged over 70 years (mg/kg-day)

SF = slope factor, expressed as (mg/kg-day)<sup>-1</sup>.

A calculated risk value of  $1 \times 10^{-6}$  indicates that an individual experiencing the RME has a one in one million chance of developing cancer as a result of site-related exposure. This is referred to as the ELCR because it would be in addition to the cancer risks individuals face from other causes such as smoking or exposure to too much sun. The chance of an individual developing cancer from all other causes has been estimated to be as high as one in three. Generally, EPA considers remedial action to be warranted at a site when the ELCR exceeds  $1 \times 10^{-4}$ . The need for remedial action when the ELCR falls within the  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$  range is generally judged on a case-by-case basis (unless applicable or relevant and appropriate requirements are exceeded). Risks less than  $1 \times 10^{-6}$  generally do not require remedial action.

#### *Non-Carcinogens*

The potential for non-carcinogenic effects is evaluated by comparing an exposure level over a specified time period (e.g., lifetime) with an RfD derived for a similar exposure period. The RfD is the dose at which a harmful effect is unlikely to occur. The ratio of exposure to toxicity is called a hazard quotient (HQ). An HQ less than 1 indicates that a receptor's dose from a single contaminant is less than the RfD,

and that toxic non-carcinogenic effects from that chemical are unlikely. The HI is generated by adding the HQs for all COPCs that affect the same target organ (e.g., liver) or that act through the same mechanism of action within a medium or across all media to which a given individual may reasonably be exposed.

The non-cancer HQ is calculated from the following:

$$HQ = CDI/RfD$$

Where:

HQ = hazard quotient

CDI = chronic daily intake

RfD = reference dose.

CDI and RfD are expressed in the same units and represent the same exposure period (i.e., chronic, subchronic, or short-term).

An HI less than 1 indicates that, based on the sum of all HQs from different contaminants and exposure routes, adverse non-carcinogenic effects from all contaminants are unlikely. An HI greater than 1 indicates that site-related exposures may present a risk to human health.

A summary of the non-carcinogenic toxicity data relevant to the COCs is presented in Table 7.B.

### **2.7.1.2 Summary of Human Health Risk Assessment Results**

The BHHRA Report utilized the maximum concentration detected in each exposure area and conservative exposure and toxicity assessment parameters to produce a protective risk characterization for a future on-site industrial worker, a future on-site construction worker, a future on-site recreational bird watcher, and a current off-site recreational bird watcher. As discussed above, the conservancy worker exposure scenario was not evaluated in the BHHRA. Nevertheless, the exposure parameters for the nature conservancy worker are the same as for the on-site recreational birdwatcher receptor except the particle emission factor (PEF) was set to 150 acres (site-wide) and the exposure frequency was set to 150 days. In addition, the Site sludge areas were not evaluated in the BHHRA, because it was assumed that the sludge required remediation as the source media.

The BHHRA determined that an exposure area was not likely to warrant remedial action based on potential unacceptable risk to human health if the estimated cumulative excess cancer risk level is within or below EPA's acceptable risk range of  $10^{-4}$  (one in ten thousand) to  $10^{-6}$  (one in one million) [40 CFR 300.430(e)(2)(i)(A)(2)]. For non-carcinogens, target endpoint HI that are 1 or less indicate there is little likelihood of an adverse effect [40 CFR 300.430(e)(2)(i)(A)(1)].

Within each soils exposure area, the soil media were divided into surface and subsurface soil data groups. Surface soil is defined in the BHHRA to include 0- to 2-foot sample intervals; sample intervals greater than 2 feet are classified as subsurface soil.

Surface water and sediment data were evaluated for the on-site Freshwater Pond, and from the off-site Marsh Area between the levee and Swan Lake. Sediment and surface water media collected in the on-site drainage ditches were not evaluated for human health exposure. Contact recreation is not a reasonable exposure pathway for the intermittent drainage ditches at the Site. The steep sides of the drainage ditches

preclude significant exposure, as it is unlikely that a receptor would climb down and up in order to cross the drainage ditches.

Impacted ground water is localized to a few areas, immediate to the source areas, within the Site boundaries and was estimated not to present an unacceptable risk to human health in the BHHRA because of an incomplete pathway. Ground water does not meet TCEQ criteria for potable water. Vapor intrusion modeling (using the Johnson and Ettinger vapor intrusion model [Johnson and Ettinger 1991]) of soil and ground water data suggests that vapor intrusion may pose an unacceptable risk to future receptors in occupied structures, if structures are constructed.

Using the above methodology, the BHHRA estimated which exposure areas present a potential unacceptable risk to human health for the on-site industrial worker, on-site construction worker, and future on-site recreational bird watcher exposure scenarios based on current sampling data. However, the BHHRA did not evaluate an exposure scenario based on future use of the Site as a nature conservancy. As part of the Site FS, preliminary remediation goals, which became the Site remediation levels, were developed based on the nature conservancy worker exposure scenario, as discussed below. Soils requiring remedial action will be defined by whether the soils exceed the remediation levels.

The BHHRA estimated that the following exposure areas present a potential unacceptable risk to human health for the on-site industrial worker, on-site construction worker, and future on-site recreational bird watcher exposure scenarios. These exposure areas were prioritized using the magnitude of the risk for the RME exposures (as summarized on Tables 8 and 9) and the size of the exposure areas. The priority order for the exposure areas based on risk are:

- Earthen Impoundment (Oil Pit) surface soil;
- Earthen Impoundment (Sludge Pit) surface water;
- Laydown Exposure Area surface soils;
- Cemetery Exposure Area surface and subsurface soils;
- Maintenance Area – Pits Exposure Area surface and subsurface soils; and
- Tank 800 Exposure Area subsurface soils.

Tables 8 and 9 present the carcinogenic and non-carcinogenic risk summary for the COCs in the exposure areas evaluated in the BHHRA. Only those exposure pathways deemed relevant to the remedy being proposed are presented in this ROD. Readers are referred to the BHHRA for a more comprehensive risk summary of all exposure pathways evaluated for all COPCs and for estimates of the central tendency risk.

### **Preliminary Remediation Goals**

During the FS document development, the MCP reached agreement with the former property owner that reuse would be as a conservancy. Therefore, future use for the Site will not involve industrial, commercial, or residential development, which will be prohibited via institutional controls. Therefore, soil Preliminary Remediation Goals (PRGs) were calculated for the on-site recreational receptors using the same exposure assumptions as presented in the BHHRA, except the PEF was set to 150 acres (site-wide) and the exposure frequency was set to 150 days. The exposure frequency was increased to account for the number of potential days at the Site by a nature conservancy volunteer worker. Table 1 of the FS Report summarizes the human health PRGs. PRGs were not calculated for sludge (inclusive of the surface water and soil overlying the Sludge Pit and the Oil Pit), as all sludge is to be remediated as source media. The PRGs are now the Site remediation levels, and are listed on Table 1 of this ROD.

### 2.7.1.3 Summary of Human Health Risk Assessment Uncertainty Analysis

Some level of uncertainty is introduced into the risk characterization process every time an assumption is made. In regulatory risk assessment, the methodology dictates that assumptions err on the side of overestimating potential exposure and risk. The effect of using numerous assumptions that each overestimates potential exposure provides a conservative (safer) estimate of potential risk.

The principal uncertainties affecting the BHHRA results included:

- **Identification of COPCs** – Uncertainties are introduced in the first step of the risk assessment process if samples do not represent site media, if analytical methods are not adequate for site constituents and matrices, if substantial amounts of analytical data are qualified or rejected, and if constituents are included in the risk assessment that are not related to historical site operations. Uncertainties can also be introduced in the COPC identification process if evaluations such as background comparisons for inorganic constituents, examination of frequency of detection, and a weight-of-evidence evaluation of the relationship of a constituent to the site are utilized to eliminate analytes for the screening process.
- **Exposure Assessment** – Uncertainties are introduced into the exposure assessment if major potential pathways of exposure are not evaluated, if the measured concentrations do not represent future concentrations, if the exposure point concentrations are over- or under-estimated, if modeling results are used in lieu of laboratory or field data, and if exposure parameters do not reflect actual exposure at the site. The uncertainty associated with models generally comes from the data used in the model, regardless of the source. Model uncertainty increases when it has not been field-validated and when default values are utilized.
- **Exposure Pathways** – The potential pathways of exposure to soil-related constituents (incidental ingestion, dermal contact, and inhalation of volatile emissions) were evaluated for the industrial worker, construction worker, and recreational bird watcher. The industrial worker, construction worker, and recreational bird watcher were evaluated at all land-based sites regardless of potential worker exposure patterns or potential recreational usage patterns.
- **Modeling Environmental Factors** – Particulate emission factors from windblown dust and volatilization factors from volatiles in soil were used to estimate concentrations in air. There is generally a higher level of uncertainty associated with the use of modeled concentrations than in the use of measured concentrations if valid measurement data are available for the exposure medium and exposure location.
- **Exposure Parameter Estimation** – Most of the exposure parameter values for the RME are high-end estimates of exposure, leading to risks that are biased high.
- **Toxicity Assessment** – Toxicity assessment uncertainties are introduced if unverified toxicity values are used in the BHHRA, if the basis for the derivation of the toxicity values is biased, or if dose-response factors are not available for detected constituents. There is a higher level of uncertainty associated with provisional values than there is for consensus values listed in IRIS. Use of provisional values could overestimate or underestimate risk/hazard. Sources of uncertainty in the derivation of toxicity values impact all risk assessments and are not specific to the risk assessment for this Site.

### 2.7.1.4 Human Health Risk Assessment Conclusions

Sludge and contaminated soils pose an unacceptable risk to human health, which will be mitigated via the implementation of remedial alternatives. The future use will be restricted to a natural preservation or

conservation area via an institutional control. Therefore, health effects from exposure to contaminated media by adults assumed to be on-site for a maximum of 150 days per year for conservancy work were evaluated for future reuse.

Table 1 of this ROD summarizes the human health remediation levels; these remediation levels are the remediation levels for the Site soils and define the areas and volumes of environmental media subject to Remedial Action. Areas of the MSC site with identified remediation level exceedances in Table 1 are portions of the surface soils in the Laydown Area and portions of the surface and subsurface soil in the Cemetery Area, Maintenance Area – Pits, Maintenance Area – 900, and Tank 800 Area.

Remediation levels in Table 1 are divided into remediation levels for surface soil and subsurface soil. EPA guidance recommends an evaluation of surface soil from 0 to 2 feet bgs, while TCEQ guidance recommends surface soil from 0 to 5 feet bgs. EPA has determined that the surface soil depth interval for remediation of Site soils will extend to 2 feet bgs; therefore, institutional controls will be imposed upon the 2- to 5-foot depth interval to prevent exposure to soils with contamination levels above the surface soil remediation levels because the TCEQ considers that to be surface soil. All Site sludge in the Sludge Pit, Oil Pit, API separators and ASTs will be remediated, as well as oily waste (principal threat waste) found in subsurface soils which extend to a depth of 15 feet bgs.

Vapor intrusion modeling suggests that vapor intrusion may pose an unacceptable risk to future receptors in occupied structures. Therefore, an institutional control will be placed on the property to prohibit the construction of facilities or buildings within a prescribed distance from contaminated areas of the Site. Per EPA guidance, OSWER EPA 530-D-02-004, a vapor intrusion study should be performed prior to construction or use of buildings.

In addition, although sludge and soils will have an active remedy applied, ground water contamination is localized and apparently not moving off-site or to another aquifer; therefore, an institutional control (restriction) will be placed, which will restrict access to and use of ground water.

## **2.7.2 Baseline Ecological Risk Assessment**

As part of the RI, a BERA was conducted to evaluate the current and future effects of contaminants on the environment.

### **2.7.2.1 Summary of Ecological Risk Assessment Approach**

The Site is located adjacent to the southwest shore of Swan Lake and the western shore of Galveston Bay. Marsh areas are located directly adjacent to the Site on the east and northwest, extending to the shore of Swan Lake and Galveston Bay and to the south. The Site area and areas adjacent to the Site to the north, west, and south are shown as being primarily uplands. The wetlands and marshes in the area are tidally influenced.

Designated water uses for the Lower Galveston Bay segment include aquatic life use, contact recreation use, general use, fish consumption use, and restricted oyster waters use. The Galveston Bay system is designated as a National Estuary as part of the National Estuary Program.

The major sections of the ecological risk assessment included: (1) Identification of COCs; (2) Exposure Assessment; (3) Ecological Effects Assessment; and (4) Ecological Risk Characterization. With the completion of this four-step risk assessment process, those exposure pathways and site-related COCs determined to pose actual or potential ecological risk are identified for remedial action.

## **Identification of COCs**

### *Terrestrial Exposure Areas*

The Screening Level Ecological Risk Assessment (SLERA) identified COPCs (including metals, SVOCs, PCBs, PAHs, pesticides, and PCDDs/PCDFs) for each exposure area by comparing screening level benchmarks from a variety of published sources to the maximum detected concentration for each exposure area or the presence of bioaccumulative compounds.

Soil data were compared to soil invertebrate and plant toxicity ecological benchmarks and evaluated to determine the impact of the COPCs in soil on soil invertebrate and terrestrial plant communities. HQs were developed to determine if terrestrial avian and mammalian receptors are potentially at risk as a result of the presence of COPCs in soil at the terrestrial ecological exposure areas.

Surface soil data were evaluated even if the sample was taken from below concrete to address potential future exposure potential. The SLERA determined that, based on exceedances of conservative screening values, a potential for ecological risk existed for the exposure areas from various COPCs.

### *Aquatic Exposure Areas*

The Drainage Area and Freshwater Pond exposure areas provide freshwater aquatic resources such as benthic and water column communities, and therefore food for upper trophic level receptors such as birds, mammals, reptiles, and amphibians. The Marsh Area provides similar resources for the tidally influenced estuarine community. There are detections of metals, PCBs, PAHs, pesticides, and PCDDs/PCDFs in sediments at concentrations that potentially could affect ecological receptors.

The SLERA determined that further assessment of the sediments in the Drainage Area, Freshwater Pond, and Marsh Area was warranted. Sediment and tissue samples were collected in the BERA field investigation from Site aquatic areas and from a reference salt marsh in Gangs Bayou along the north shore of Galveston Island and a reference freshwater pond located in Galveston Island State Park. HQs were also developed to determine if aquatic avian and mammalian receptors are potentially at risk as a result of the presence of COPCs in sediments at the aquatic ecological exposure areas.

Surface water concentrations did not indicate a potential for adverse impact on ecological receptors, since few analyte concentrations exceeded ecological benchmarks and none of the bioaccumulator concentrations exceeded ecological benchmarks. None of the detected concentrations in the surface water samples at the Drainage Area exceeded their respective ecological benchmarks. The maximum manganese and cyanide concentrations in the Freshwater Pond and the maximum antimony (total), cadmium (dissolved), silver (dissolved), and thallium (total) in the Marsh Area exceeded the ecological screening benchmarks. There is limited information on the aquatic toxicity of manganese and the benchmark value does not account for hardness. In addition, the analytical methodology for total cyanide measurements overstates the concentrations for a benchmark based on measurements of cyanide amenable to chlorination. There is uncertainty in evaluation of surface water concentrations, especially naturally occurring inorganic constituents, in tidally influenced dynamic systems.

Sediment data, toxicity tests, tissue sampling, and habitat observations address the assessment of risk to the aquatic community receptors (i.e., benthic invertebrates and water column) and therefore a discussion of sediment and surface water concentrations compared to sediment and surface water benchmarks was not presented.

### *Contaminants of Concern*

The BERA identified COCs, which were chemicals that had Lowest Observed Adverse Effect Level (LOAEL) based HQs greater than unity after the application of an area-specific use factor (AUF). COCs identified at the Site included metals and SVOCs as presented in Table 10. Table 10 also contains the exposure point concentrations used in the BERA.

### **Exposure Assessment**

The objectives for the exposure assessment are to evaluate potential current and future ecological exposures to COPCs in media of concern. In the exposure assessment part of the BERA, a detailed evaluation was completed for each potential exposure scenario at the Site. The food web for the various exposure areas are presented in Attachment 2 – BERA Figures.

### *Exposure Areas*

The Site has a blend of terrestrial and aquatic exposure areas that were evaluated in the BERA, which included the following terrestrial exposure areas:

- Laydown Area;
- Cemetery Area;
- Unused Area 1 combined with the operating area designated as Earthen Impoundment Soils (soils outside bermed pits);
- Unused Area 2 combined with the WDW-138 (injection well) Area and the Unit 1200 API separator operating areas;
- Borrow Area;
- Laboratory/Office Area combined with the Unit 100 API separator;
- Maintenance Area divided into three exposure areas (Pits, Warehouse, and 900);
- Tank 800 Area; and
- Soils overlying the Oil Pit portion of the Earthen Impoundment.

The Laydown Area was evaluated as both a terrestrial system and as a wetland or aquatic exposure area. The other terrestrial areas were evaluated for terrestrial exposure only. In addition, the BERA identified the following areas as aquatic exposure areas:

- Drainage Ditches;
- Freshwater Pond; and
- Marsh Area between the levee and Swan Lake.

A site-wide aquatic assessment was also completed using the Drainage Ditch, Freshwater Pond, and Marsh Areas combined for those receptors that could potentially utilize all three habitats. The BERA analyzed risks to ecological receptors, including plants, invertebrates, birds, and mammals, for ecological COPCs.

### *Terrestrial Receptors*

Representative avian receptors are likely to forage or capture prey species in the grass areas of the terrestrial exposure areas. Avian receptors chosen to represent feeding guilds of birds at the Site include the barn owl, snowy egret, mourning dove, and red-winged blackbird.

Representative mammalian receptors are likely to forage or capture prey species in the grass areas of the terrestrial exposure areas. Mammalian receptors chosen to represent feeding guilds of mammals include the deer mouse, coyote, least shrew, and raccoon.

### *Aquatic Receptors*

Avian and mammalian receptors utilizing the aquatic food web were evaluated to determine if these ecological receptors might be at risk in the aquatic exposure areas. The avian receptors selected to represent aquatic exposure were the mallard duck, snowy egret, and spotted sandpiper. The mammalian receptors selected to represent aquatic exposure were the marsh rice rat and the raccoon. The spotted sandpiper was considered an appropriate surrogate for the piping plover and reddish egret and the snowy egret was considered an appropriate surrogate for the white-faced ibis when the diet is adjusted to 100 percent invertebrates to better represent the diet of the white-faced ibis.

### *Exposure Point Concentrations*

The exposure assessment also includes calculation of the EPCs, which are based on measured or modeled COPC concentrations present at the Site. To assess risks to terrestrial community-level receptors (i.e., terrestrial plants and soil invertebrates), surface soil EPCs, which were the 95 percent upper confidence limit (UCL) or maximum detected concentration of constituents within each exposure area, were utilized. For the aquatic exposure areas, the maximum detected value was used for each sample type for the EPC. EPCs are presented for COCs in Table 11.

## **Ecological Effects Assessment**

The BERA Problem Formulation determined that fish tissue and benthic invertebrate tissue samples were needed to fill data gaps.

### *Benthic Invertebrate and Fish Sampling*

Benthic or substrate-associated macroinvertebrate and/or small fish (depending upon availability) were collected from the Drainage Area (ditches), Freshwater Pond, the Marsh Area, and reference marsh. Small fish are defined as individuals, 10- to 80-millimeter total length, considered to represent prey of larger fish, many semi-aquatic tetrapod vertebrates (wildlife), and birds. Benthic species were not captured from the reference pond.

### *Bioassays*

Sediment samples were used in sediment toxicity tests for both marine and freshwater systems. The following EPA test methods were conducted on sediment samples from the Drainage Area, the Freshwater Pond, and the reference pond:

- Test Method 100.1: *Hyalella azteca* 10-day Survival and Growth Test for Sediments; and
- Test Method 100.2: *Chironomus tentans* 10-day Survival and Growth Test for Sediments.



The following tests were conducted on sediment samples from the Marsh Area and reference marsh:

- American Society for Testing and Materials (ASTM) Method E1367-03e: Standard Test Method for Measuring the Toxicity of Sediment-Associated-Contaminants with Estuarine and Marine Invertebrates, *Leptocheirus plumulosus*; and
- ASTM Method E1367-03e: Standard Test Method for Measuring the Toxicity of Sediment-Associated-Contaminants with Estuarine and Marine Invertebrates, *Ampelisca abdita*.

These species were chosen as representative species for the toxicity testing because they are commonly used as indicator species in toxicity testing.

### **Risk Characterization**

The BERA utilized soil, sediment, surface water, tissue, and toxicity data from the BERA field investigation to evaluate risk to ecological receptors.

To assess risks to terrestrial community-level receptors (i.e., terrestrial plants and soil invertebrates), surface soil EPCs were compared to terrestrial plant and soil invertebrate toxicity benchmarks. This differs from the SLERA benchmark screening, because only benchmarks derived specifically for protection of plants or invertebrates were used in the BERA (the SLERA used the lowest benchmark irrespective of the organism the benchmark was designed to protect).

In order to address the following risk questions, HQ analyses were used to evaluate ecological impacts to upper trophic-level receptors to determine if these receptors might be at risk as a result of the presence of COPCs in sediment or soils at the Site.

1. Are avian and mammalian receptors at risk from ingestion of soil invertebrates, terrestrial plants, and/or other prey that have accumulated COPCs from the soil?
2. Are the avian and mammalian receptors at risk from ingestion of the benthic invertebrates that have accumulated COPCs from the sediments?
3. Are the avian and mammalian receptors at risk from ingestion of the fish that have accumulated COPCs from the sediments?

The HQ was calculated for each constituent by dividing the estimated constituent intake (dose) by the toxicity reference value (TRV).

#### *Doses*

A detailed description of the HQ calculation process can be found in Section 8.5.2 of the SLERA/BERA Workplan (URS 2006b). The total COPC exposure dose for each representative species is equal to the sum of the doses from incidental ingestion of water, soil, plant material, invertebrate prey, and vertebrate prey. The exposure assumptions (i.e., body weight, food ingestion rate, water ingestion rate, and soil ingestion percentage) for avian and mammalian terrestrial receptors, and dietary composition assumptions (i.e., diet composition) for each receptor are provided in the BERA. In addition, the BERA provides the exposure assumptions (i.e., body weight, food ingestion rate, water ingestion rate, and soil ingestion percentage) and dietary composition assumptions (i.e., diet composition) for the avian and mammalian aquatic receptors.

Doses for the Laydown Aquatic Area were obtained from the median benthic and fish tissue concentrations for the Freshwater Pond and Drainage Areas and the Freshwater Pond surface water, from

the soil EPCs for the Laydown Area, and from sediments (the maximum of the concentrations for the aquatic area). Laydown Area sediment data was used as proxy values to calculate HQs for COPCs that were not detected in fish or benthic tissue. One bioaccumulator, hexachlorobenzene, was not detected in the fish tissue. The hexachlorobenzene benthic tissue concentration was used as the proxy value for the fish tissue concentration.

The Site-wide aquatic doses for tissue, surface water, and sediments were calculated using the average of the Freshwater Pond, Drainage Ditches, and Marsh Area. The Site-wide aquatic doses for soils ingestion were calculated using the Site-wide (excluding the Laydown Area, Tank 800 Area, and Oil Pit Area) soils data. Doses were calculated using one-half the detection limit for non-detected analytes.

### *Toxicity Reference Values*

The strategy for selection of a TRV was based on several key factors:

- Preference for chronic (i.e., long-term) endpoints, especially those that include critical life stages (see below for more information);
- Preference for the use of the ecological receptor as a test organism; and
- Preference for food studies over gavage or oral intubation studies (intraperitoneal or intravenous studies were not used for ingestion-based TRVs), and direct inhalation exposure studies were used for inhalation-based TRVs.

No observable adverse effect level (NOAEL) and LOAEL TRVs were utilized in the HQ calculations (see Table 10). TRVs were not extrapolated across taxonomic classes because physiological differences between taxonomic classes are assumed to be too great to make any extrapolation useful in predicting effects to another taxonomic class of animals (e.g., using mammal data for birds or bird data for amphibians). The TRVs for ecological COPCs were adjusted for the ecological receptor by incorporating exposure duration uncertainty factors (UFs). The UFs were used to account for differences in exposure duration and endpoints. UF adjustments for LOAELs to NOAELs and to adjust from acute to chronic duration or subchronic to chronic duration followed the U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM 2000) guidelines.

## **2.7.2.2 Summary of Ecological Risk Assessment Results**

### **Terrestrial Exposure Areas**

Multiple lines of evidence, including (1) field observations, (2) number of COPCs, (3) number of LOAEL-HQs exceeding 1, (4) AUFs, (5) bioavailability, (6) the comparability of background LOAEL-HQs to exposure area LOAEL-HQs, and (7) an evaluation of the Site risk (i.e., an assessment of exposure areas post-remedial action), were used to interpret the risk from the terrestrial assessment. LOAEL-based HQs were considered applicable because there are no protected terrestrial species associated with the Site. The Borrow Area was chosen to represent the background concentrations of PAHs and PCDDs/PCDFs at the Site because of the lack of Site activities in that area.

Based on the multiple lines of evidence, the BERA recommended inclusion of the following soil exposure areas in the FS because of potentially unacceptable risk to terrestrial receptors:

- Laydown Area;
- Cemetery Area;

- Tank 800 Area; and
- Oil Pit.

Table 2 summarizes the ecological remediation levels for terrestrial receptors.

Multiple lines of evidence, including the comparability of background LOAEL-HQs to exposure area LOAEL-HQs, AUFs, and uncertainty in TRVs, uptake factors, and bioavailability, indicate the remaining terrestrial exposure areas did not warrant response action based on ecological risk.

### **Aquatic Exposure Areas**

Multiple lines of evidence, including (1) toxicity testing of the sediment, (2) tissue analysis, (3) field observations, (4) an evaluation of LOAEL-based HQs, (5) an evaluation of NOAEL-based HQs for protected species, (6) AUFs and bioavailability, and (7) a comparison of risk from the reference areas were used to interpret risk from the aquatic areas. Based on these lines of evidence, the three aquatic exposure areas, Drainage Area, Freshwater Pond, and Marsh Area, do not warrant response action based on ecological risk. Ten-day sediment toxicity tests did not indicate toxicity, as measured by survival and growth, from sediment exposure to the benthic invertebrate community. Based on the toxicity tests, the sediments of these three areas are not adversely affecting the benthic invertebrate community. The analysis of the invertebrate and fish tissue did not indicate that COPCs are at concentrations that are impacting these communities. The trophic analysis showed very little risk to the populations of birds and mammals that may utilize these areas for foraging. The protected species (white-faced ibis in the Drainage Area and Freshwater Pond, and piping plover and reddish egret in the Marsh Area) show minor risk from the naturally occurring metals and the low detections of 2,3,7,8-TCDD toxic equivalent (TEQ). Comparison of the risk from the reference areas shows that the risk from the metals (e.g., aluminum, chromium, vanadium, and zinc) is largely contributed by naturally occurring background concentrations.

The Freshwater Pond provides a freshwater resource in an estuarine area. Destruction of the Freshwater Pond would unnecessarily remove ecological services for a hypothetical risk that is not supported by the multiple lines of evidence (viable aquatic habitat, lack of toxicity, low tissue burdens, and low HQs). Destruction of the Marsh Area would unnecessarily remove ecological services for foraging, nursery, and nesting habitat based on a hypothetical risk that is not supported by multiple lines of evidence (viable aquatic habitat, lack of toxicity, low tissue burdens, and low HQs). The present risk from the Marsh Area is currently low and is not expected to increase as siltation deposits clean sediment into the Marsh Area.

### **2.7.2.3 Summary of Ecological Risk Assessment Uncertainty Analysis**

Some level of uncertainty is introduced into the risk characterization process every time an assumption is made. In regulatory risk assessment, the methodology dictates that assumptions err on the side of overestimating potential exposure and risk. The effect of using numerous assumptions that each overestimates potential exposure provides a conservative (safer) estimate of potential risk.

The principal uncertainties affecting the BERA results included:

- Uncertainties with the Use of Background Concentrations;
- Uncertainties with Exposure Analysis, including:
  - Laydown Aquatic Exposure,
  - Use of SLERA Surface Water Data to Represent Drinking Water Exposure,
  - Bioavailability,
  - Influences on the Toxicity of Metals,

- Uptake Factors,
  - Food Chain Multipliers,
  - Metabolism of PAHs in Vertebrates (Birds, Mammals, and Fish),
  - Area Use Factors,
  - Synergistic or Antagonistic Effects of Constituents, and
  - Use of Tissue Concentrations to Estimate Toxicity;
- Uncertainties with TRVs and Community Screening Values, including:
    - Toxicity Data Selection,
    - Conservatism of Toxicity Data,
    - Surrogate Toxicity Values,
    - Uncertainty Factors Used in TRV Development,
    - Uncertainty Associated with Least Shrew Exposure to PCBs,
    - Lack of Toxicity Data and Screening Values,
    - Phytotoxicity Benchmarks,
    - Soil Invertebrate Toxicity Benchmarks, and
    - Amphibians and Reptiles;
  - Uncertainties in Risk Characterization;
  - Uncertainties in the Comparison of Site Freshwater Areas to Reference Pond;
  - Uncertainties Associated with the Tissue Sampling; and
  - Uncertainties Associated with Toxicity Testing.

#### **2.7.2.4 Ecological Risk Assessment Conclusions**

##### **Terrestrial Ecological Risk**

Based on the BERA analysis, the following exposure areas warrant response action based on ecological risk: Laydown Area, Cemetery Area (a small portion), Tank 800, and the Oil Pit. Each of these exposure areas has LOAEL-based HQs above 1 for multiple bioaccumulative analytes for multiple species. LOAEL-based HQs are an adequate assessment of terrestrial ecological risk because there are no threatened and endangered species associated with the terrestrial habitat.

The Laydown Area has LOAEL-based HQs (after adjustments for AUFs) above 1 for 2-methylnaphthalene, hexachlorobenzene, hexachlorobutadiene, high molecular weight PAHs, metals, PCDDs/PCDFs, phenanthrene, and PCBs. The Cemetery Area (one portion) has a LOAEL-based HQ above 1 for high molecular weight PAHs. The Tank 800 soils have LOAEL-based HQs greater than 1 for bis(2-ethylhexyl) phthalate, hexachlorobenzene, high molecular weight PAHs, and metals. The Oil Pit soils have LOAEL-based HQs greater than 1 for hexachlorobutadiene, high molecular weight PAHs, and metals.

Multiple lines of evidence, including the comparability of background LOAEL-HQs to exposure area LOAEL-HQs, AUFs, and uncertainty in TRVs, uptake factors, and bioavailability, indicate the remaining terrestrial exposure areas do not warrant response action based on ecological risk.

## **Aquatic Ecological Risk**

Based on multiple lines of evidence, the Drainage Area, Freshwater Pond, and Marsh Area do not warrant response action based on ecological risk. Relevant lines of evidence include: (1) toxicity testing of the sediment, (2) tissue analysis, (3) field observations, (4) an evaluation of LOAEL-based HQs, (5) an evaluation of NOAEL-based HQs for protected species, (6) AUFs and bioavailability, and (7) a comparison of risk from the reference areas. Ten-day sediment toxicity tests did not indicate toxicity, as measured by survival and growth, from sediment exposure to the benthic invertebrate community. The analysis of invertebrate and fish tissue did not indicate that COPCs are at concentrations that are impacting the fish community. The trophic analysis showed very little risk to the populations of birds and mammals that may utilize these areas for foraging. The protected species (white-faced ibis, piping plover, and reddish egret) show minor risk from the naturally occurring metals and the low detections of 4,4'-DDT and 2,3,7,8-TCDD TEQ. Comparison of the risk from the reference areas shows that the risk from the metals (e.g., aluminum, chromium, vanadium, and zinc) is largely contributed by naturally occurring background concentrations.

## **Ecological Remediation Levels**

The potential for significant exposure of wildlife to site-related contaminants does occur within contaminated portions of the Site. The remediation levels listed in Table 2 are the basis for defining the areas and environmental media subject to Remedial Action based on ecological receptor protection. All the receptors, exposure factors, including the AUFs, and uptake factors discussed in the BERA were used to calculate ecological remediation levels.

Ecological risk attributed to contaminated soils (terrestrial) was evaluated mostly through food chain modeling of small mammals and predatory birds. After the decision was made for future land use to be a land conservancy, the vast majority of ecological risk was ameliorated by human health risk and cleanup values (i.e., the human health values were more stringent). However, there was one small parcel of land (immediate to and east-southeast of the Tank 800 berm, along the road [Figure 3]) in which ecological cleanup values were the more stringent. In this case, risk and associated remedial levels were based on the least shrew (a primary food source for predatory birds) (see Table 2).

### **2.7.3 Basis for Remedial Action**

The response action selected in this ROD is necessary to protect human health and the environment from actual or threatened releases of hazardous substances. The actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

## **2.8 REMEDIAL ACTION OBJECTIVES**

According to the NCP, 40 CFR §300.430(a)(1)(i), the “national goal of the remedy selection process is to select remedies that are protective of human health and the environment, that maintain protection over time, and that minimize untreated waste.” Based on information relating to types of contaminants, environmental media of concern, and potential exposure pathways, remedial action objectives (RAOs) were developed to aid in the development and screening of remedial alternatives.

### **2.8.1 Remedial Action Objectives and Media-Specific Remediation Levels**

Under the NCP, 40 CFR § 300.430(e)(2)(i), EPA is to establish RAOs that provide a general description of what the cleanup will accomplish. Therefore, RAOs were developed for the Site. Table 12 summarizes the results of the RI and risk assessments and presents the RAOs for each environmental medium. The RAOs presented in this table serve as the design basis for remedial alternatives, which will be presented in the next section.

Remediation levels establish acceptable exposure levels (i.e., contaminant concentration levels) that are protective of human health and the environment, and are developed considering applicable, relevant, and appropriate requirements (ARARs), as specified in the NCP. The remediation levels for the Site are the same as the PRGs established in the FS. The term “remediation level” is used in order to make clear that the selected remedy establishes binding requirements to ensure that RAOs are satisfied. Remediation levels are the basis for defining the areas and volumes of environmental media subject to remedial action; the lower of the human health or ecological remediation level will be used in this determination.

### **Human Health Remediation Levels**

Risk-based calculations set human health remediation levels using carcinogenic or non-carcinogenic toxicity values and site-specific exposure conditions. Remediation levels were calculated to obtain a COC specific carcinogenic risk less than or equal to  $10^{-6}$  or non-carcinogenic HQ less than or equal to 1 for the on-site nature conservancy worker. However, if the cumulative carcinogenic risk exceeded  $10^{-4}$  or a cumulative non-carcinogenic HQ was greater than or equal to 10 for the surface or subsurface soils media, then allowable soil concentrations were adjusted downward until the cumulative carcinogenic risk was less than  $10^{-4}$  or a cumulative non-carcinogenic HQ was less than or equal to 10.

### **Ecological Remediation Levels**

Remediation levels for ecological receptors were determined on a site-specific basis and take into account multiple factors. They correspond to acceptable levels of risk for the ecological receptor or habitat. Ecological remediation levels were calculated for soils.

Remediation levels for protection of human health and the environment are presented in Tables 1 and 2.

The RAOs and remediation levels for the Site include:

#### **2.8.1.1 Sludge**

The RAOs for sludge (including soils and surface water overlying the sludge) are to:

- Prevent the potential direct contact/inhalation of carcinogenic and non-carcinogenic COCs by human receptors above risk-based remediation levels;
- Prevent the release of carcinogenic and non-carcinogenic COCs from sludge to surface soils and sediments above risk-based remediation levels;
- Prevent the migration of carcinogenic and non-carcinogenic COCs from sludge to ground water above risk-based remediation levels for inhalation from ground water contaminants by human receptors;
- Prevent the release of COCs from sludge to surface soils and sediments above ecological risk-based remediation levels; and
- Prevent the release of COCs from sludge to surface water above ecological risk-based remediation levels.

Remediation levels were not calculated for sludge (inclusive of the surface water and soil overlying the Sludge Pit and the Oil Pit), because it was determined that all sludge is to be remediated as source media. Any surface water remaining in the Sludge Pit will need to meet the Texas Surface Water Quality Standards (30 TAC 307) or other values, such as those used to evaluate surface water in the SLERA, and the pit will be backfilled with clean soil to ground surface.

### 2.8.1.2 Soil

The studies found that surface and subsurface soils in some areas need to be remediated. The RAOs for soil are to:

- Prevent ingestion/direct contact/inhalation by human receptors of carcinogenic and non-carcinogenic COCs from surface soils above risk-based remediation levels;
- Prevent migration of COCs to ground water from soils with subsequent emanation of vapors above risk-based remediation levels for the prevention of inhalation of contaminants by human receptors;
- Prevent ingestion by ecological receptors of COCs from surface soils above risk-based remediation levels;
- Prevent ingestion by avian and mammalian receptors of soil invertebrates, terrestrial plants, and/or other prey that have accumulated COCs from the soil; and
- Prevent inhalation by human receptors of carcinogenic and non-carcinogenic COCs from subsurface soils above risk-based remediation levels.

Areas of the Site with human health remediation level (Table 1) exceedances include portions of the surface soils in the Laydown Area and portions of the surface and subsurface soil in the Cemetery Area, Maintenance Area – Pits, Maintenance Area – 900, and Tank 800 Area (Figure 2). Areas of the Site with ecological remediation level (Table 2) exceedances include portions of the surface soils in the Oil Pit Area, the Laydown Area, the Cemetery Area, and the Tank 800 Area (Figure 2).

After the decision was made for future land use to be a land conservancy, the vast majority of ecological risk was ameliorated by human health risk and remediation levels (i.e., the human health values were more stringent). However, there was one small parcel of land (immediate to and east-southeast of the Tank 800 berm, along the road) in which ecological remediation levels were the more stringent. In this case, the remediation levels were based on the least shrew (a primary food source for predatory birds) (see Table 2).

EPA soil screening guidance (U.S. EPA 2002) (supplemental guidance for developing soil screening levels for Superfund sites) recommends an evaluation of surface soil from 0 to 2 feet bgs, while TCEQ guidance recommends evaluation of surface soil from 0 to 5 feet bgs. EPA has determined that the surface soil depth interval for remediation will extend to 2 feet bgs; therefore, institutional controls will be imposed upon soils in the 2- to 5-foot depth interval and below to prevent exposure to soils that the TCEQ classifies as surface soil and which have contamination exceeding the surface soil remediation levels. Subsurface soils extending to the top of the uppermost water-bearing unit which contain source material or which exceed the subsurface soil remediation levels will be remediated, so that all source material will be excavated and remediated, including soils in the Cemetery Area, Maintenance Area – Pits, Maintenance Area – 900, and the Tank 800 Area.

Vapor intrusion modeling of soil data suggests that vapor intrusion may pose an unacceptable risk to future receptors in occupied structures, if present. Therefore, institutional controls will be placed on the property to protect occupants from potential vapor intrusion from impacted soil. A vapor intrusion study should be performed prior to construction or use of buildings (OSWER EPA530-D-02-004, November 2002).

### 2.8.1.3 Ground Water

The BHHRA determined that ground water at the Site does not present a potential unacceptable risk to human health for those exposure pathways evaluated in the BHHRA, although, as discussed below, an unacceptable risk from potential vapor intrusion from the shallow ground water exists. Because the aquifer is considered a Class 3 aquifer (>10,000 parts per million [ppm] TDS), it is not suitable for drinking water. The RI concluded that shallow ground water contamination remains localized near operational areas on-site; the plumes of contamination appear stable and do not appear to be migrating off-site; and that source material has not been found in the shallow ground water. The RI also presents information indicating that the clays underlying the shallow ground water may prevent vertical migration. Nevertheless, shallow ground water has been impacted by operations. Therefore, based on the information presented in the RI, the RAO for ground water is to:

- Prevent migration of COCs beyond the Site boundary or into uncontaminated aquifers at concentrations exceeding Texas Class 3 ground water protective concentration levels.

Source material was discovered in subsurface soil, but not in ground water, during the RI. Therefore, it is anticipated that once the source material in subsurface soil above these localized ground water contaminant plumes has been removed, the ground water will naturally attenuate. Because there is the potential for ground water to travel off-site or to discharge to surface water, ground water will be monitored at the point of compliance (property boundary). Ground water COC selection was based on the detection above TCEQ Class 3 PCLs, degradation products, and mobility. COCs will include the ground water analytes as identified in Table 15. In addition, ground water will be monitored for those constituents necessary to evaluate natural attenuation potential, of which most are not part of the COCs listed on Table 15 but must be determined during the design.

A containment or treatment remedy will be required if any of the following conditions are met:

- (1) Organic COCs are detected in a boundary well in concentrations above the TCEQ PCLs;
- (2) Metal concentrations are greater than TCEQ PCLs and background levels in a boundary monitoring well(s); and
- (3) Information suggests to EPA that the plume (metals or organics) has the potential to migrate off-site.

In addition, if EPA determines that contamination in the shallow ground water is migrating to an aquifer not currently known to be contaminated, additional actions may be required. In the future, EPA may select additional COCs based on new information or input from its Federal and State partners.

Vapor intrusion modeling of ground water data suggests that vapor intrusion may pose an unacceptable risk to future receptors in occupied structures, if present. Therefore, institutional controls will be placed on the property to protect human receptors from potential vapor intrusion from impacted ground water.



#### **2.8.1.4 Sediment and Surface Water**

RAOs for the protection of human health or ecological receptors from COCs in sediments and surface water were not developed, because the BHHRA and BERA determined that sediments and surface water in the aquatic areas do not present a potential unacceptable risk. RAOs for surface water overlying the Sludge Pit were not developed; the RAOs for surface water overlying the Sludge Pit are included in the RAOs for sludge and liquid wastes.

### **2.8.2 Basis and Rationale for Remedial Action Objectives**

The basis for the sludge and contaminated soil RAOs is to remediate these media to on-site conservancy worker and ecological remediation levels to maintain and allow for future land use as a preserve or conservancy. In addition, the sludge is a principal threat waste and requires a response per NCP requirements (40 CFR 300.430).

The ground water is Class 3 (non-potable), and is therefore, not a drinking water aquifer. The shallow contaminated ground water is not anticipated to be used as a drinking water source in the future due to its high salinity content. However, an off-site surface water discharge point for contaminated ground water is not known, and in consideration of the TCEQ Class 3 Groundwater PCLs requirement, the ground water will be monitored to prevent off-site migration at those respective TCEQ PCLs.

## **2.9 DESCRIPTION OF ALTERNATIVES**

### **2.9.1 Statutory Requirements/Response Objectives**

Remedial alternatives were developed to address the RAOs for the Site and to be consistent with the statutory requirements and preferences found in Section 121 of CERCLA, 42 U.S.C. § 9621, and further detailed in the NCP, 40 CFR § 300.430. Each remedial alternative selected at a Superfund site must be protective of human health and the environment. In addition statutory requirements and preferences include: a requirement that EPA's remedial action must comply with all applicable or relevant and appropriate Federal and more stringent State environmental and facility siting standards, requirements, criteria, or limitations, unless a waiver is invoked; a requirement that EPA select a remedial action that is cost-effective and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and a preference for remedies in which treatment that permanently and significantly reduces the volume, toxicity, or mobility of the hazardous substances is a principal element over remedies not involving such treatment.

### **2.9.2 Technology and Alternative Development and Screening**

CERCLA and the NCP set forth the process by which remedial actions are evaluated and selected. In accordance with these requirements, the FS Report (URS 2008) developed a range of remedial alternatives to achieve the RAOs and remediation levels described in Section 2.8.

With respect to source control, the FS developed a range of alternatives in which treatment that reduces the toxicity, mobility, or volume of the hazardous substances is a principal element. This range included an alternative that removes or destroys hazardous substances to the maximum extent feasible, eliminating or minimizing to the degree possible the need for long-term management. This range also included alternatives that treat the principal threats posed by the Site, but vary in the degree of treatment employed

and the quantities and characteristics of the treatment residuals and untreated waste that must be managed; alternatives that involve little or no treatment but provide protection through engineering or institutional controls; and a no-action alternative. The alternatives are summarized in Table 13 and discussed further in the following sections. These alternatives are numbered to correspond with the descriptions provided in the FS Report.

With respect to ground water response action, the FS developed only one remedial alternative that attains site-specific goals. The sludge, contaminated soil, and ground water were addressed inclusively in each alternative discussed (i.e., there is only one Operable Unit for the Site).

Remedial alternatives for the Site were assembled using an array of presumptive and innovative technologies. Presumptive technologies are preferred technologies for common categories of sites based on historical patterns of remedy selection and EPA's scientific and engineering evaluation of presumptive technology performance. Presumptive technologies that were screened for use at this Site and utilized in developing remedial alternatives included: source (sludge) ex-situ solidification, source in-situ solidification, thermal desorption of sludge, bioremediation of sludge, and RCRA Subtitle C equivalent cell (containment). As previously stated, ground water will be monitored only.

Innovative technologies are relatively new or emerging remediation methods that offer the potential for comparable or superior treatment effectiveness, less intrusive implementation, reduced adverse affects, or lower costs for comparable levels of performance than other demonstrated technologies. Innovative technologies, such as chemical oxidation of soil and sludge were considered, but are less cost-effective and afford no more comparable level of performance than the presumptive remedies.

As discussed in Section 4.1 of the FS Report (URS 2008), sludge and soil treatment technology options were indentified, assessed, and screened based on implementability, effectiveness, and cost. The purpose of the initial screening was to narrow the number of potential remedial actions for further detailed analysis while preserving a range of options. Each alternative was then evaluated in detail in Section 5 of the FS Report.

The alternatives are:

- Alternative 1 – No Action;
- Alternative 2 – Engineered Containment of Unsolidified Sludge and RCRA Subtitle C Containment of Soils;
- Alternative 3 – Engineered Containment of Solidified Sludge and RCRA Subtitle C Containment of Soils;
- Alternative 4 – RCRA Subtitle C Containment of Solidified Sludge and Untreated Soils; and
- Alternative 5 – Slurry-Phase Bioremediation of Sludge and RCRA Subtitle C Containment of Treated Sludge and Untreated Soils.

Alternatives were developed to span the range of possible remedies for the Site from “no action” to “clean closure” with intermediate options providing varying degrees of protectiveness. Table 14 lists the appropriate treatment technology for each medium and the alternative(s), which include the specific treatment technology. The construction time for each alternative reflects only the time required to construct or implement the remedy and does not include the time required to design the remedy or procure contracts for construction.

After the alternatives are described, differences between alternatives with respect to effectiveness, implementability, and cost are identified. Although seven alternatives were screened, Alternatives 6 (Thermal Desorption and RCRA Subtitle C Landfill) and 7 (Off-site Incineration) were not included in the remedial alternative development. Alternative 6 (\$105–\$115 million) was not included in the remedial alternative development because the additional remedial cost of \$25 million over Alternative 5 (Bioremediation) was not supported by any increase in effectiveness or implementability. Since thermal desorption preferentially removes VOCs, mobility of the waste is also reduced; however, it would not address metals concentrations which would have to be addressed through another treatment such as solidification. In addition, the community may have the same concerns for thermal desorption as with incineration—air quality. Alternative 7 was also not included in the remedial alternative development because of the grossly excessive costs (\$450–\$500 million) for the effectiveness provided. Short-term risks to the community would be increased with this alternative; approximately 23,500 truckloads of sludge would be moved from the Site to an off-site incineration facility. In addition, the sludge would still require solidification for transport to the incineration facility.

Each of the five remaining alternatives are individually assessed against the nine NCP criteria, and a comparative analysis of Alternatives 1 through 5 is conducted to evaluate the relative advantages and disadvantages of the alternatives in relation to each of the specific criteria.

### 2.9.3 Common Elements

The following remedial elements (activities or remedial technologies) are shared (*common elements*) by all five alternatives discussed below, with the exception of the “No Action” alternative (i.e., Alternative 1):

- *Preconstruction Activities:* Phase 1- includes pre-construction activities, management of tank contents, and tank demolition. The pre-construction phase includes the remedy design; planning facility and demolition work; preparation of submittals; mobilization and construction of project facilities and utilities; improving site roads; plugging and abandoning of existing monitoring wells; transfer of tank water to the on-site injection well; abatement and off-site disposal of asbestos and lead paint; off-site disposal of laboratory chemicals, drums, and bucket wastes; tank structure and piping demolition; hauling scrap metal to an off-site processor; and demobilization of Phase 1 equipment and personnel. Additional pre- and post-construction activities will be needed to address the presence of the cemetery at the Site. Pre-construction activities include an archaeological survey of the cemetery area; due to community concerns regarding the cemetery, either the cemetery or the RCRA Subtitle C equivalent cell will be relocated according to federal, State, and local requirements.
- *Air Monitoring:* To evaluate the potential for releases to ambient air and to develop fence-line and remediation worker safety monitoring programs for remedy implementation. Ambient air monitoring consists of short-term monitoring and time-integrated monitoring. In addition to ambient air monitoring, remediation worker safety monitoring programs would be implemented during the remediation phase of the project by the remediation contractor.
- *Sludge Pit Improvements:* The perimeter berms will be enlarged to allow for access of construction equipment, and a subsurface barrier wall (slurry wall) is proposed to control infiltration of ground water into the Sludge Pit during remedy implementation (see *Slurry Wall Barrier* below).
- *Solidification:* Solidification refers to a physical process where a semi-solid material or sludge is treated to render it solid with no free water. Solidification/stabilization refers to a group of remediation methods that prevent or slow the release of harmful chemicals from contaminated soil or sludge. These methods usually do not destroy the chemicals; they protect human health and the

environment by preventing the chemicals from moving into the environment. These two methods are often used together to prevent exposure to harmful chemicals. Solidification enhances the structural integrity and durability of the waste material, increasing compressive strength and load-bearing capacity and decreasing permeability. Solidification is a technology implemented by mixing a pozzolanic reagent, such as organophilic clay, Portland cement, cement kiln dusts, Class C (calcareous) or Class F (siliceous) fly ash, lime, or bentonite into contaminated soil or sludge. Stabilization, or chemical fixation, transforms contaminants into less toxic and/or less mobile form, thereby reducing their impact on the environment and human health. The treatability study demonstrates that solidification is a viable technology for Site sludge. The results of solidification treatability testing are presented in the Stabilization/ Solidification Treatability Study Report (Shaw 2008) and in Section 2.9.5.4 of this ROD.

- *Solidification/Stabilization Treatability Study:* Considering that four of the five source control alternatives require solidification/stabilization (S/S) as a principal remedial component, a bench-scale (laboratory tests) treatability study (Shaw 2008) conducted for Site sludge evaluated the chemical and physical characteristics of solidified/stabilized sludge to determine formulations that should produce a treated material which is appropriate for placement in an on-site RCRA Subtitle C or D disposal cell. Four tiers of formulations were tested; the formulations were various combinations of reagents that have been used at RCRA and CERCLA remediation sites for the S/S of total petroleum hydrocarbons in soil and sludge. Each tier was designed in conjunction with EPA. The S/S testing used a combination of lime-based reagents (Portland cement, quicklime, hydrated lime), fly ash, and other specialty reagents.

The primary objective of the solidification/stabilization bench-scale treatability study was to develop and verify treatment formulations for each of the waste types (Sludge Pit, Oil Pit, and API-100 separator sludge) such that the treated material meets requirements for disposal in either a RCRA C or D equivalent cell on site. Secondary objectives were to provide information to: 1) produce a treated material with no free liquids due to compaction or compression; 2) determine the physical (unconfined compressive strength [UCS]), consolidation, and permeability properties of the solidified/stabilized material; 3) demonstrate the leachability characteristics, using the Synthetic Precipitation Leaching Procedure (SPLP) of the solidified/stabilized material; and 4) determine how the physical and chemical properties of the solidified/stabilized material may influence the final design of the on-site disposal cell.

For placement in a RCRA C equivalent disposal cell, EPA determined that the treated material should have a UCS greater than 25 pounds per square inch (psi) with no free liquids expressed during the UCS testing. For placement in a RCRA D equivalent cell, EPA determined that the treated material should have a UCS of greater than 50 psi with no free liquids expressed during UCS testing, a permeability of less than  $1 \times 10^6$  cm/sec, and contaminant concentrations in the SPLP leachate less than the Texas Class 3 ground water standards under commercial/industrial use.

The conclusions of the bench-scale treatability study (Shaw 2008) were that no formulations attempted in the first three tiers of formulations met the leaching criteria for placement in a Subtitle D equivalent cell. The concentrations of hazardous contaminants such as benzene, methylene chloride, 1,2-dichloroethane, trichloroethylene, and tetrachloroethylene in the SPLP leachate for the formulations were often much higher than the TCEQ Class 3 Groundwater PCLs. Including a 0.03 or 0.05 mix ratio of activated carbon in the formulation (at a cost approximately \$30 to \$50 per ton treated) did not significantly reduce the contaminant concentrations in the SPLP leachate. More than \$150 per ton treated would likely be required to reduce contaminant concentrations in the SPLP leachate to near the Class 3 ground water standards. Based on these results, the placement of treated

material on-site in a RCRA Subtitle D cell would not be cost-effective; therefore, a RCRA Subtitle C cell is required for the solidified sludge.

The treatability study also concluded that, based on observations of water/oil bleed during loading of UCS samples, all Tier 2, 3, and 4 formulations did not show evidence of free liquids due to compaction or compression. The treatability study further determined formulations which should develop 25 psi UCS in 28 days for sludge materials from the different Site areas. The Treatability Study also concluded that concentrations of benzene, 1,2-dichloroethane, and trichloroethene in untreated soil samples from the Cemetery Area, Maintenance Area – Pits, and Tank 800 area leached in excess of the TCEQ Class 3 Groundwater PCLs, and that untreated soils from the Laydown Area did not leach in excess of the TCEQ Class 3 Groundwater PCLs

- *RCRA Subtitle C Equivalent Cell:* The RCRA Subtitle C equivalent cell includes both a cap and leachate collection and leak detection system as depicted on Figure 10. During the Remedial Design, it will be determined whether the on-site cemetery must be moved in compliance with all Federal, State, and local requirements, and in consultation with relatives of the deceased, or whether the cell can be designed around the cemetery so that it will remain in place. The typical elements of the RCRA cell cover include a clay layer, a synthetic drainage layer (geonet with geotextile on top), high-density polyethylene (HDPE) geomembrane liner, geosynthetic clay liner (GCL) with geotextile on top and bottom, and gas vent layer (geonet with geotextile on top and bottom). The typical elements of the RCRA leachate collection and leak detection system include geotextile, geomembrane with a drain pipe in the leachate collection system, geomembrane, geotextile, and a drain pipe in the leak detection system, and an underlying compacted clay layer with geotextile on top and bottom.
- *General Site Improvements:* Common activities for general site improvements are mobilization/demobilization and abandoning monitoring wells, injection wells, and water supply wells. General site improvements for the on-site actions include site grading to minimize accumulation of storm water during construction activities and construction of drainage ditches for storm water management, and improving the levee along the Marsh Area with additional soil for slope and adding rip-rap to address possible storm surge.
- *Storm Water Discharge:* The existing storm water discharge point, which allows water that accumulates on the Site to be discharged to Galveston Bay, would be utilized for storm water discharge during and after remedy implementation – following Storm Water Management Plan (SWMP – URS 2005a) requirements.
- *Institutional Controls (ICs):* ICs are administrative and/or legal instruments that reduce the potential for human exposure to contaminated soil, soil vapor, or ground water by placing restrictions on the use or development of land and ground water within a defined area. Typical IC instruments include restrictive covenants, deed notices, ordinances, zoning restrictions, building and excavation permits, easements, and well drilling prohibitions, or the like, or any combination thereof.

As previously stated, the court-approved settlement, which requires that the land be used in the future for purposes not inconsistent with final use as a natural preservation or conservation area, gives the MCP the ability to impose on the property an IC prohibiting residential, commercial, and industrial development. Consistent with reuse, a notification device or restrictive covenant should include a vicinity map showing areas of residual contaminant concentrations. The IC will also restrict any excavation below 2 feet, and restrict any drilling to or use of ground water below the Site. A vapor intrusion study should be performed prior to construction or use of buildings (OSWER EPA530-D-02-004, November 2002).

- *RA Monitoring:* RA monitoring consists of periodic sample collection, laboratory testing, data evaluation and reporting for the purposes of confirming that the RA is performing in accordance with expectations, to identify opportunities for RA enhancement and optimization, and to verify that RAOs have been achieved.
- *Ground Water Monitoring:* Monitoring will be required to track the remedial action progress; i.e., to document that natural processes (natural attenuation) are degrading the contaminant plume and that the existing contaminant plumes do not migrate off-site at concentrations above TCEQ Class 3 Groundwater PCLs and background levels (metals). If ground water at TCEQ PCLs and metals background levels migrates to the Site boundary, then an action such as ground water extraction and disposal or containment may be implemented. The ground water element includes the installation of permanent ground water monitoring wells and monitoring to demonstrate compliance with the ground water RAOs of no migration of contaminants beyond the Site boundaries at concentrations exceeding the TCEQ Class 3 PCLs and metals background levels. Possible modifications to the final monitoring program will be identified in periodic performance evaluation reports and/or five-year reviews.
- *RCRA Subtitle C Equivalent Cell Monitoring:* Following remediation, the RCRA Subtitle C equivalent cell will be maintained and monitored as part of the post closure care. Monitoring wells will be placed at strategic locations around the RCRA Subtitle C equivalent cell to monitor for any potential leachate that may move from the solidified waste to ground water. Although a monitoring system is required for contingencies, the probability of leachate leaving a RCRA Subtitle C cell is very remote due to its design/construction.
- *Slurry Wall Barrier:* The solidification remedy requires excavation of sludge from the Sludge Pit and solidification within a treatment unit. To accomplish this, the sludge must be dewatered and the ground water must be captured to prevent it from re-entering the sludge in the Sludge Pit. Constructing a subsurface barrier wall around the Sludge Pit and installing a hydraulic gradient control recovery system (i.e., ground water extraction wells) within the barrier wall surrounding the Sludge Pit will accomplish dewatering of the sludge.
- *Ground Water Extraction and Injection Well Disposal – Sludge Pit Containment:* Subsequent to extraction from within the barrier constructed around the Sludge Pit, ground water can be treated or injected into the on-site operating Class 1 (hazardous waste) injection well. The slurry wall barrier constructed around the Sludge Pit is to prevent ground water from entering the pit during solidification activities.
- *Five-Year Review:* Because the selected remedy will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unrestricted use and unrestricted exposure, a statutory review will be conducted within 5 years after initiation of the remedial action to ensure that the remedy is protective of human health and the environment. Subsequent reviews will occur every 5 years thereafter. These future reviews are also used to identify needed remedy modifications or enhancements to assure that RAOs are achieved in a timely manner.
- *Injection Well Disposal:* The injection well system for disposal of aqueous wastes during the remedial action has high long-term effectiveness. Injecting aqueous liquids, such as water remaining in tanks, contact storm water, or ground water, into the on-site deep hazardous waste well reduces the volume of wastes and meets the RAOs for liquid wastes. Injection shall follow the Storm Water Management

Plan requirements. All wells will be plugged and abandoned following agency Underground Injection Control requirements after completion of the remedial action.

- *Fencing*: A permanent fence will be required for the perimeter of the RCRA Subtitle C equivalent cell (landfill). Although the RCRA Subtitle C cap is constructed with clean soil, a fence is required to prevent any disturbance of the cap, which may lead to erosion, by trespassers.
- *Backfilling*: All excavated soil areas will be backfilled to ground surface with clean soil, with the possible exception of the excavated sludge pit, which may be used as a pond for wildlife.
- *Design Investigations*: During the design phase, additional investigations may be needed to determine locations for new monitoring wells to (1) monitor around the RCRA Subtitle C equivalent cell to address point of compliance (i.e., to demonstrate that leachate is not escaping the cell), and (2) monitor the ground water plumes. The ground water well network would consist of wells, which would be screened in the upper and lower portion of the paleochannel and in the potentially transmissive zones (i.e., floodplain silts). The design will also provide for sampling to fully delineate the areas requiring remediation. A design pilot study will also be required to demonstrate that the solidification mixture will address all solidification criteria.
- *Operations and Maintenance (O&M)*: O&M activities will be required to maintain the integrity of the remedy (i.e., maintain integrity of RCRA cell and monitoring wells).

## 2.9.4 Contaminated Ground Water (Plume) Alternative

The RI concludes that:

- Shallow ground water beneath the Site does not meet the EPA and TCEQ criteria for potable water (i.e., it is not a drinking water aquifer). The applicable ground water classification for the Site is Class 3 based on TDS concentrations (for salinity) in the monitoring wells, and therefore, the shallow ground water is not a drinking water source.
- Shallow ground water at the MSC Site was evaluated site-wide; concentrations of benzene, 1,2-dichloroethane, and trichloroethene in soil samples have leached into ground water in excess of the respective TCEQ Class 3 Groundwater PCLs.
- Impacted ground water is presently contained within the Site boundaries and limited to portions of four areas (Cemetery Area, Maintenance Area – Pits, Maintenance Area – 900, and around the Earthen Impoundments).

In addition to the primary/major source areas, there are localized areas where source material has entered the subsurface soils. However, ground water has been contaminated with dissolved constituents only (i.e., the RI found no direct evidence of source material in ground water). EPA recommends a passive approach to contaminated Class 3 ground water. Through historic ground water analytical data review, it appears the localized ground water plumes (i.e., contaminated ground water) have not migrated a great distance from the source areas, and it appears that current contaminant concentrations are similar to or lower than historic concentrations. The evaluation would suggest that degradation of the chemical constituents in ground water is occurring and stabilizing the plume. The RI contains no conclusions regarding potential vertical migration of contaminants, nor does it contain site-specific information regarding hydrology below 80 feet bgs.

Since the shallow contaminated aquifer is classified as Class 3 (i.e., non-drinking water), there is no complete exposure pathway or risk associated with exposure to COCs present in ground water. However, the ground water off-site discharge point to surface water was not determined in the RI and is not known. Because ground water containing COCs at concentrations exceeding the TCEQ PCLs or background levels for metals may migrate off-site and discharge to surface water, and considering that no surface water discharge point has been evaluated, contaminated ground water will be addressed at the Site boundary. EPA proposes to use the TCEQ PCLs for Class 3 ground water to define the plume concentrations, above which the plume cannot migrate off-site, and additional remedial actions such as containment or extraction may be required. In addition, if any of the information or conclusions in the RI are found to be incorrect, or if there is new information regarding vertical migration of contaminants or migration of contaminants to an aquifer not currently documented as contaminated, then additional remedial actions may be required.

In this ROD, the sludge and soils alternatives were defined as Alternative 1 through Alternative 5; however, to distinguish ground water from sludge and soil, the ground water alternatives have been titled Alternative GW-1 and Alternative GW-2 as identified below.

Under this ROD, EPA has selected only one ground water alternative (Natural Attenuation with Monitoring), in addition to the “No Action” alternative, to address Class 3 ground water contamination.

#### **2.9.4.1 Alternative GW-1: No Action**

*Estimated Capital Cost: \$0*

*Estimated Annual O&M Costs: \$0*

*Estimated Present Worth Cost (4.5%): \$0*

*Estimated Implementation Time: 0 Months*

*This alternative was not selected.* Under the NCP, 40 CFR § 340.430(e), EPA is to develop a range of remedial alternatives in the FS including a “no action” alternative to be used as a baseline for comparison against the other alternatives. Under the no action alternative, EPA would have taken no action to prevent exposure or to reduce COC concentrations in Source Area ground water. An allowance to conduct reviews every 5 years would have been included. Considering that no off-site ground water to surface water discharge point has been evaluated, and Site ground water has been impacted with contaminants, a “no action” remedy is inappropriate.

#### **2.9.4.2 Alternative GW-2 (Selected Remedy): Monitoring**

*Estimated Capital Cost: \$300,000*

*Estimated Annual O&M Costs: \$102,000*

*Estimated Present Worth Cost (4.5%): \$3,300,000*

*Estimated Implementation Time: 30 Years*

*This alternative is the selected remedy.* The specifics of the selected ground water remedy are:

- **Monitoring:** Ground water will be monitored at the point of compliance (property boundary). COCs will include the ground water analytes as identified in Table 15. In addition, ground water will be monitored for those constituents necessary to evaluate natural attenuation potential, of which most are not part of the COCs listed on Table 15 but must be determined during the design. Additional monitoring analytes are further discussed in this section. A containment or treatment remedy may be required if any of the following conditions are met:



- (1) Organic COCs are detected in a boundary well in concentrations above the TCEQ PCLs;
- (2) Metal concentrations are greater than TCEQ PCLs and background levels in a boundary monitoring well(s); and
- (3) Information suggests to EPA that the plume (metals or organics) has the potential to migrate off-site.

Additional ground water remedial action may be required if it is demonstrated that Site contamination has migrated to an aquifer not currently known to be contaminated. EPA may select additional COCs or removed them based on new information or input from its Federal and State partners.

- ICs: ICs will be required to prevent access and exposure to Site ground water.
- New monitoring wells: Strategic locations for new monitoring wells will be identified to monitor around the RCRA Subtitle C equivalent cell to address point of compliance (i.e., to demonstrate that no leachate is escaping the cell) and also to monitor the contaminated ground water plumes.

Only one alternative is proposed for contaminated ground water – monitoring (no active remediation). The primary ground water remedy requirement is that contaminated ground water does not migrate across the Site boundary at concentrations above the TCEQ Class 3 Groundwater PCLs and background levels for metals. EPA has determined that Class 3 PCLs and background levels for metals are the appropriate levels for monitoring of COCs at the Site boundary. This justification is based on the findings that the marsh surface water and sediments immediate to the boundary did not pose unacceptable risks. Although monitoring for Natural Attenuation (NA) (natural contaminant degradation) is a part of the ground water remedial component, the remedy will not be considered ineffective if it is determined that NA alone is not reducing on-site concentrations. NA is expected to document that contaminants in ground water are degrading over time and is anticipated to prevent the migration of impacted ground water beyond the Site boundary. Presently, the plumes are localized immediate to surface and subsurface source areas and remain on-site; therefore, NA is selected to aid in support of a stable plume, and consequently, no migration/expansion of that plume. The monitoring program will monitor for plume stability and any off-site migration of the plume across the Site boundary.

NA with monitoring is used to demonstrate ground water plume stability and to prevent exposure of human or ecological receptors to COCs. NA with monitoring can be implemented with a plume management zone (PMZ) (TNRCC 2001). A PMZ allows control and prevents the use of and exposure to the ground water within the PMZ. The ground water point of exposure (POE) is relocated from within and throughout the impacted ground water to an alternate location down-gradient of the impacted ground water. As part of the ground water monitoring program, the hydraulic gradient is monitored and attenuation monitoring points are established to provide data on plume stability. This is not a true “no action” alternative because regular monitoring is used to ensure protectiveness.

Monitoring of the ground water will consist of one comprehensive ground water event for the analysis of metals, SVOCs, VOCs, and other parameters such as sulfate, nitrate, ferrous iron, and ethane. Seven subsequent quarterly monitoring events will be analyzed for the COCs identified on Table 15 and other parameters deemed necessary based on analytical results, as determined by EPA. Years three through five will consist of semiannual monitoring events and years six through thirty will consist of one annual monitoring event per year for the COCs identified on Table 15 and other parameters deemed necessary. As EPA and TCEQ gain confidence in RA performance, the frequency of sample collection may be reduced. Modifications to the final monitoring program will be identified in periodic performance evaluation reports and/or five-year reviews.

If contaminated ground water above TCEQ Class 3 Groundwater PCLs and background levels (metals) is detected at a boundary well, an active ground water option will be evaluated and implemented, at the direction of EPA. Actions, such as hydraulic containment, may entail the extraction and then treatment of that ground water for disposal or discharge.

Ground water monitoring wells will be placed at strategic locations at the Site to monitor plume movement, and to monitor ground water around the RCRA Subtitle C equivalent cell. The plumes will be monitored to document that Natural Attenuation (NA – natural contaminant degradation) processes are at work and that the plumes are not migrating any further from the source areas. NA is expected to document that contaminants in ground water are degrading over time, and is anticipated to prevent the migration of impacted ground water beyond the Site boundary.

RI borings were drilled only 30 feet into the lower clay member (below the paleochannel and silt member), which exists at approximately 55 feet bgs. If evidence is found of non-aqueous phase liquids in the Site ground water during the remedial action, or there is evidence of downward migration found during the remediation of the Site sludge or contaminated subsurface soils, then additional actions may be required.

ICs to restrict access to ground water, and in turn, prevent exposure to contaminated ground water, will be put in place. The ICs component of this ground water remedy would provide long-term protection by reducing the potential risk for people to be exposed. Information on the nature and extent of ground water contamination would be prepared and updated annually. ICs will be effective in preventing exposure to contaminated ground water; for example, an IC could be placed on the property to prohibit the construction of facilities or buildings within 100 feet of contaminated ground water areas of the Site to prevent inhalation exposure, or the construction of buildings could be restricted.

The only active ground water collection presently proposed (which will cease following completion of the selected remedy) will be the ground water collection system (i.e., extraction wells) within the subsurface barrier/slurry wall constructed around the Sludge Pit, which is constructed to prevent flow of ground water into the Sludge Pit during remedial operations within that pit. The internal gradient control maintained via extraction wells/pumps within the barrier wall would mitigate the migration of COCs to ground water by minimizing infiltration of water through the sludge. The subsurface barrier wall and the internal ground water recovery system also mitigate potential releases of COCs to the ground water outside of the enclosure.

### **2.9.5 Sludge (Principal Threat Waste) and Contaminated Soil Alternatives**

Sludge and contaminated soil pose a current and future health risk. Remedial alternatives to address sludge are needed to prevent exposure to sludge, and minimize the affect of COCs leaching from sludge to contaminate soils and ground water. Remedial alternatives are needed to address contaminated soil to prevent exposure of future on-site conservancy workers to COCs in soil, and to minimize the affect of COCs potentially leaching from contaminated soil to ground water. As shown in Table 13 and described in the following sections, the FS developed five different alternatives for addressing sludge, contaminated soil, and ground water.

As documented in this ROD, EPA has selected Alternative 4 (RCRA Subtitle C Containment of Solidified Sludge and Untreated Soils) as the selected remedy for Site sludge and contaminated soil. For the reasons discussed above, ground water is addressed by NA and monitoring (Alternative GW-2) only for all alternatives evaluated.

The following alternatives were assembled and evaluated in the selection process:

### **2.9.5.1 Alternative 1: No Action**

*Estimated Implementation Time: 0 Months*

*Estimated Capital Cost: \$0*

*Estimated Annual O&M Costs: \$0*

*Estimated Present Worth Cost (4.5%): \$0*

*This alternative was not selected.* As required by the NCP, 40 CFR § 300.430(e)(6), the alternatives for soil/sludge must include the “no action” alternative. This is to be used as the baseline alternative against which the effectiveness of all other remedial alternatives are judged. Under this alternative, no remedial actions would be conducted to address contaminated soil or sludge. Soil and sludge contaminants would remain in place and would be subject to environmental influences. No institutional controls would be implemented for the soils and sludge. This response was not selected because it does not address the risks posed by the Site, and it does not reduce the volume, toxicity, or mobility of hazardous substances present at the Site.

### **2.9.5.2 Alternative 2: Engineered Containment of Unsolidified Sludge and RCRA Subtitle C Containment of Soils**

*Estimated Capital Cost: \$24,900,000*

*Estimated Annual O&M Costs: \$376,000*

*Estimated Present Worth Cost (4.5%): \$31,200,000*

*Estimated Implementation Time: 36 Months*

*This alternative was not selected.* With this alternative, the majority of the sludge within the Sludge Pit would not be solidified; only the upper portion of the sludge would be solidified in-situ sufficiently to support a RCRA cap. In addition, a RCRA Subtitle C equivalent cell would be constructed to contain the unsolidified contaminated soil. ICs would be in place as discussed in Section 2.9.3 (Common Elements). In addition to the common elements discussed above, this alternative includes the following specific components:

- Consolidate sludge in the Sludge Pit and construct a RCRA Subtitle C cap supported by a solidified bridge cap over the Sludge Pit.
- Excavate and consolidate contaminated soils, debris, and rubble in a RCRA Subtitle C equivalent cell.

Components of the Sludge Pit containment area include:

- Constructing a subsurface barrier wall around the Sludge Pit and installing a hydraulic gradient control recovery system within the barrier wall.
- Consolidating sludge from the Oil Pit, the tanks, the API 100 separator, and the API 1200 separator into the Sludge Pit.
- Solidifying the upper 10 feet of sludge in the Sludge Pit with a pozzolanic reagent or reagent mixture to a compressive strength sufficient to support a RCRA Subtitle C cap.
- Constructing a RCRA Subtitle C cap.

Applying reagent to the surface of the Sludge Pit with a hydraulic excavator and mixing the reagent with the sludge accomplishes solidification. The depth of the mixing and reagent choice is a function of the strength required to support the RCRA Subtitle C cap.

Components of the soils cell include:

- Constructing a RCRA Subtitle C leachate collection and leak detection system for a cell to contain excess solidified sludge and contaminated soils.
- Consolidating affected surface soils from the Laydown Area and surface and subsurface soils from the Cemetery Area, the Maintenance Area – Pits, the Maintenance Area – 900, and Unit 800 Area (Figure 2) into the RCRA Subtitle C equivalent cell.
- Constructing a RCRA Subtitle C cap over the consolidated soils.
- Backfilling the excavated soil areas to ground surface with clean soil.

Only the upper portion of the sludge would be solidified sufficiently to support a RCRA cap. The engineered containment of the Sludge Pit would eliminate direct contact and inhalation of COCs by on-site conservancy workers, as well as the potential release of COCs from the sludge to surface soils, sediments, and surface water. The RCRA Subtitle C cap, barrier wall immediate to and surrounding the Sludge Pit, and internal gradient control of ground water within the barrier wall via pump/disposal would mitigate the migration of COCs to ground water by minimizing infiltration of water through the sludge. The subsurface barrier wall and the internal ground water recovery system would also mitigate potential releases of COCs to the ground water.

The RCRA Subtitle C containment of soils with COC concentrations exceeding risk-based criteria would reduce the pathways of direct contact/ingestion/inhalation by on-site nature conservancy workers and terrestrial ecological receptors to soil COCs and the potential for COC migration from soils to sediments and surface water. Impacted subsurface soils would be excavated from above the top of the uppermost water-bearing unit. The RCRA Subtitle C equivalent cell would control the migration of COCs to ground water by greatly reducing infiltration of water through the consolidated soils.

This alternative retains a risk of migration of COCs from sludge to ground water because unconsolidated source material would remain in the paleochannel. Since construction details for the existing Sludge Pit liner system are not available and the integrity of the system cannot be evaluated, there is potential for future failure. The potential for impacted ground water to migrate to the property boundary is mitigated by the presence of a barrier wall with ground water recovery to maintain an inward gradient within the contained Sludge Pit area. Because unconsolidated wastes would be left in place in the paleochannel, the ground water monitoring component provides additional protection for the environment with periodic evaluations to reconfirm the stability of the impacted ground water plumes.

The RI concludes that impacted ground water has not migrated to the Site boundary in the paleochannel or through the potentially transmissive zones even though the Site is uncontrolled. Additional long-term protective components for ground water include the inward gradient maintained around the Sludge Pit with the barrier wall and ground water recovery wells and the ground water monitoring program. The goal of these components is to mitigate the potential for ground water impacted by or in contact with sludge to migrate off-site to adjacent properties or to the Marsh Area. The wall integrity should be routinely monitored as part of the O&M process for long-term effectiveness.

### **2.9.5.3 Alternative 3: Engineered Containment of Solidified Sludge and RCRA Subtitle C Containment of Soils**

*Estimated Capital Cost: \$35,400,000*  
*Estimated Annual O&M Costs: \$381,000*  
*Estimated Present Worth Cost (4.5%): \$41,800,000*  
*Estimated Implementation Time: 42 Months*

*This alternative was not selected.* This alternative consists of complete in-situ solidification of the Sludge Pit and placement of contaminated soils in a RCRA Subtitle C equivalent cell. In addition to the common components discussed above, Alternative 3 includes the following specific components:

- Consolidate sludge in the Sludge Pit, solidify sludge in situ, and construct a RCRA Subtitle C cap over the Sludge Pit.
- Excavate and consolidate excess sludge, contaminated soils, debris, and rubble in a RCRA Subtitle C equivalent cell.

Components of the Sludge Pit containment include:

- Constructing a subsurface barrier wall around the Sludge Pit and installing a hydraulic gradient control recovery system within the barrier wall.
- Consolidating sludge from the Oil Pit, the tanks, the API 100 separator, and the API 1200 separator into the Sludge Pit.
- Solidifying the entire sludge depth in the Sludge Pit with a pozzolanic reagent or reagent mixture to a compressive strength sufficient to support a RCRA Subtitle C cap.
- Construct a RCRA Subtitle C cap.

Components of the soils containment include:

- Constructing a RCRA Subtitle C leachate collection and leak detection system for a cell to contain excess solidified sludge and contaminated soils.
- Consolidating excess solidified sludge from the Sludge Pit into the RCRA Subtitle C equivalent cell.
- Consolidating affected soils above the Site remediation levels, including surface soils from the Laydown Area and surface and subsurface soils from the Cemetery Area, the Maintenance Area – Pits, the Maintenance Area – 900, and Unit 800 Area into the RCRA Subtitle C equivalent. Soil areas for remediation are depicted in Figure 3.
- Constructing a RCRA Subtitle C cap over the excess solidified sludge and consolidated soils.

In situ solidification uses auger/caisson systems and injector head systems to add binders to the contaminated soil or waste without excavation, leaving the resultant material in place. For example, in situ solidification in the Sludge Pit could be accomplished with a crane equipped with a 12-foot-diameter auger that solidifies in columns; the solidification process continues in this manner until complete.

The above- and below-ground engineered containment of the Sludge Pit would reduce direct contact and inhalation of COCs by on-site nature conservancy workers as well as the potential release of COCs from the solidified sludge to surface soils, sediments, ground water, and surface water above ecological risk-based criteria. The RCRA Subtitle C cap, barrier wall, and internal gradient control via pump/disposal would mitigate the migration of COCs to ground water by minimizing infiltration of water through the sludge. This alternative integrates the existing Sludge Pit liner system with a solidified sludge matrix.

However, implementation of this alternative may damage the liner system as the augers mix at the bottom of the Sludge Pit.

The RCRA Subtitle C equivalent cell containment of soils with COC concentrations exceeding risk criteria would eliminate the potential for ingestion/direct contact by on-site nature conservancy workers and terrestrial ecological receptors to soil COCs and the potential for COC migration from soils to sediments and surface water. Impacted subsurface soils would be excavated from above the top of the uppermost water-bearing unit. The RCRA Subtitle C equivalent cell would control the migration of COCs to ground water by reducing infiltration of water through the consolidated soils.

This alternative provides protection for migration of COCs from sludge to ground water since wastes would be solidified throughout the depth of the Sludge Pit to remove free liquids. The removal of free liquids reduces migration potential. The potential for impacted ground water to migrate to the property boundaries is mitigated by the presence of a barrier wall with ground water recovery to maintain an inward gradient toward the Sludge Pit. Since solidified wastes would be left in place in the paleochannel, the ground water monitoring component provides additional protection to the environment with periodic evaluations of the stability of the impacted ground water plumes.

#### **2.9.5.4 Alternative 4 (Selected Remedy): RCRA Subtitle C Containment of Solidified Sludge and Untreated Soils**

*Estimated Capital Cost: \$52,600,000*

*Estimated Annual O&M Costs: \$101,000*

*Estimated Present Worth Cost (4.5%): \$53,100,000*

*Estimated Implementation Time: 48 Months*

*This alternative is the selected remedy.* It addresses current or potential future risk associated with exposure to sludge and contaminated soil, by extracting and placing solidified sludge and unsolidified contaminated soils in a RCRA Subtitle C equivalent cell. The ICs component under this alternative, as described in Section 2.9.3 (i.e., Common Elements) will protect the Subtitle C cell integrity and reduce the potential for further contamination of ground water by removing the source of ground water contamination. Implementing the long-term maintenance and monitoring must also be performed to protect the cell's integrity.

In addition to the common components discussed above, this alternative includes the following specific components:

- Remove all sludge from tanks, Sludge Pit, Oil Pit, API separators, and place in solidification area.
- Source material in subsurface soil will be excavated; if the material passes the solidification/stabilization standards it can be placed in the on-site Subtitle C equivalent cell, otherwise, it will require solidification before placement in the cell.
- Solidify sludge in solidification area.
- Construct containment area berms and a RCRA Subtitle C leachate collection and leak detection system to contain solidified sludge and contaminated soils.
- Transfer and consolidate solidified sludge into the aboveground RCRA Subtitle C equivalent cell.
- Consolidate contaminated soils above Site remediation levels, including surface soils from the Laydown Area and surface and subsurface soils from the Sludge Pit, the Oil Pit, the Cemetery Area, the Maintenance Area – 900, and Unit 800 Area into the single RCRA Subtitle C equivalent cell.

- Construct a RCRA Subtitle C cap with an 18-inch clay layer, a synthetic drainage layer (geonet with geotextile on top), HDPE geomembrane liner, GCL with geotextile on top and bottom, and gas vent layer (geonet with geotextile on top and bottom) as depicted in Figure 10.
- Backfill the Sludge Pit and other excavated area to ground surface with clean soil. As an option, partial backfill of the Sludge Pit excavation to create a shallow freshwater pond may be considered during the remedial design.

The RCRA Subtitle C equivalent cell for the solidified sludge and untreated soils would reduce direct contact and inhalation of COCs as well as the potential release of COCs from the sludge to surface soils, sediments, ground water, and surface water. The solidified sludge would be removed from below the water table in the Sludge Pit and other source areas and located on a RCRA cell liner consisting of a primary leachate collection/secondary leachate detection system. Therefore, as compared to Alternatives 2 and 3, this alternative would further reduce the potential for infiltration of water through the solidified sludge and migration of COCs to ground water by removing solidified sludge waste from the ground water-bearing zone. The long-term effectiveness and reductions in toxicity, mobility, and volume are similar for this alternative and Alternative 3. However, in this alternative, the sludge is solidified within a solidification area and moved to a RCRA Subtitle C equivalent cell.

The ability to exercise quality control over the solidification process is enhanced in this alternative over Alternatives 2 and 3, because each lift of material can be tested for strength during placement in the RCRA Subtitle C equivalent cell, as opposed to testing within the Sludge Pit. If necessary, the solidified sludge could be reworked in the cell or the solidification area.

The consolidation and capping of soils with COC concentrations exceeding risk-based criteria would eliminate the potential for ingestion/direct contact to soil COCs and the potential for COC migration from soils to sediments and surface water. Impacted subsurface soils would be excavated from above the top of the uppermost water-bearing unit. The RCRA Subtitle C equivalent cell would control the migration of COCs to ground water by limiting infiltration of water into the solidified sludge and consolidated soils and by controlling migration of leachate from the cell into ground water.

Since solidified wastes would remain on-site, the ground water monitoring component provides additional protection to the environment with periodic evaluations of the stability of the impacted ground water plumes.

### **2.9.5.5 Alternative 5: Slurry Phase Bioremediation of Sludge and RCRA Subtitle C Containment of Treated Sludge and Untreated Soils**

*Estimated Capital Cost: \$82,600,000*

*Estimated Annual O&M Costs: \$186,000*

*Estimated Present Worth Cost (4.5%): \$85,800,000*

*Estimated Implementation Time: 72 Months*

*This alternative was not selected.* This alternative includes the following specific components:

- Consolidate sludge within the Sludge Pit.
- Slurry-phase bioremediate consolidated sludge within the Sludge Pit.
- Solidify sludge residual from the slurry-phase bioremediation to a compressive strength sufficient to place in a RCRA Subtitle C equivalent cell.

- Construct containment area berms and a RCRA Subtitle C leachate collection and leak detection system to contain solidified sludge residual and contaminated soils.
- Consolidate solidified sludge residuals into the RCRA Subtitle C equivalent cell.
- Consolidate contaminated soils into the RCRA Subtitle C equivalent cell.
- Construct a RCRA Subtitle C cap.
- Backfill the Sludge Pit and excavated soil areas to ground surface with clean soil. As an option, partial backfill of the excavation to create a shallow freshwater pond may be considered during the remedial design.

Slurry phase bioremediation utilizes microorganisms existing in the sludge or overlying water to destroy the organic compounds within the sludge and break down the sludge organic/water/inert solids emulsion structure, and thus reduce sludge volume. The slurry phase bioremediation system includes an oxygenation process, oxygen mixing system, sludge mixing system, and chemical addition system. During bioremediation, a variety of parameters would be measured. These can be divided into controlling parameters to manage the bioremediation process and monitoring parameters to demonstrate the degradation of targeted sludge components or surrogates. Controlling parameters could include microbial plate count, toxicity analyses, pH, temperature, dissolved oxygen, oxygen uptake rate, ammonia and nitrate/nitrite nitrogen, ortho-phosphorus, total and volatile suspended solids, and total petroleum hydrocarbons. Monitoring parameters could include particular VOCs, SVOCs, and similar organic compounds.

The long-term effectiveness and reductions in toxicity, mobility, and volume are similar for this alternative and Alternative 4. However, in this alternative, the slurry-phase bioremediation should reduce both organic COC concentrations in the sludge and volume of sludge. Biodegradation of organic compounds is irreversible and generally results, depending on the extent of treatment, in the generation of innocuous end products such as water, carbon dioxide, and various inorganic salts, with only residual concentrations of organic constituents.

After completion of each phase of the biotreatment, the sludge residuals are transferred to a solidification area, solidified, and consolidated along with contaminated soils in a RCRA Subtitle C equivalent cell. No sludge, solidified or unsolidified, would remain within the paleochannel, minimizing long-term risk for potential COC migration from wastes to ground water and improving the ability of this alternative to meet the RAO for mitigating potential migration of COCs from wastes.



## 2.10 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

The EPA uses nine criteria to evaluate remedial alternatives to facilitate selection of the selected remedial alternative for the cleanup of an NPL site. These nine criteria are categorized into three groups: threshold, balancing, and modifying. The threshold criteria must be met for an alternative to be eligible for selection. The threshold criteria are: overall protection of human health and the environment and compliance with ARARs. The balancing criteria are used to weigh major tradeoffs among alternatives. The five balancing criteria are: long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost. The modifying criteria are State acceptance and community acceptance. Each of the evaluation criteria are briefly summarized below, followed by an evaluation of how each alternative evaluated complies with the criteria. The FS Report provides a detailed alternatives evaluation in Table 7 and a comparative evaluation in Table 8 (URS 2008); a summary of comparative evaluation of alternatives is provided in Table 13 of this ROD.

### 2.10.1 Overall Protection of Human Health and the Environment

This criterion is used to determine whether an alternative can adequately protect human health and the environment, in both the short- and long-term, from unacceptable risks associated with exposure to COCs by eliminating, reducing, or controlling exposure. The overall protection of human health and the environment determination draws upon assessments of other criteria including long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs.

For the sludge and soil alternatives, each of the described remedial alternatives other than Alternative 1 (No Action) meets the RAOs for the Site and provides overall protection of human health and the environment. Each active alternative isolates the Site sludge and contaminated soil from the environment and would provide adequate protection of human health and the environment by eliminating, reducing, or controlling risk through a combination of engineering and institutional controls and/or treatment. All alternatives would achieve protection by removing the direct contact exposure to sludge and contaminated soil. Alternative 2 provides the lowest degree of treatment of Site materials, while Alternative 5 provides the highest degree of treatment; however, the effectiveness of biological treatment in destroying the COCs in the sludge materials at the Site has not yet been tested in Site-specific treatability studies and is uncertain.

Alternatives 2, 3, and 4 provide increasing levels of protection at increasing costs. Alternatives 2 and 3 either partially or fully solidify sludge *in situ*, allowing material to reside in the paleochannel in a low-leachability state, thus resulting in greater uncertainty regarding the long-term protectiveness of those alternatives. Alternative 4 removes the long-term potential threat to ground water by removing sludge from the Sludge Pit, the Oil Pit, tanks, and API separators, treating the sludge in a solidification area, and consolidating the treated sludge in a RCRA Subtitle C equivalent cell, thereby providing overall protectiveness with minimum uncertainty. While the slurry-phase bioremediation component of Alternative 5 is not as commonly implemented as containment, it provides for a reduction in volume and concentration of the contaminated sludge. Alternative 5 provides similar short- and long-term effectiveness and is only slightly more protective of human health and the environment than Alternative 4. In addition, Alternative 5 is estimated to require 50 percent more time (an additional 2 years) to implement relative to Alternative 4; Site materials would continue to be exposed to the environment (including possible severe storm events) and to human and ecological receptors during this period.

The ground water alternative, except “no action,” would provide protection of human health by preventing direct contact with, or vapor intrusion from, contaminated ground water through ICs within the Site boundary until natural attenuation processes reduce COC concentrations at or below protective levels.

## 2.10.2 Compliance with ARARs

Section 121(d) of CERCLA, 42 U.S.C. § 9621(d), and NCP § 300.430(f)(1)(ii)(B) require that remedial actions at CERCLA sites must attain legally applicable or relevant and appropriate Federal and State requirements, standards, criteria, and limitations (collectively referred to as ARARs) unless such ARARs are waived under CERCLA §121(d)(4). Remedial alternatives shall be assessed to determine whether they attain ARARs, or provide grounds for invoking a waiver. Federal and State of Texas ARARs potentially applicable to the development and selection of a remedial alternative for this Site are summarized in Tables 16A through 16C. State standards that constitute ARARs are those regulations that are promulgated, substantive in nature, more stringent than Federal requirements, consistently applied and identified by the State in a timely manner. The ARARs are divided into three categories: (1) location-specific, (2) chemical-specific, and (3) action-specific.

Applicable requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site.

Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that, while not “applicable” to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well-suited to the particular site.

Each of the described remedial alternatives other than Alternative 1 (No Action) and Alternative 2 meet the ARARs for the Site. The “no action” alternative does not comply with ARARs, and therefore this alternative cannot be selected unless an ARAR waiver is invoked. Alternative 2 does not meet the requirements of 40 CFR 264.228 for closure of surface impoundments since free liquids will not be eliminated by solidifying sludge throughout the entire depth of the Sludge Pit.

Under CERCLA and the NCP, response actions must comply with regulatory standards from other Federal or State environmental programs if they are “applicable” or if they are “relevant and appropriate” to the specific circumstances of a site. 42 U.S.C. Section 9621(d)(2); 40 CFR Section 300.400(g). RCRA Subtitle C, the nation’s hazardous waste management program, imposes regulatory requirements on the management of hazardous wastes. Land disposal restrictions (LDRs) are an element of the RCRA hazardous waste program. EPA guidance for determining if LDRs are “applicable” to CERCLA response actions remediation wastes states that applicability depends on whether the response action meets the definition of “placement,” whether the substance being “placed” qualifies as an RCRA hazardous waste, and whether the RCRA hazardous waste is restricted under the LDRs (MCP 2006).

EPA uses the AOC concept to determine whether “placement” is occurring for LDR purposes. An AOC is delineated by the areal extent (or boundary) of contiguous contamination at a site. Contamination within an AOC may contain varying types and concentrations of hazardous substances, and it is generally appropriate to consider CERCLA areas of contamination as a single RCRA land-based unit unless certain

areas of contamination are discrete or widely separated. In-situ treatment, movement or consolidation of waste within an AOC, processing within an AOC to improve structural stability, and capping in place do not constitute placement. Placement, however, does occur if wastes are consolidated from different AOCs into a single AOC, or if wastes are moved outside an AOC for storage or treatment and then returned to the AOC. For example, placement occurs if the waste is excavated, placed in a separate unit such as a tank or incinerator within the areal extent of the AOC, and then redeposited on the land within an AOC (MCP 2006).

The MSC Site is largely composed of one AOC delineated by the areal extent of contamination that includes not only the Earthen Impoundment, Units 100 and 1200 API Separators, ASTs, the Cemetery Area, and the Laydown Area, but also the soil areas surrounding and linking these residual waste locations (MCP 2006). Because the solidification and consolidation of the sludge on-site would occur within the defined AOC, it would not involve “placement” of the materials, and would therefore, be exempt from LDRs.

Contaminated aqueous phase materials would be injected in the on-site deep hazardous waste injection well in accordance with the current usage of the well, as well as applicable Underground Injection Control requirements for injection of wastes into the on-site hazardous waste injection well. Any surface water discharges of storm water would meet appropriate water discharge standards. Solidified sludge would be sequestered in a RCRA Subtitle C equivalent cell in Alternatives 4 and 5, thus meeting the landfill ARARs. Pursuant to CERCLA, acquisition of permits will not be necessary for on-site treatment of sludge and soils or the use of the on-site hazardous waste injection well for the disposal of ground water.

The ARARs for this Site include:

Location-specific ARARs: Floodplain and Wetlands Protection, at 40 CFR 230 and 264.18, designates procedures for the protection of wetlands and construction within a 100-year floodplain. Requirements at 50 CFR 17 and 31 Texas Administrative Code (TAC) 65.175 identify those species of wildlife and plants determined to be endangered or threatened. 50 CFR 17 requires that proposed actions minimize effects on endangered species; one protected bird species potentially exists on-site. A cemetery on-site is subject to the Texas Health and Safety Code Chapter 711 and 40 CFR Part 800 which requires agencies to take into account the effects of their actions relative to cemeteries.

Chemical-specific ARARs: The Texas Class 3 Groundwater Protective Concentration Levels (30 TAC Chapter 350 Subchapter D) apply to contaminated ground water; i.e., prevent off-site migration at these levels; off-site discharge is being addressed because an off-site surface water discharge point for ground water is unknown. 40 CFR 300.150 is applicable to worker safety.

Action Specific ARARs: Management of solid hazardous wastes, and underground injection of hazardous liquids (40 CFR 144, 146 and 148; 30 TAC 331.64(d)) are applicable; the on-site hazardous waste injection well is being used for disposal of liquids in waste management units, and will be used during the RA to dispose of hazardous liquids generated during the response. Requirements for owner operators of hazardous waste facilities are at 40 CFR 264 and 761. 30 TAC 307.4 and 307.6 may be also applicable to the extent that surface water is discharged from the Site during the remedial action or after completion of the remedy. 40 CFR 122 and 445, and 30 TAC 319.22 address the discharge of water from the Site. Closure of landfills and RCRA Subtitle C cell construction requirements are applicable and found at 40 CFR 264 and 30 TAC 335.5. Classification, managing and transport of hazardous wastes will be part of the overall remedial response; these activities are subject to 40 CFR 261, 262 and 171, and 30 TAC 335.505 to 335.508. National Emissions Standards for Hazardous Air Pollutants (NESHAPs) and NESHAPs for hazardous waste combustors, 40 CFR 61 and 63, are also applicable.

### **2.10.3 Long-Term Effectiveness and Permanence**

This criterion refers to expected residual risk and the ability to maintain reliable protection of human health over time, once remediation levels have been met.

Alternative 4 is the selected remedy and is expected to achieve and maintain the highest degree of long-term protectiveness and permanence over time. It removes all of the sludge, solidifies the sludge, and contains the solidified sludge and contaminated soil in an aboveground surface RCRA Subtitle C equivalent cell. Alternative 4 removes the risk from the surface and addresses the ground water contamination with monitoring to prevent off-site migration.

The long-term effectiveness and reductions in mobility are similar for Alternative 5 and Alternative 4. However, metals concentrations are unlikely to be reduced with bioremediation; therefore, a RCRA Subtitle C equivalent cell, as in Alternative 4, would still be required.

In Alternative 3, all sludge within the Sludge Pit containment area is solidified through in-situ solidification and the RCRA Subtitle C cap is supported by solidified sludge (instead of unsolidified sludge below a bridge cap, as in Alternative 2). However, since the solidified sludge still remains within the paleochannel sand aquifer, there is long-term risk for potential COC migration from wastes to ground water. In addition, it may be difficult to verify the completeness of the solidification process using conventional strength testing procedures due to the depth of the sludge in the Sludge Pit, which is 37 feet. Incomplete solidification would result in similar risks as described in Alternative 2 for the bridge cap and migration of COCs.

Alternative 2 partially solidifies the sludge in the Sludge Pit and places a barrier wall around the Pit to control infiltration of ground water into the unsolidified sludge in the Pit. Over the long term, the barrier wall may fail due to material incompatibility associated with unconfined sludge, making this alternative less protective in the long-term. In addition, if a decision is made to switch to a different treatment technology because the remedial objectives are not met, it may be difficult to remove the wall. In addition, this alternative relies upon a bridge cap to support the RCRA Subtitle C cap. Since the bridge cap rests on unsolidified sludge, a potential risk to the long-term effectiveness of this remedy is the settlement or collapse of the bridge cap with subsequent settlement of the RCRA Subtitle C cap. In this scenario, the sludge could potentially emerge onto the surface of the cap.

The ground water remedy maintains long-term effectiveness and permanence through maintaining a ground water monitoring system to implement an active remedy (e.g., extraction and treatment for containment purposes) if contaminated ground water above the TCEQ Class 3 Groundwater PCLs and background levels (metals) is detected in a boundary monitoring well, or if contamination is migrating to an aquifer not currently known to be contaminated.

### **2.10.4 Reduction in Toxicity, Mobility, and Volume**

This criterion relates primarily to the degree of toxicity, mobility, or volume reduction that will be achieved by each alternative through treatment of COC-contaminated media.

Each of the remedial alternatives, other than the No Action alternative provides some reduction of toxicity, mobility, or volume of hazardous substances. Alternative 5 provides the most predicted reduction in toxicity and volume through treatment, because biological treatment is used to destroy COCs

in sludge prior to solidification and RCRA Subtitle C containment. However, the effectiveness of biological treatment in destroying the COCs in the sludge materials at the Site has not yet been tested, and the degree of COC destruction is uncertain and unpredictable.

Solidification of the sludge provides some reduction of the mobility of the COCs in the sludge, with the degree of reduction dependent on the nature of the compound. Alternative 2, which involves only enough sludge solidification to support a RCRA Subtitle C cap, provides the least amount of treatment relative to the other alternatives. Alternative 3 does not address fully the reduction in toxicity and mobility because the in-situ treatment of the total sludge area is difficult to document, and the mobility of sludge contaminants through infiltration and leaching of contaminants may move dissolved contaminants into ground water and may allow migration of the ground water plume off-site. Alternatives 4 and 5 provide the most reduction in toxicity, mobility, and volume. Alternatives 2 through 5 provide for removal of contaminated soils and placement within a RCRA Subtitle C equivalent cell and are considered equivalent relative to addressing soil contamination.

### **2.10.5 Short-Term Effectiveness**

Short-term effectiveness addresses the period of time needed to implement and operate the remedy and any adverse impacts that may be posed to workers, the community, and the environment during construction.

Each alternative involves significantly different short-term effectiveness. The No Action alternative is immediately implementable and presents no incremental risks to the community, remediation workers, or the environment during implementation; however, the current risks would remain. The in-situ solidification process in Alternatives 2 and 3 may involve potential exposure of remediation workers and any other nearby receptors to volatile emissions, but air monitoring will occur and engineering steps can be implemented if necessary to control such emissions. The excavation and transport of sludge to a solidification area followed by solidification and subsequent transport to the RCRA Subtitle C equivalent cell in Alternative 4 potentially may result in exposure of remediation workers and other nearby receptors to volatile and particulate emissions. The use of a solidification area minimizes the risk of uncontrolled exothermic reaction since temperature control should be easier to maintain in the solidification area. This precaution adds handling steps and requires additional time to implement. Alternative 5 includes in-situ biological treatment of the sludge prior to solidification, which reduces the potential for volatile emissions during solidification and consolidation of the sludge material.

Of the alternatives involving active remediation, Alternative 2 can be implemented most rapidly, with an estimated implementation duration (following completion of remedial design) of 36 months. As a result, Alternative 2 would provide the most prompt protection of human health and the environment.

Alternative 3 is the next most rapid, with an estimated implementation time of 42 months. Alternative 4 is only slightly longer, with an estimated duration of 48 months. With an estimated implementation time of 72 months, Alternative 5 will require 50 percent more time (2 more years) to implement than Alternative 4; human and ecological receptors would continue to be exposed to Site materials during this period.

The primary risks to the worker during the remedial action would be from VOCs emitted from sludge handling and VOCs and PCBs from soils handling. In general, the remedial actions have minimal impact upon the community, considering that the Site is accessed by a private gate, which is located over 1 mile from a public road, and the nearest community is 1.5 miles from the Site. Potential increased emissions during solidification resulting in increased risk to the worker should be minimized with these alternatives.

Some limited increased risk may occur during consolidation of sludge and contaminated soil. Depending on the choice and concentration of solidification reagents, there is the risk of uncontrolled exothermic reactions from the heat generated during the solidification reaction.

### **2.10.6 Implementability**

Implementability addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other governmental entities are also considered.

Each of the remedial alternatives is implementable. Contractors, pozzolanic reagents, and cap materials are readily available. Construction of the bridge cap in Alternative 2 would require careful engineering, which would bring into question the implementability of Alternative 2. The construction techniques required for Alternatives 3 and 4 are routine. The feasibility of solidification has been demonstrated with the Treatability Study (Shaw 2008). RCRA Subtitle C equivalent cells are routinely constructed for landfills and are highly reliable if properly designed, constructed, monitored, and maintained. Each alternative includes routine cap and cell inspections and site maintenance. In addition to the RCRA Subtitle C equivalent cell for the sludge residual and solids containment, Alternative 5 requires the construction and operation of a slurry-phase bioremediation system for several years. Such systems have been implemented at other sites, but the implementability of such a system with respect to the particular sludge materials at the MSC Superfund Site has not been verified. At a minimum, the slurry-phase bioremediation system will require additional treatability studies and additional design effort. In addition, slurry-phase bioremediation experience with a system of this size is limited.

### **2.10.7 Cost**

The estimated capital and annual O&M cost for each alternative is provided on Table 17. Alternative 2 is estimated to cost \$31,200,000. Alternative 3, which involves more solidification than Alternative 2, is estimated to cost \$41,800,000. Alternative 4, which involves the same amount of solidification as Alternative 3 but consolidates all solidified material and contaminated soil into a single RCRA Subtitle C equivalent cell, is estimated to cost \$56,400,000. Alternative 5 is estimated to cost \$85,800,000. The uncertainties in the bioremediation costs are significant cost drivers for this alternative.

### **2.10.8 State Acceptance**

The State of Texas, as the support agency, has been an active participant in preparation of the RI and FS reports, the development of the Proposed Plan, as well as this ROD. The State of Texas has provided its concurrence on these documents and the selected remedy components.

### **2.10.9 Community Acceptance**

Community acceptance of the selected remedy was determined through the Public Comment process (see Responsiveness Summary – Part 3). Based on EPA’s interpretation of comments received during the public comment period and the questions received at the public meeting, the community concurs with the selected remedy identified in this ROD.

## **2.11 PRINCIPAL AND LOW-LEVEL THREAT WASTE**

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable, 40 CFR §300.430(a)(1)(iii)(A). The “principal threat” concept is applied to the characterization of “source materials” at a Superfund site. Source material is any material that includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for migration of contamination to ground water, surface water, air, or acts as a source for direct exposure. Identifying principal threat wastes combines concepts of both hazard and risk. In general, principal threat wastes are those source materials considered to be highly toxic or highly mobile which generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur. Conversely, low-level threat wastes are those source materials that generally can be reliably contained and that would present only a low risk in the event of exposure. The manner in which principal threats are addressed generally will determine whether the statutory preference for treatment as a principal element is satisfied. The decision to treat these wastes is made on a site-specific basis through a detailed analysis of remedial alternatives using the nine remedy selection criteria. This analysis provides the basis for making a statutory finding that the selected remedy uses a proven treatment technology as a principal element.

As stated previously, the Site contains approximately 260,000 yd<sup>3</sup> of sludge (principal threat waste/source material) located in surface pits, API separators, ASTs, and in subsurface soils; dissolved contaminants have migrated from these primary source areas to ground water. There are localized areas where principal threat waste has migrated to some degree into the immediate subsurface soils; however, this volume is relatively small. The majority of the sludge, or principal threat waste, is confined in impoundments, API separators, and ASTs.

In addition, there are approximately 160,000 yd<sup>3</sup> of contaminated soils, which poses an unacceptable human health and/or ecological risk. Soil contamination does exist on site and is considered a low-level threat waste. Low-level threat wastes are those source materials that generally can be reliably contained and that would present only a low risk in the event of exposure. Wastes that are generally considered to be low-level threat wastes include non-mobile contaminated source material of low to moderate toxicity, surface soil containing chemicals of concern that are relatively immobile in air or ground water, low leachability contaminants, or low toxicity source material.

## **2.12 SELECTED REMEDY**

### **2.12.1 Summary of the Rationale for the Selected Remedy**

In selecting the remedy for the MSC Site, EPA compared the remedial alternatives against the nine evaluation criteria and the ability to achieve the RAOs. The selected remedy is Alternative 4 (RCRA Subtitle C Containment of Solidified Sludge and Untreated Soils) for the sludge and contaminated soil, and Alternative GW-2 (Monitoring) for the ground water.

Based on the information available at this time, EPA believes the selected remedy will be protective of human health and the environment, will comply with ARARs, will be cost-effective, and will utilize both permanent solutions and alternative treatment technologies to the maximum extent practicable.

Alternative 4 was selected based on cost and effectiveness compared to other sludge alternatives. Alternative 4 also addresses the risks posed by Site sludge; all sludge is removed and placed in a RCRA Subtitle C equivalent cell, which removes the direct contact exposure and prevents further contamination

of ground water. The selected ground water alternative, Alternative GW-2, addresses Class 3 ground water contamination through monitoring and a contingency, which would require extraction/or containment if the ground water information indicates to EPA that ground water, above TCEQ Class 3 Groundwater PCLs and background levels for metals, has the potential to move off-site, or into aquifers not currently known to be contaminated. Alternative GW-2 is the most cost-effective alternative for ground water based on the present ground water information. The TCEQ on behalf of the State of Texas concurs with this remedy.

The permanent ICs provision under both alternatives will reduce or eliminate the potential for inadvertent exposure, thereby protecting human health until RAOs are achieved.

Because it aggressively treats source material (sludge) the remedy meets the statutory preference for selection of a remedy that involves treatment as a principal element.

## 2.12.2 Description of the Selected Remedy

The following is a description of the selected remedial alternative for sludge and contaminated soil (Alternative 4) and Class 3 ground water (Alternative GW-2). These two alternatives comprise the overall selected remedy for the Site.

### *Alternative 4 – RCRA Subtitle C Containment of Solidified Sludge and Untreated Soils*

**Placement of Solidified Sludge (source material) and Unsolidified Contaminated Soil in RCRA Subtitle C Equivalent Cell; Monitoring for Cell Leachate and ICs:** This element of the selected remedy addresses the current and future direct contact pathway risk, associated with exposure to sludge and contaminated soil, by excavating the sludge, the most probable source of the contaminated soil and ground water, construction of the RCRA Subtitle C equivalent cell, O&M of the cell, and ICs to protect the integrity of the cell as discussed in Section 2.9.3 (Common Elements). The actual construction of the selected remedy will take approximately 48 months to complete, but will be monitored as long as the waste remains hazardous. The remedy will remove all surface exposure to sludge and contaminated soil.

The Site sludge will be solidified on-site and placed in a RCRA Subtitle C equivalent cell along with the unsolidified contaminated soil. The RCRA Subtitle C equivalent cell for the solidified sludge and untreated soils would eliminate direct contact and inhalation of COCs by on-site nature conservancy workers as well as the potential release of COCs from the sludge to surface soils, sediments, and surface water. The solidified sludge and contaminated soil would be located on a RCRA cell liner consisting of a primary leachate collection/secondary leachate detection system; the cell would then be covered by a RCRA cap.

EPA expects the sludge and contaminated soil remedy to be implemented in phases such that information gained in early phases can be used to improve the design and construction of the remedy. It is anticipated that during the initial phase, a field-scale solidification pilot test will be implemented to determine the most effective reagents that will solidify the sludge to meet the solidification criteria for placement in the RCRA Subtitle C equivalent cell. Because this remedy will result in hazardous substance, pollutants, or contaminants remaining onsite above levels that allow for unrestricted use or exposure, statutory five-year reviews will be required.



**NA and Ground Water Monitoring and ICs:** This portion of the selected remedy addresses the potential for a contaminated ground water plume to migrate across the Site boundary above the TCEQ Class 3 Groundwater PCLs and background levels (specifically for metals). The ICs component under this alternative, as described in Section 2.9.3 (Common Elements), will reduce the potential for exposure to contaminated ground water. To prevent inadvertent exposure to Site ground water, ICs will restrict access to ground water.

The ground water monitoring system will consist of approximately 40 wells. Monitoring wells will be located around the RCRA Subtitle C equivalent cell at strategic positions to monitor for any potential leachate movement into the immediate ground water. Monitoring wells will also be placed at strategic locations to monitor the ground water contaminant plumes, to detect any potential off-site migration of those plumes above the TCEQ Class 3 Groundwater PCLs and background levels for metals. The plumes will also be monitored for NA potential; NA monitoring has the potential to document that the plume is stable, and therefore there is no potential for off-site migration. As previously stated, if EPA determines, through ground water analytical data, that the plume has the potential to migrate off-site, an active remedy such as containment or extraction, treatment, and disposal will be implemented. Considering that no off-site ground water to surface water discharge point is known, this approach will assure that the potential for discharge to surface water is addressed.

If monitoring data supports that NA is effective in containing or decreasing the plumes, the monitoring period may be modified, as determined by EPA. The ultimate objective for the ground water portion of this remedial action is to mitigate off-site migration of the ground water contaminant plume above the TCEQ Class 3 Groundwater PCLs and background levels for metals. Information obtained from the monitoring and data evaluation effort will document ground water plume stability or plume migration; if EPA determines that the plume has the potential to move across the Site boundary, or to an aquifer not currently known to be contaminated, EPA will require an active remedy to address contaminated ground water. However, it is anticipated that once the surface and subsurface source material has been removed, the plume should degrade within a relatively short period of time.

### **2.12.3 Summary of the Estimated Remedy Costs**

Table 18 shows a summary of the estimated cost for the selected sludge and contaminated soils and ground water remedy. The cost summary is based on the capital and annual O&M cost to implement the remedy. The information in the cost summary is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. Major changes in cost for the selected remedy may be documented in the form of a memorandum to the file, an Explanation of Significant Difference (ESD), or an Amendment to the ROD, depending on NCP requirements for the change in question. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost. The discount factor used in FS to estimate the present worth cost is 4.5 percent. A more complete breakdown of the cost estimate and associated work sheets is provided in Appendix C of the FS Report. Tables 18 and 19 contain cost information and respective discount rates.

### **2.12.4 Expected Outcomes of the Selected Remedy**

Once the sludge and contaminated soil are remediated, the selected remedy is expected to restore the Site for use as a preserve or conservancy.

## **Available Uses of Land**

The selected remedy will address the COCs in sludge and soil, such that the Site is made safe for use as a preserve or conservancy. Restricted land use (i.e., preserve or conservancy) will be available once the sludge and contaminated soil are placed in the RCRA Subtitle C equivalent cell, the ground water monitoring program is implemented, and ICs are in place.

## **Institutional Controls**

The selected remedy will utilize ICs to preserve the integrity of the RCRA cell remedy, and to minimize the potential for human exposure to contaminated ground water through restriction of access to that ground water. As part of the RD/RA, a plan will be developed to identify ICs for the Site and implement them. The ICs will limit land and ground water access by providing information that will help guide human behavior at the Site and by preventing excavation to ground water or the construction of wells to and through the shallow aquifer. Although not all inclusive, ICs will address (1) land use, (2) soil between 2 and 5 feet, (3) ground water access, and (4) vapor intrusion.

## **Available Uses of Ground Water**

There is no current human health risk posed by the Site's ground water for those exposure pathways evaluated in the BHHRA, since the ground water is classified as Class 3 – non-potable/non-drinking water. However, the selected remedy will address the potential migration of the ground water plume to address the potential, but unknown, contaminated ground water migration or exposure pathways (e.g., ground water to surface water; vapor intrusion).

## **Final Remediation Levels**

The results of the risk assessment indicate that the Site, if left un-remediated, will present an unacceptable risk to on-site conservancy workers as a result of exposure to COCs present in sludge and soil above remediation levels. The RAOs and remediation levels developed for this Site are protective of human health and the environment and will ensure human exposure to COCs is prevented.

Remediation (cleanup) levels were not calculated for sludge, as all sludge is to be remediated as source media. All sludge is to be removed, solidified, and placed in the RCRA Subtitle C cell. All contaminated soil, exceeding the remediation levels presented on Tables 1 and 2, is to be excavated and placed in the cell as well. Contaminated Site ground water will be monitored for migratory potential, and contingency remedies will be implemented as necessary.

## **2.13 STATUTORY DETERMINATIONS**

Under CERCLA, 42 U.S.C. § 6921, and the NCP, 40 CFR §300.430(f)(5)(ii), EPA must select remedies that are protective of human health and the environment, comply with ARARs (unless a statutory waiver is justified), are cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes as a principal element, and it includes a bias against off-site disposal of untreated wastes.

The following sections discuss how the selected remedy meets these statutory requirements.

### **2.13.1 Protection of Human Health and the Environment**

The sludge and contaminated soil selected remedy (Alternative 4) and the ground water selected remedy (Alternative GW-2) protect human health and the environment by eliminating, reducing, or controlling risk through a combination of treatment, engineering, and IC measures. The use of a RCRA Subtitle C equivalent cell to contain solidified sludge and untreated soil achieves protection by reducing direct contact with sludge and contaminated soil. Containment of the sludge reduces the potential for leachate from the sludge to move from the cell and contaminate ground water. The use of ICs prevents inadvertent exposure to contaminated environmental media.

The selected ground water remedy protects human health by preventing direct contact through ICs that restrict access to Site ground water. The selected alternative GW-2 protects the environment by monitoring possible expansion of the contaminant plume. Human health and the environment are protected by the contingency provision of this alternative if EPA determines that the plume has the potential to migrate.

### **2.13.2 Compliance with Applicable or Relevant and Appropriate Requirements**

The selected remedy will comply with all Federal and any more stringent State ARARs that pertain to the Site.

### **2.13.3 Cost-Effectiveness**

The selected remedy is cost-effective because the remedy costs are proportional to its overall effectiveness (see 40 CFR §300.430(f)(1)(ii)(D)). This determination was made by evaluating the overall effectiveness of those alternatives that satisfied the threshold criteria (i.e., that are protective of human health and the environment and comply with all Federal and any more stringent State ARARs, or as appropriate, waive ARARs). Overall effectiveness was evaluated (in the FS Report) by assessing three of the five balancing criteria in combination (long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness). The overall effectiveness of each alternative was then compared to each alternative's cost to determine cost-effectiveness. The relationship of the overall effectiveness of this remedial alternative was determined to be proportional to its costs and hence represents a reasonable value.

### **2.13.4 Utilization of Permanent Solutions to the Maximum Extent Practicable**

EPA has determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner. Of those alternatives that are protective of human health and the environment and comply with ARARs, EPA has determined that the media-specific selected remedy provides the best balance of trade-offs in terms of the five balancing criteria, while also considering the statutory preference for treatment as a principal element, bias against off-site treatment and disposal, and considering State and community acceptance. The selected remedy is necessary to ensure the long-term effectiveness and permanence of this cleanup.

### **2.13.5 Preference for Treatment as a Principal Element**

Reduction of toxicity, mobility, or volume through treatment refers to the anticipated performance of the treatment technologies that may be included as part of a remedy. Treatment is the primary component of the preferred alternative. The sludge and contaminated soil will be excavated; the sludge will be solidified and the solidified sludge and untreated contaminated soil will be placed in a RCRA Subtitle C equivalent cell.

### **2.13.6 Five-Year Review Requirements**

Section 121(c) of CERCLA and the NCP, 40 CFR §300.430(f)(5)(iii)(C), provide the statutory and legal basis for conducting five-year reviews. Because hazardous substances will remain on-site, a statutory review will be conducted within 5 years after initiation of the RA, and every 5 years thereafter, to ensure that the remedy is, or will continue to be, protective of human health and the environment.

## **2.14 DOCUMENTATION OF SIGNIFICANT CHANGES FROM PREFERRED ALTERNATIVE OF PROPOSED PLAN**

EPA has not made any significant changes to the remedy, as originally identified in the Proposed Plan. The Proposed Plan was released for public comment for 30 days, from May 22, 2009 to June 22, 2009. EPA held a public meeting on June 9, 2009, to present the preferred alternative in the Proposed Plan. Few written comments were received during the public comment period. EPA did review and respond to written comments and verbal comments submitted during the public meeting in the Responsiveness Summary in Part 3 of this ROD.

### **2.14.1 State Role**

The Texas Commission on Environmental Quality, on behalf of the State of Texas, has reviewed the various alternatives and has indicated its support for the selected remedy.

The TCEQ has also been actively involved during the RI and FS process and reviewed the subsequent RI Report (URS 2006a) and FS Report (URS 2008) to determine if the selected remedy is in compliance with applicable or relevant and appropriate State environmental laws and regulations. The State of Texas concurs with the selected remedy for the Site.

## PART 3: RESPONSIVENESS SUMMARY

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The Responsiveness Summary summarizes information about the views of the public and the support agency regarding both the remedial alternatives and general concerns about the Site submitted during the public comment period.

**Question 1:** Scenic Galveston (conservancy) (pertaining to the location of the on-site cemetery and the proposed location of the cell/landfill, which, as proposed, would cover the cemetery): *The largest concern of most on our board remains the eventual disposition of the historic Dick-Campbell cemetery. We are well aware that while the cap is still being designed, it and the cemetery are in fundamental conflict, and that this may be irreconcilable. We understand that a ground-penetrating study is currently underway to learn more about what is underground, and also that a salvage archeology re-location may be the best (if not the only feasible) solution. While we are not altogether happy with that plan, it seems preferable to leaving the underground remains under the cap, with relocated surface materials on top. We understand the Malone Parties and EPA are in contact with the Texas Historical Commission and family member, so we will continue to stand by.*

**EPA's Response:** All Federal, State and local requirements to address the on-site cemetery will be followed. The MCP has been/is in contact with relatives to address their concerns. An archeological survey to define grave sites and the extent of the cemetery will be conducted. The EPA is currently examining the options of either moving the cemetery to an alternate location or relocating the RCRA Subtitle C cell. The decision on the cemetery will take into account the need to protect human health and the environment, the federal, state, and local requirements, and the wishes of the public.

**Question 2:** Scenic Galveston (conservancy) (pertaining to retaining one of the Storm Levees): *Post-Ike; we wonder about potentially retaining the inner south levee to protect both the cap and any restored freshwater or treed habitats from future storm surge.*

**EPA's Response:** The storm levees will be addressed during the remedial design phase. The EPA will take into account the future storm surge issues at the Site during remedial design.

**Question 3:** Scenic Galveston (conservancy) (pertaining to retaining on-site building): *We continue to be interested in retaining the main office building and attached warehouse, if possible, in concept.*

**EPA's Response:** The Site is being cleaned up to a nature conservancy worker level. This means that the exposure levels are safe for someone who visits once every 150 days. This cleanup level may be contrary to the intentions of Scenic Galveston in maintaining a constant presence at the Site. The remedial action contemplates removing all structures on-site. If any building has hazardous substances (e.g., asbestos), creates an obstacle to the remedial action, or is structurally unstable, it could be removed.

**Question 4:** Scenic Galveston (conservancy) (pertaining to retaining on-site separators for conservancy work): *We continue to be interested in rehabilitating some of the old separators as a wetland nursery, but we are aware, too, that soil contamination may preclude this.*

**EPA's Response:** The separators contain sludge (source material/principal threat waste) hazardous waste within the concrete pits and must be removed. The separators may have cracks, which, if containing liquid of any kind, has the potential to drive dissolved contaminants into the ground water, or further mobilize the existing plume. Therefore, rehabilitating the separators may not be feasible.

**Question 5:** Scenic Galveston (conservancy) (pertaining to ecological habitat): *We are happy that the freshwater pond habitat has been avoided, and we would like to see the largest habitat buffers achievable around this site feature as the site develops.*

**EPA's Response:** The Resource Trustees have voiced a similar concern. The remedial action will address all habitat concerns appropriately. The trustees and EPA will meet with the Potential Responsible Parties (PRPs) to discuss habitat within the Site during the remedial design phase.

**Question 6:** Scenic Galveston (conservancy) (pertaining to native grasses on the cell cap): *Our interest in working with the project on a native vegetation scheme for the cap (and, of course, other portions of the site) remains high. We have been discussing the concept of finding a suitable native prairie under threat of development and relocating it wholesale to the Malone site. This sounds like science fiction, but it could be, by far, the easiest way to ensure rapid vegetative cover. We hope the cap will be designed to accommodate relatively deep-rooted non-woody prairie versus turf type grass.*

**EPA's Response:** Native plants are considered for all sites with a cell remedial component. To protect the integrity of the High-Density Polyethylene (HDPE – heavy duty plastics) liner at the base of the cap, no plants which may extend roots into the HDPE will be used. To protect the integrity of the cap, no public access will be allowed on the cap.

**Question 7:** Scenic Galveston (conservancy) (pertaining to access to water supply): *Freshwater sources for both future preserve support facilities (nursery, maintenance sheds) and to serve re-establishment of vegetative cover on denuded portions of the site remains a quandary for us, but the presence of the pond and the ability to pump water out of it for this purpose helps. (We note presence of old pump equipment and fire hydrants.) If an un-contaminated water well is present, we would be interested in learning more about it.*

**EPA's Response:** Only one water supply well was used by Malone Service; it was reported that this well was not used for drinking water purposes. This site well may present a potential avenue for contaminants in the shallow ground water to migrate to a deeper aquifer. All wells on-site (with the exception of the shallow ground water monitoring wells) will be plugged and abandoned. In addition, institutional controls will be placed on the Site to restrict access to the ground water.

**Question 8:** Mr. Richard Greer (pertaining to plugging of wells): *“The deep wells that are on the site, are they going to be left there? I mean, are they going to be plugged up, or what’s going to happen to them?”*

**EPA's Restatement of Question:** *Will the ground water wells that are separated from and exist in sands below the contaminated aquifer be plugged and abandoned?*

**EPA's Response:** There are three deep wells on-site. One is the Malone Service Company water supply well, which is screened (accessing ground water) from 183 feet below ground surface; this well will be plugged because it may present an avenue for movement of shallow contaminated ground water to the 183-foot sand. There are two on-site hazardous waste disposal wells, one operable and the other inoperable due to a casing problem. These wells are screened at approximately 4,800 feet below ground surface and are proposed to be plugged following completion of the remedy.

**Question 9:** Mr. Richard Greer (pertaining to ground water monitoring wells): *the ground water wells, how long are they going to be left there in place?*

**EPA's Restatement of Question:** *How long will the monitoring wells, which will monitor ground water for any movement of contaminated ground water, be left in place?*

**EPA's Response:** The shallow ground water monitoring wells are put in place to monitor the effectiveness of the cell in preventing movement of any contaminants from that cell, and to monitor for any off-site movement of the existing dissolved contaminant plumes. The monitoring wells will exist for as long as the cell contains hazardous waste.

**Question 10:** Mr. Thomas (pertaining to the remedial schedule): *"What about the schedule?"*

**EPA's Restatement of Question:** *How long will it take to complete the remedial action (the cleanup) – what is the schedule?*

**EPA's Response:** First, EPA will finalize the decision document (the Record of Decision), which presents the selected remedy. Then EPA will attempt to negotiate an agreement with the potentially responsible parties (PRPs) to conduct the remedial action. The Remedial Design, which designs all components of the remedy, will require approximately 1.5 years. The construction of the selected remedy is projected to take approximately 2 years to complete.

**Question 11:** Mr. Frank Dick (pertaining to the on-site cemetery): *The soil in the Campbell Bayou Cemetery has never been tested for any kind of contamination. My family and also the families of the Parr and Campbell families want the soil "inside" the cemetery fence tested. If no contamination is found, we do not want the graves disturbed in any way, fashion or form.*

**EPA's Response:** The soil in the cemetery area will be sampled during the remedial design stage. The remedial action will follow all Federal, State, and local laws in addressing this issue, as well as discussing concerns of relatives. Following appropriate assessment, either the cemetery or the RCRA cell will be relocated.

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## **Tables**

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**Table 1. Remediation Levels for Human Health**

<b>Exposure Point</b>	<b>Contaminant of Concern</b>	<b>Remediation Level or PRG (mg/kg)</b>
Surface Soil	1,1,2,2-Tetrachloroethane	1.2
	1,1,2-Trichloroethane	2.2
	1,2-Dibromoethane	0.80
	1,2-Dichloroethane	7.0
	2,3,7,8-TCDD TEQ (Mammal)	0.005 <sup>a</sup>
	Aldrin	1.0
	Arsenic	32
	Benzene	20
	Benzo(a)anthracene	22
	Benzo(a)pyrene	4.5
	Benzo(b)fluoranthene	4.5
	bis(2-Ethylhexyl)phthalate	315
	Chloroform	0.65
	Dibenz(a,h)anthracene	2.2
	Hexachlorobenzene	13
	Hexachlorobutadiene	18
	Indeno(1,2,3-cd)pyrene	4.5
	Methylene chloride	27
	Naphthalene	70
	Tetrachloroethene	112
	Total Polychlorinated Biphenyls	15 <sup>b</sup>
	Total Xylenes	225
	Trichloroethene	83
	Vinyl chloride	4.8
Subsurface Soil	1,2-Dichloroethane	7.0
	2,3,7,8-TCDD TEQ (Mammal)	0.005 <sup>a</sup>
	2-Methylnaphthalene	6,750
	Aldrin	11
	Arsenic	75
	Benzene	20
	Benzo(a)anthracene	280
	Benzo(a)pyrene	78
	Benzo(b)fluoranthene	425
	bis(2-Ethylhexyl)phthalate	1,000
	Chloroform	6.5
	Dibenz(a,h)anthracene	285
	Hexachlorobenzene	25
	Hexachlorobutadiene	39
	Indeno(1,2,3-cd)pyrene	730
	Methylene chloride	275
	Naphthalene	70
	Tetrachloroethene	240
	Total Polychlorinated Biphenyls	20 <sup>b</sup>
	Total Xylenes	225
	Trichloroethene	83
	Vinyl chloride	5.0

<sup>a</sup> 2,3,7,8-TCDD TEQ (Mammal) Preliminary Remediation Goal (PRG) based on EPA directive and TCEQ regulations (OSWER Directive 9200.4-26 and 30 TAC 350.76[e][3], respectively)

<sup>b</sup> Total PCBs PRG based on Toxic Substance Control Act regulations (40 CFR 761.61)

Remediation Levels were developed from PRGs based on 10<sup>-5</sup> Individual Risk and/or Hazard Quotient (HQ) < 1 and Cumulative Risk < 10<sup>-4</sup> and/or HQ < 10

2,3,7,8-TCDD - 2,3,7,8-Tetrachlorodibenzo-p-Dioxin  
mg/kg – milligram(s) per kilogram

**Table 2. Remediation Levels for Ecological Receptors (mg/kg)**

Exposure Point	Contaminant of Concern	Midpoint LOAEL/NOAEL (all receptors)	Midpoint LOAEL/NOAEL (mobile receptors)	Remediation Levels
Laydown Area	2,3,7,8-TCDD TEQ (Mammal)	3.19E-05 <sup>6</sup>	<b>2.80E-04<sup>4</sup></b>	<b>2.80E-04</b>
Laydown Area	2,3,7,8-TCDD TEQ (Avian)	5.20E-05 <sup>6</sup>	<b>5.20E-05<sup>6</sup></b>	<b>5.20E-05</b>
Laydown Area	2-Methylnaphthalene	8.0 <sup>1</sup>	<b>8.1<sup>1</sup></b>	<b>8.1</b>
Laydown Area	Hexachlorobenzene	8.0 <sup>2</sup>	<b>9.5<sup>1</sup></b>	<b>9.5</b>
Laydown Area	Hexachlorobutadiene	2.5 <sup>3</sup>	<b>60<sup>1</sup></b>	<b>60</b>
Laydown Area	High Molecular Weight PAHs	5 <sup>3</sup>	<b>5.6<sup>1</sup></b>	<b>5.6</b>
Laydown Area	Phenanthrene	10.5 <sup>1</sup>	<b>10.5<sup>1</sup></b>	<b>10.5</b>
Laydown Area	Total PCBs	0.055 <sup>3</sup>	<b>1.35<sup>1</sup></b>	<b>1.35</b>
Oil Pit Area	Hexachlorobutadiene	2.5 <sup>3</sup>	<b>725<sup>1</sup></b>	<b>725</b>
Oil Pit Area	High Molecular Weight PAHs	5.0 <sup>3</sup>	<b>70<sup>1</sup></b>	<b>70</b>
Cemetery Area	High Molecular Weight PAHs	5.0 <sup>3</sup>	<b>19.2<sup>1</sup></b>	<b>19.2</b>
Tank 800 Area	bis(2-Ethylhexyl)phthalate	<b>33<sup>1</sup></b>	33 <sup>1</sup>	<b>33</b>
Tank 800 Area	Cadmium	<b>1.3<sup>3</sup></b>	9.5 <sup>1</sup>	<b>1.3</b>
Tank 800 Area	Chromium	<b>30<sup>5</sup></b>	90 <sup>1</sup>	<b>30</b>
Tank 800 Area	Copper	<b>115<sup>3</sup></b>	4,100 <sup>1</sup>	<b>115</b>
Tank 800 Area	High Molecular Weight PAHs	<b>5<sup>3</sup></b>	14 <sup>1</sup>	<b>5</b>
Tank 800 Area	Nickel	<b>10.5<sup>3</sup></b>	2,700 <sup>1</sup>	<b>10.5</b>
Tank 800 Area	Zinc	<b>30<sup>5</sup></b>	30 <sup>5</sup>	<b>30</b>

**Bold-italicized** values are considered the ecological remediation levels for surface soils from 0 - 6 inches below ground surface. Portions of the Tank 800 Area that will not be covered by either the Subtitle C Landfill or by a minimum of 6 inches of soil will be subject to ecological remediation levels for all receptors. Otherwise, ecological remediation levels for mobile receptors apply.

2,3,7,8-TCDD - 2,3,7,8-Tetrachlorodibenzo-p-Dioxin; mg/kg – milligram(s) per kilogram

<sup>1</sup> Red-winged Blackbird

<sup>3</sup> Least Shrew

<sup>5</sup> State Background

<sup>2</sup> Deer Mouse

<sup>4</sup> Raccoon

<sup>6</sup> Borrow Pit Background

**Table 3. Monitoring Well Information**

<b>Well I.D.</b>	<b>Installation Date</b>	<b>Total Depth (feet)</b>	<b>Screened Interval (feet)</b>	<b>Total Depth (feet)</b>	<b>Screened Interval (feet)</b>	<b>Screen Material</b>	<b>Casing</b>
MW-01	5/11/1982	40	11 - 18	16.4	10- 16.4	0.014-inch	2-inch PVC
MW-02	12/19/1978	20	5 - 20	Not Measured	Not Measured	0.006-inch perf.	2-inch PVC
MW-03	7/2/1980	30	15 - 30	27.5	13 - 27.5	0.006-inch perf.	4-inch PVC
MW-04	7/2/1980	26	6 - 26	25	5 - 25	0.006-inch perf.	4-inch PVC
MW-05U	5/14/1982	15	8 - 15	15	8 - 15	0.014-inch	2-inch PVC
MW-05D	5/14/1982	30	20 - 30	30	20.5 - 30	0.014-inch	2-inch PVC
MW-06	12/22/1978	35	5 - 35	27.5	5 - 27.5	0.006-inch perf.	2-inch PVC
MW-07U	5/14/1982	16	9 - 16	15.6	8 - 15.6	0.014-inch	2-inch PVC
MW-07D	5/14/1982	28	18 - 28	28.3	19 - 28.3	0.014-inch	2-inch PVC
MW-08	1/15/1976	35	25 - 35	34.7	26 - 34.7	0.006-inch perf.	4-inch PVC
MW-09	7/2/1980	26	6 - 26	37.8	20 - 37.8	Unknown	4-inch PVC
MW-10	12/15/1978	45	5 - 45	46.5	7 - 46.5	0.006-inch perf.	2-inch PVC
MW-11	12/15/1978	45	5 - 45	42.6	5 - 42.6	0.006-inch perf.	2-inch PVC
MW-12U	5/11/1982	16	8 - 16	19.7	12 - 17.6	0.014-inch	2-inch PVC
MW-12D	5/11/1982	33	23 - 33	34	24 - 34	0.014-inch	2-inch PVC
MW-13	5/12/1982	33	23 - 33	31	24 - 31	0.014-inch	2-inch PVC
MW-14	7/1/1980	32	9 - 32	32.5	10 - 32.5	Unknown	4-inch PVC
MW-15U	5/11/1982	16	9 - 16	Not Measured	Not Measured	0.014-inch	2-inch PVC
MW-15D	5/11/1982	30	20 - 30	32	22.5 - 32	0.014-inch	2-inch PVC
MW-16	4/30/1984	44	28 - 38	38.4	29 - 38.4	Unknown	2-inch PVC
MW-17	4/30/1984	40	30 - 40	41.5	30 - 41.5	Unknown	2-inch PVC
MW-18	4/30/1984	40	30 - 40	40.5	10 - 40.5	Unknown	2-inch PVC
MW-19	4/30/1984	40	30 - 40	Not Measured	Not Measured	Unknown	2-inch PVC
MW-20	12/14/1978	45	5 - 45	Not Measured	Not Measured	0.006-inch perf.	2-inch PVC
MW-24	6/30/1980	18	8 - 18	18.5	9 - 18.5	0.01	4-inch PVC
MW-25	5/12/1982	18	9.5 - 18	18.3	9.5 - 18.3	0.014-inch	2-inch PVC
MW-26	12/27/2005	31	6 - 31	Not Measured	Not Measured	0.010-inch	2-inch PVC
MW-27	12/27/2005	33	13 - 33	Not Measured	Not Measured	0.010-inch	2-inch PVC
MW-28	12/27/2005	35	10 - 35	Not Measured	Not Measured	0.010-inch	2-inch PVC
MW-29	12/28/2005	15	5 - 15	Not Measured	Not Measured	0.010-inch	2-inch PVC
MW-30	12/28/2005	34	9 - 34	Not Measured	Not Measured	0.010-inch	2-inch PVC
MW-31	12/28/2005	30	10 - 30	Not Measured	Not Measured	0.010-inch	2-inch PVC
MW-32	12/29/2005	25	10 - 25	Not Measured	Not Measured	0.010-inch	2-inch PVC

The monitoring wells with the same identification number are nested wells, installed in a single soil test boring that was reamed to 5 7/8 inches. "U" denotes wells completed at the phreatic surface and "D" denotes completion in the center of the paleochannel sand.

**Table 4. Geotechnical Data Summary**

Sample Identification	Depth (feet)	Visual Classification	Unified Soil Classification	Moisture Content (Percent)	Dry Unit Weight (pcf)	Wet Unit Weight (pcf)	Liquid Limit (Percent)	Plastic Limit (Percent)	Coefficient of Permeability (cm/sec)
BASS-15	8 - 10	Yellowish brown silty clay, with sand seams and ferrous nodules	CL	26.2	NA	NA	30	17	NA
BASS-13	10 - 12	Yellowish brown silty clay, with sand seams and ferrous nodules	CL	22.4	127.6	101	32	18	1.38 x 10 <sup>-7</sup>
MW-29	20 - 21.5	Reddish brown clay with calcareous and ferrous nodules and silt seams	CH	30.2	88	114.6	58	24	2.6 x 10 <sup>-7</sup>
CB-03 @ CPT-17N2	40 - 42	Brown clay with calcareous and ferrous nodules and sand seams	CH	26.5	99.9	126.4	58	24	1.5 x 10 <sup>-7</sup>

CH - Inorganic clays of high plasticity

CL - Inorganic clays of low to medium plasticity

cm/sec - Centimeters per second

NA - Not applicable

pcf - Pounds per cubic foot

**Table 5. Summary of Contaminants of Concern and Medium-Specific Exposure Point Concentrations  
Baseline Human Health Risk Assessment**

		Scenario Timeframe: Current							
		Medium: Soil							
		Exposure Medium: Soil							
Exposure Point	Exposure Area	Contaminant of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
			Min	Max					
Surface Soil	Earthen Impoundment - Oil Pits	Arsenic	3.5	20.8	mg/kg	2/2	20.8	mg/kg	MAX
Surface Soil	Earthen Impoundment - Oil Pits	1,1,2,2-Tetrachloroethane	5.5	960	mg/kg	2/2	960	mg/kg	MAX
Surface Soil	Earthen Impoundment - Oil Pits	1,1,2-Trichloroethane	8.6	1200	mg/kg	2/2	1200	mg/kg	MAX
Surface Soil	Earthen Impoundment - Oil Pits	1,2-Dibromoethane	0.27	45	mg/kg	2/2	45	mg/kg	MAX
Surface Soil	Earthen Impoundment - Oil Pits	1,2-Dichloroethane	37	4300	mg/kg	2/2	4300	mg/kg	MAX
Surface Soil	Earthen Impoundment - Oil Pits	Benzene	15	1600	mg/kg	2/2	1600	mg/kg	MAX
Surface Soil	Earthen Impoundment - Oil Pits	Chloroform	0.37	52	mg/kg	2/2	52	mg/kg	MAX
Surface Soil	Earthen Impoundment - Oil Pits	Methylene chloride	33	3100	mg/kg	2/2	3100	mg/kg	MAX
Surface Soil	Earthen Impoundment - Oil Pits	Tetrachloroethene	35	2700	mg/kg	2/2	2700	mg/kg	MAX
Surface Soil	Earthen Impoundment - Oil Pits	Trichloroethene	36	4300	mg/kg	2/2	4300	mg/kg	MAX
Surface Soil	Earthen Impoundment - Oil Pits	Vinyl chloride	0.14	16	mg/kg	2/2	16	mg/kg	MAX
Surface Soil	Earthen Impoundment - Oil Pits	Benzo(a)anthracene	1.8	15	mg/kg	2/2	15	mg/kg	MAX
Surface Soil	Earthen Impoundment - Oil Pits	Benzo(a)pyrene	0.98	5.4	mg/kg	2/2	5.4	mg/kg	MAX
Surface Soil	Earthen Impoundment - Oil Pits	Benzo(b)fluoranthene	1.5	11	mg/kg	2/2	11	mg/kg	MAX
Surface Soil	Earthen Impoundment - Oil Pits	bis(2-Chloroethyl)ether	0.43	11	mg/kg	2/2	11	mg/kg	MAX
Surface Soil	Earthen Impoundment - Oil Pits	Hexachlorobenzene	17	66	mg/kg	2/2	66	mg/kg	MAX
Surface Soil	Earthen Impoundment - Oil Pits	Hexachlorobutadiene	93	390	mg/kg	2/2	390	mg/kg	MAX
Surface Water	Earthen Impoundment - Sludge Pit	Arsenic	0.583	0.587	mg/L	3/3	0.587	mg/kg	MAX
Surface Water	Earthen Impoundment - Sludge Pit	Vinyl chloride	0.013	0.015	mg/L	3/3	0.015	mg/kg	MAX
Surface Water	Earthen Impoundment - Sludge Pit	Benzo(a)anthracene	0.0014	0.0018	mg/L	2/3	0.0018	mg/kg	MAX
Surface Water	Earthen Impoundment - Sludge Pit	bis(2-Ethylhexyl)phthalate	0.045	0.094	mg/L	3/3	0.094	mg/kg	MAX
Surface Water	Earthen Impoundment - Sludge Pit	Hexachlorobenzene	0.0014	0.0022	mg/L	2/3	0.0022	mg/kg	MAX
Surface Water	Earthen Impoundment - Sludge Pit	Pentachlorophenol	0.0034	0.0049	mg/L	3/3	0.0049	mg/kg	MAX
Surface Soil	Laydown Area	2,3,7,8-TCDD TEQ (Mammal)	0.000189	0.000189	mg/kg	1/1	0.000189	mg/kg	MAX
Surface Soil	Laydown Area	Arsenic	0.94	49	mg/kg	42/42	49	mg/kg	MAX
Surface Soil	Laydown Area	Total PCBs	0.006	219	mg/kg	18/18	219	mg/kg	MAX
Surface Soil	Laydown Area	Benzo(a)anthracene	0.0021	11	mg/kg	30/42	11	mg/kg	MAX
Surface Soil	Laydown Area	Benzo(a)pyrene	0.0031	9.5	mg/kg	32/42	9.5	mg/kg	MAX
Surface Soil	Laydown Area	Benzo(b)fluoranthene	0.0038	14	mg/kg	32/42	14	mg/kg	MAX
Surface Soil	Laydown Area	Dibenz(a,h)anthracene	0.0031	1.5	mg/kg	18/42	1.5	mg/kg	MAX
Surface Soil	Laydown Area	Hexachlorobenzene	0.0025	94	mg/kg	38/42	94	mg/kg	MAX
Surface Soil	Laydown Area	Hexachlorobutadiene	0.002	310	mg/kg	34/42	310	mg/kg	MAX
Surface Soil	Laydown Area	Indeno(1,2,3-cd)pyrene	0.0027	5.3	mg/kg	30/42	5.3	mg/kg	MAX
Surface Soil	Cemetery	2,3,7,8-TCDD TEQ (Mammal)	0.0047	0.0047	mg/kg	1/1	0.0047	mg/kg	MAX
Surface Soil	Cemetery	Arsenic	0.81	7.6	mg/kg	28/28	7.6	mg/kg	MAX
Surface Soil	Cemetery	Total PCBs	131	131	mg/kg	1/1	131	mg/kg	MAX



**Table 5. Summary of Contaminants of Concern and Medium-Specific Exposure Point Concentrations  
Baseline Human Health Risk Assessment**

Scenario Timeframe: Current									
Medium: Soil									
Exposure Medium: Soil									
Exposure Point	Exposure Area	Contaminant of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
			Min	Max					
Surface Soil	Cemetery	1,2-Dichloroethane	0.0012	68	mg/kg	4/28	68	mg/kg	MAX
Surface Soil	Cemetery	Benzene	0.00099	800	mg/kg	16/28	800	mg/kg	MAX
Surface Soil	Cemetery	Vinyl chloride	0.00088	39	mg/kg	4/28	39	mg/kg	MAX
Surface Soil	Cemetery	Benzo(a)anthracene	0.0025	16	mg/kg	26/28	16	mg/kg	MAX
Surface Soil	Cemetery	Benzo(a)pyrene	0.0021	7.5	mg/kg	24/28	7.5	mg/kg	MAX
Surface Soil	Cemetery	Benzo(b)fluoranthene	0.0084	6	mg/kg	23/28	6	mg/kg	MAX
Surface Soil	Cemetery	Hexachlorobenzene	0.0056	2	mg/kg	19/28	2	mg/kg	MAX
Surface Soil	Cemetery	Indeno(1,2,3-cd)pyrene	0.0048	2.9	mg/kg	21/28	2.9	mg/kg	MAX
Surface Soil	Cemetery	Naphthalene	0.0014	600	mg/kg	23/28	600	mg/kg	MAX
Subsurface Soil	Cemetery	1,2-Dichloroethane	0.16	370	mg/kg	9/13	370	mg/kg	MAX
Subsurface Soil	Cemetery	Benzene	0.0015	1000	mg/kg	11/13	1000	mg/kg	MAX
Subsurface Soil	Cemetery	Chloroform	0.029	2.3	mg/kg	3/13	2.3	mg/kg	MAX
Subsurface Soil	Cemetery	Methylene chloride	0.082	150	mg/kg	9/13	150	mg/kg	MAX
Subsurface Soil	Cemetery	Total Xylenes	0.0125	2480	mg/kg	11/13	2480	mg/kg	MAX
Subsurface Soil	Cemetery	Tetrachloroethene	0.00039	79	mg/kg	10/13	79	mg/kg	MAX
Subsurface Soil	Cemetery	Trichloroethene	0.00071	350	mg/kg	10/13	350	mg/kg	MAX
Subsurface Soil	Cemetery	Vinyl chloride	0.083	39	mg/kg	8/13	39	mg/kg	MAX
Subsurface Soil	Cemetery	Naphthalene	0.12	9700	mg/kg	10/12	9700	mg/kg	MAX
Subsurface Soil	Cemetery	2-Methylnaphthalene	0.23	7600	mg/kg	10/12	7600	mg/kg	MAX
Subsurface Soil	Cemetery	Benzo(a)anthracene	0.017	190	mg/kg	9/12	190	mg/kg	MAX
Subsurface Soil	Cemetery	Benzo(a)pyrene	0.0071	62	mg/kg	5/12	62	mg/kg	MAX
Surface Soil	Maintenance Pits Area	2,3,7,8-TCDD TEQ (Mammal)	0.000946	0.00094587	mg/kg	1/1	0.00094587	mg/kg	MAX
Surface Soil	Maintenance Pits Area	Arsenic	0.69	6.86	mg/kg	17/17	6.86	mg/kg	MAX
Surface Soil	Maintenance Pits Area	Aldrin	0.91	0.91	mg/kg	1/1	0.91	mg/kg	MAX
Surface Soil	Maintenance Pits Area	Total PCBs	54.39	54.39	mg/kg	1/1	54.39	mg/kg	MAX
Surface Soil	Maintenance Pits Area	Benzo(a)anthracene	0.0038	26	mg/kg	15/17	26	mg/kg	MAX
Surface Soil	Maintenance Pits Area	Benzo(a)pyrene	0.0051	12	mg/kg	14/17	12	mg/kg	MAX
Surface Soil	Maintenance Pits Area	Benzo(b)fluoranthene	0.0022	13	mg/kg	13/17	13	mg/kg	MAX
Surface Soil	Maintenance Pits Area	Dibenz(a,h)anthracene	0.019	1.4	mg/kg	4/17	1.4	mg/kg	MAX
Surface Soil	Maintenance Pits Area	Hexachlorobenzene	0.035	1.9	mg/kg	12/17	1.9	mg/kg	MAX
Surface Soil	Maintenance Pits Area	Indeno(1,2,3-cd)pyrene	0.013	3.8	mg/kg	11/17	3.8	mg/kg	MAX
Subsurface Soil	Maintenance Pits Area	1,2-Dichloroethane	0.18	7.7	mg/kg	3/23	7.7	mg/kg	MAX
Subsurface Soil	Maintenance Pits Area	Benzene	0.0017	77	mg/kg	21/23	77	mg/kg	MAX
Subsurface Soil	Maintenance Pits Area	Methylene chloride	0.026	63	mg/kg	11/23	63	mg/kg	MAX
Subsurface Soil	Maintenance Pits Area	Total Xylenes	0.00367	2390	mg/kg	15/23	2390	mg/kg	MAX
Subsurface Soil	Maintenance Pits Area	Tetrachloroethene	0.053	58	mg/kg	8/23	58	mg/kg	MAX

**Table 5. Summary of Contaminants of Concern and Medium-Specific Exposure Point Concentrations  
Baseline Human Health Risk Assessment**

		Scenario Timeframe: Current							
		Medium: Soil							
		Exposure Medium: Soil							
Exposure Point	Exposure Area	Contaminant of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
			Min	Max					
Subsurface Soil	Maintenance Pits Area	Trichloroethene	0.076	320	mg/kg	7/23	320	mg/kg	MAX
Subsurface Soil	Maintenance Pits Area	Hexachlorobenzene	21	64	mg/kg	2/23	64	mg/kg	MAX
Subsurface Soil	Maintenance Pits Area	Hexachlorobutadiene	0.28	600	mg/kg	4/23	600	mg/kg	MAX
Subsurface Soil	Maintenance Pits Area	Naphthalene	0.011	610	mg/kg	14/23	610	mg/kg	MAX
Subsurface Soil	Tank 800	2,3,7,8-TCDD TEQ (Mammal)	0.003409	0.003409	mg/kg	1/1	0.003409	mg/kg	MAX
Subsurface Soil	Tank 800	Aldrin	7.8	7.8	mg/kg	1/1	7.8	mg/kg	MAX
Subsurface Soil	Tank 800	Total PCBs	121.89	121.89	mg/kg	1/1	121.89	mg/kg	MAX
Subsurface Soil	Tank 800	1,2-Dichloroethane	0.0013	55	mg/kg	8/23	55	mg/kg	MAX
Subsurface Soil	Tank 800	Benzene	0.0014	190	mg/kg	17/23	190	mg/kg	MAX
Subsurface Soil	Tank 800	Methylene chloride	0.07	61	mg/kg	8/23	61	mg/kg	MAX
Subsurface Soil	Tank 800	Total Xylenes	0.026	1850	mg/kg	10/23	1850	mg/kg	MAX
Subsurface Soil	Tank 800	Tetrachloroethene	0.00061	170	mg/kg	6/23	170	mg/kg	MAX
Subsurface Soil	Tank 800	Trichloroethene	0.0019	510	mg/kg	11/23	510	mg/kg	MAX
Subsurface Soil	Tank 800	Hexachlorobenzene	0.0046	230	mg/kg	8/23	230	mg/kg	MAX
Subsurface Soil	Tank 800	Hexachlorobutadiene	0.0082	2200	mg/kg	9/23	2200	mg/kg	MAX
Subsurface Soil	Tank 800	Naphthalene	0.02	2700	mg/kg	10/23	2700	mg/kg	MAX
Subsurface Soil	Tank 800	Benzo(a)pyrene	0.0025	27	mg/kg	8/23	27	mg/kg	MAX

**Table 6.A Values Used for Intake Calculations, Reasonable Maximum Exposure  
Baseline Human Health Risk Assessment**

Scenario Timeframe: Current/Future Medium: Surface Soil Exposure Medium: Surface Soil, Vapors and Particulates							
Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units
Ingestion	Industrial Worker	Adult	Surface soil at the site	IRsoil	Ingestion rate of soil	50	mg/day
				Flsoil	Fraction ingested, soil	1	unitless
				EF	Exposure frequency	250	days/year
				ED	Exposure duration	25	years
				BW	Body weight	70	kg
				ATnc	Averaging time for non-carcinogenics	9125	days
				ATc	Averaging time for carcinogenics	25550	days
Dermal Contact	Industrial Worker	Adult	Surface soil at the site	AF	Adherence factor of soil to skin	0.2	mg/cm2-event
				EF	Exposure frequency	250	days/year
				ED	Exposure duration	25	years
				EV	Event frequency	1	events/day
				SA	Skin surface area available for contact	3300	cm2
				BW	Body weight	70	kg
				ATnc	Averaging time for non-carcinogenics	9125	days
				ATc	Averaging time for carcinogenics	25550	days
Inhalation	Industrial Worker	Adult	Ambient air above the site vapors and particulates	InhR	Inhalation rate, hourly	1	m3/hr
				ET	Exposure time	8	hr/day
				EF	Exposure frequency	250	days/year
				ED	Exposure duration	25	years
				BW	Body weight	70	kg
				ATnc	Averaging time for non-carcinogenics	9125	days
				ATc	Averaging time for carcinogenics	25550	days
				T	Exposure interval	9.50E+08	s

Notes:

mg/day = milligrams per day

kg = kilogram

mg/cm2-event = milligrams per square centimeter per event

cm2 = square centimeter

m3/hr = cubic meters per hour

hr/day = hours per day

s = second

**Table 6.B Values Used for Intake Calculations, Reasonable Maximum Exposure  
Baseline Human Health Risk Assessment**

		Scenario Timeframe: Current/Future Medium: Surface and Subsurface Soil Exposure Medium: Surface Soil, Subsurface Soil, Vapors and Particulates					
Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units
Ingestion	Construction Worker	Adult	Surface and Subsurface soil at the site	IRsoil	Ingestion rate of soil	330	mg/day
				FIsoil	Fraction ingested, soil	1	unitless
				EF	Exposure frequency	30	days/year
				ED	Exposure duration	1	years
				BW	Body weight	70	kg
				ATnc	Averaging time for non-carcinogenics	365	days
				ATc	Averaging time for carcinogenics	25550	days
Dermal Contact	Construction Worker	Adult	Surface and subsurface soil at the site	AF	Adherence factor of soil to skin	0.3	mg/cm2-event
				EF	Exposure frequency	30	days/year
				ED	Exposure duration	1	years
				EV	Event frequency	1	events/day
				SA	Skin surface area available for contact	3300	cm2
				BW	Body weight	70	kg
				ATnc	Averaging time for non-carcinogenics	365	days
				ATc	Averaging time for carcinogenics	25550	days
Inhalation	Construction Worker	Adult	Ambient air above the site vapors and particulates	InhR	Inhalation rate, hourly	1.5	m3/hr
				ET	Exposure time	8	hr/day
				EF	Exposure frequency	30	days/year
				ED	Exposure duration	1	years
				BW	Body weight	70	kg
				ATnc	Averaging time for non-carcinogenics	365	days
				ATc	Averaging time for carcinogenics	25550	days
				T	Exposure interval	9.50E+08	s

Notes:

mg/day = milligrams per day

kg = kilogram

mg/cm2-event = milligrams per square centimeter per event

cm2 = square centimeter

m3/hr = cubic meters per hour

hr/day = hours per day

s = second

**Table 6.C Values Used for Intake Calculations, Reasonable Maximum Exposure  
Baseline Human Health Risk Assessment**

Scenario Timeframe: Current/Future Medium: Surface Soil Exposure Medium: Surface Soil, Vapors and Particulates							
Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units
Ingestion	Recreational Birdwatcher	Adult	Surface soil at the site	IRsoil	Ingestion rate of soil	20	mg/day
				Fsoil	Fraction ingested, soil	1	unitless
				EF	Exposure frequency	15	days/year
				ED	Exposure duration	25	years
				BW	Body weight	70	kg
				ATnc	Averaging time for non-carcinogenics	9125	days
				ATc	Averaging time for carcinogenics	25550	days
Dermal Contact	Recreational Birdwatcher	Adult	Surface soil at the site	AF	Adherence factor of soil to skin	0.3	mg/cm <sup>2</sup> -event
				EF	Exposure frequency	15	days/year
				ED	Exposure duration	25	years
				EV	Event frequency	1	events/day
				SA	Skin surface area available for contact	3300	cm <sup>2</sup>
				BW	Body weight	70	kg
				ATnc	Averaging time for non-carcinogenics	9125	days
				ATc	Averaging time for carcinogenics	25550	days
Inhalation	Recreational Birdwatcher	Adult	Ambient air above the site vapors and particulates	InhR	Inhalation rate, hourly	1.5	m <sup>3</sup> /hr
				ET	Exposure time	8	hr/day
				EF	Exposure frequency	15	days/year
				ED	Exposure duration	25	years
				BW	Body weight	70	kg
				ATnc	Averaging time for non-carcinogenics	9125	days
				ATc	Averaging time for carcinogenics	25550	days
				T	Exposure interval	9.50E+08	s

Notes:

mg/day = milligrams per day

kg = kilogram

mg/cm<sup>2</sup>-event = milligrams per square centimeter per event

cm<sup>2</sup> = square centimeter

m<sup>3</sup>/hr = cubic meters per hour

hr/day = hours per day

s = second

**Table 6.D Values Used for Intake Calculations, Reasonable Maximum Exposure  
Baseline Human Health Risk Assessment**

		<b>Scenario Timeframe: Current/Future Medium: Surface Soil Exposure Medium: Surface Soil, Vapors and Particulates</b>					
<b>Exposure Route</b>	<b>Receptor Population</b>	<b>Receptor Age</b>	<b>Exposure Point</b>	<b>Parameter Code</b>	<b>Parameter Definition</b>	<b>Value</b>	<b>Units</b>
Dermal Contact	Recreational Wader	Adult	Surface water at Earthen Impoundment	t-event	Event duration	3	hours/event
				EF	Exposure frequency	39	days/year
				ED	Exposure duration	25	years
				EV	Event frequency	1	events/day
				SA	Skin surface area available for contact	6310	cm <sup>2</sup>
				BW	Body weight	70	kg
				ATnc	Averaging time for non-carcinogenics	9125	days
				ATc	Averaging time for carcinogenics	25550	days

Notes:

kg = kilogram

cm<sup>2</sup> = square centimeter

**Table 6.E Values Used for Intake Calculations, Reasonable Maximum Exposure  
Baseline Human Health Risk Assessment**

VALUES USED FOR INTAKE CALCULATIONS, REASONABLE MAXIMUM EXPOSURE							
	Scenario Timeframe: Current/Future Medium: Surface Soil Exposure Medium: Surface Soil, Vapors and Particulates						
Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units
Ingestion	Conservancy Worker	Adult	Surface soil at the site	IRsoil	Ingestion rate of soil	20	mg/day
				FIsoil	Fraction ingested, soil	1	unitless
				EF	Exposure frequency	150	days/year
				ED	Exposure duration	25	years
				BW	Body weight	70	kg
				ATnc	Averaging time for non-carcinogenics	9125	days
				ATc	Averaging time for carcinogenics	25550	days
Dermal Contact	Conservancy Worker	Adult	Surface soil at the site	AF	Adherence factor of soil to skin	0.3	mg/cm2-event
				EF	Exposure frequency	150	days/year
				ED	Exposure duration	25	years
				EV	Event frequency	1	events/day
				SA	Skin surface area available for contact	3300	cm2
				BW	Body weight	70	kg
				ATnc	Averaging time for non-carcinogenics	9125	days
ATc	Averaging time for carcinogenics	25550	days				
Inhalation	Conservancy Worker	Adult	Ambient air above the site vapors and particulates	InhR	Inhalation rate, hourly	1.5	m3/hr
				ET	Exposure time	8	hr/day
				EF	Exposure frequency	150	days/year
				ED	Exposure duration	25	years
				BW	Body weight	70	kg
				ATnc	Averaging time for non-carcinogenics	9125	days
				ATc	Averaging time for carcinogenics	25550	days
T	Exposure interval	9.50E+08	s				

Notes:

mg/day = milligrams per day

kg = kilogram

mg/cm2-event = milligrams per square centimeter per event

cm2 = square centimeter

m3/hr = cubic meters per hour

hr/day = hours per day

s = second

**Table 7.A Cancer Toxicity Data Summary  
Baseline Human Health Risk Assessment**

<b>Pathway: Ingestion, Dermal</b>						
<b>Chemical of Concern</b>	<b>Oral Cancer Slope Factor</b>	<b>Dermal Cancer Slope Factor</b>	<b>Slope Factor Units</b>	<b>Weight of Evidence</b>	<b>Source</b>	<b>Date</b>
1,1,2,2-Tetrachloroethane	2.00E-01	2.00E-01	kg-day/mg	C	I	3/7/2006
1,1,2-Trichloroethane	5.70E-02	5.70E-02	kg-day/mg	C	I	3/7/2006
1,2-Dibromoethane	2.00E+00	2.00E+00	kg-day/mg	Likely	I	3/7/2006
1,2-Dichloroethane	9.10E-02	9.10E-02	kg-day/mg	B2	I	3/7/2006
2,3,7,8-TCDD TEQ (Mammal)	1.50E+05	1.50E+05	kg-day/mg	B2	H	7/31/1997
2-Methylnaphthalene	--	--	kg-day/mg	Cannot be determined		
Aldrin	1.70E+01	1.70E+01	kg-day/mg	B2	I	3/7/2006
Arsenic	1.50E+00	1.50E+00	kg-day/mg	A	I	3/7/2006
Benzene	5.50E-02	5.50E-02	kg-day/mg	A	I	3/7/2006
Benzo(a)anthracene	7.30E-01	7.30E-01	kg-day/mg	B2	EPA-93	3/7/2006
Benzo(a)pyrene	7.30E+00	7.30E+00	kg-day/mg	B2	I	3/7/2006
Benzo(b)fluoranthene	7.30E-01	7.30E-01	kg-day/mg	B2	EPA-93	3/7/2006
bis(2-Chloroethyl)ether	1.10E+00	1.10E+00	kg-day/mg	B2	I	3/7/2006
bis(2-Ethylhexyl)phthalate	1.40E-02	7.37E-02	kg-day/mg	B2	I	3/7/2006
Chloroform	--	--	kg-day/mg	B2	--	
Dibenz(a,h)anthracene	7.30E+00	7.30E+00	kg-day/mg	B2	EPA-93	3/7/2006
Hexachlorobenzene	1.60E+00	1.60E+00	kg-day/mg	B2	I	3/7/2006
Hexachlorobutadiene	7.80E-02	7.80E-02	kg-day/mg	C	I	3/7/2006
Indeno(1,2,3-cd)pyrene	7.30E-01	7.30E-01	kg-day/mg	B2	EPA-93	3/7/2006
Methylene chloride	7.50E-03	9.50E-01	kg-day/mg	B2	I	3/7/2006
Naphthalene	--	--	kg-day/mg	C	--	
Pentachlorophenol	1.20E-01	1.20E-01	kg-day/mg	B2	I	3/7/2006
Tetrachloroethene	5.20E-02	5.20E-02	kg-day/mg	Likely	N	3/7/2006
Total PCBs	2.00E+00	2.00E+00	kg-day/mg	A	I	3/7/2006
Total Xylenes	--	--	kg-day/mg	Cannot be determined		
Trichloroethene	1.10E-02	1.10E-02	kg-day/mg	B1	N	3/7/2006
Vinyl chloride	1.50E+00	1.50E+00	kg-day/mg	A	I	3/7/2006



**Table 7.A Cancer Toxicity Data Summary  
Baseline Human Health Risk Assessment**

<b>Pathway: Inhalation</b>							
<b>Chemical of Concern</b>	<b>Unit Risk</b>	<b>Units</b>	<b>Inhalation Cancer Slope Factor</b>	<b>Units</b>	<b>Weight of Evidence/ Cancer Guideline Description</b>	<b>Source</b>	<b>Date</b>
1,1,2,2-Tetrachloroethane	5.80E-05	m3/ug	0.203	kg-day/mg	C	I	3/7/2006
1,1,2-Trichloroethane	1.60E-05	m3/ug	0.056	kg-day/mg	C	I	3/7/2006
1,2-Dibromoethane	8.80E-05	m3/ug	0.308	kg-day/mg	Likely	0	3/7/2006
1,2-Dichloroethane	2.60E-05	m3/ug	0.091	kg-day/mg	B2	I	3/7/2006
2,3,7,8-TCDD TEQ (Mammal)	4.29E+01	m3/ug	150000	kg-day/mg	B2	H	7/31/1997
2-Methylnaphthalene	--	m3/ug	--	kg-day/mg	Cannot be determined		
Aldrin	4.90E-03	m3/ug	17.2	kg-day/mg	B2	I	3/7/2006
Arsenic	4.30E-03	m3/ug	15.1	kg-day/mg	A	I	3/7/2006
Benzene	7.80E-06	m3/ug	0.0273	kg-day/mg	A	I	3/7/2006
Benzo(a)anthracene	8.80E-05	m3/ug	0.308	kg-day/mg	B2	EPA-93	3/7/2006
Benzo(a)pyrene	8.80E-04	m3/ug	3.08	kg-day/mg	B2	N	3/7/2006
Benzo(b)fluoranthene	8.80E-05	m3/ug	0.308	kg-day/mg	B2	EPA-93	3/7/2006
bis(2-Chloroethyl)ether	3.30E-04	m3/ug	1.16	kg-day/mg	B2	I	3/7/2006
bis(2-Ethylhexyl)phthalate	--	m3/ug	--	kg-day/mg	B2		
Chloroform	0.000023	m3/ug	0.0805	kg-day/mg	B2	I	3/7/2006
Dibenz(a,h)anthracene	8.80E-04	m3/ug	3.08	kg-day/mg	B2	EPA-93	3/7/2006
Hexachlorobenzene	4.60E-04	m3/ug	1.61	kg-day/mg	B2	I	3/7/2006
Hexachlorobutadiene	2.20E-05	m3/ug	0.077	kg-day/mg	C	I	3/7/2006
Indeno(1,2,3-cd)pyrene	8.80E-05	m3/ug	0.308	kg-day/mg	B2	EPA-93	3/7/2006
Methylene chloride	4.70E-07	m3/ug	0.00165	kg-day/mg	B2	I	3/7/2006
Naphthalene	--	m3/ug	--	kg-day/mg	B2		
Pentachlorophenol	--	m3/ug	--	kg-day/mg	B2		
Tetrachloroethene	5.80E-07	m3/ug	0.00203	kg-day/mg	Likely	N	3/7/2006
Total PCBs	5.70E-04	m3/ug	2	kg-day/mg	A	I	3/7/2006
Total Xylenes	--	m3/ug	--	kg-day/mg	Cannot be determined		
Trichloroethene	1.70E-06	m3/ug	0.00595	kg-day/mg	B1	N	3/7/2006
Vinyl chloride	8.80E-06	m3/ug	0.0308	kg-day/mg	A	I	3/7/2006

**Table 7.B Non-Cancer Toxicity Data Summary  
Baseline Human Health Risk Assessment**

Chemical of Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Dermal RfD	Dermal RfD Units	Primary Target Organ	Combined Uncertainty/ Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ
Pathway:	Ingestion, Dermal								
1,1,2,2-Tetrachloroethane	Chronic	4.00E-02	mg/kg-day	4.00E-02	mg/kg-day	Respiratory	1000	A	3/7/2006
1,1,2-Trichloroethane	Subchronic	4.00E-03	mg/kg-day	4.00E-03	mg/kg-day	Blood	1000	I	3/7/2006
1,2-Dibromoethane	Chronic	9.00E-03	mg/kg-day	9.00E-03	mg/kg-day	Testes/Liver/Kidneys	3000	I	3/7/2006
1,2-Dichloroethane	--	--	mg/kg-day	--	mg/kg-day	--	--	--	--
2,3,7,8-TCDD TEQ (Mammal)	--	--	mg/kg-day	--	mg/kg-day	--	--	--	--
2-Methylnaphthalene	Chronic	4.00E-03	mg/kg-day	4.00E-03	mg/kg-day	Heart	1000	I	3/7/2006
Aldrin	Chronic	3.00E-05	mg/kg-day	3.00E-05	mg/kg-day	Liver	1000	I	3/7/2006
Arsenic	Chronic	3.00E-04	mg/kg-day	3.00E-04	mg/kg-day	Vascular System	3	I	3/7/2006
Benzene	Chronic	4.00E-03	mg/kg-day	4.00E-03	mg/kg-day	Bone Marrow	300	I	3/7/2006
Benzo(a)anthracene	--	--	mg/kg-day	--	mg/kg-day	--	--	--	--
Benzo(a)pyrene	--	--	mg/kg-day	--	mg/kg-day	--	--	--	--
Benzo(b)fluoranthene	--	--	mg/kg-day	--	mg/kg-day	--	--	--	--
bis(2-Chloroethyl)ether	--	--	mg/kg-day	--	mg/kg-day	--	--	--	--
bis(2-Ethylhexyl)phthalate	Chronic	2.00E-02	mg/kg-day	3.80E-03	mg/kg-day	Liver	1000	I	3/7/2006
Chloroform	Chronic	1.00E-02	mg/kg-day	2.00E-03	mg/kg-day	Liver	1000	I	3/7/2006
Dibenz(a,h)anthracene	--	--	mg/kg-day	--	mg/kg-day	--	--	--	--
Hexachlorobenzene	Chronic	8.00E-04	mg/kg-day	8.00E-04	mg/kg-day	Liver	100	I	3/7/2006
Hexachlorobutadiene	Chronic	2.00E-04	mg/kg-day	2.00E-04	mg/kg-day	Kidney	1000	H	3/7/2006
Indeno(1,2,3-cd)pyrene	--	--	mg/kg-day	--	mg/kg-day	--	--	--	--
Methylene chloride	Chronic	6.00E-02	mg/kg-day	6.00E-02	mg/kg-day	Liver	100	I	3/7/2006
Naphthalene	Subchronic	2.00E-02	mg/kg-day	2.00E-02	mg/kg-day	Weight	3000	I	3/7/2006
Pentachlorophenol	Chronic	3.00E-02	mg/kg-day	3.00E-02	mg/kg-day	Liver/Kidney	100	I	3/7/2006
Tetrachloroethene	Subchronic	1.00E-02	mg/kg-day	1.00E-02	mg/kg-day	Liver	1000	I	3/7/2006
Total PCBs	Chronic	4.00E-02	mg/kg-day	4.00E-02	mg/kg-day	Respiratory	1000	A	3/7/2006
Total Xylenes	Chronic	2.00E-01	mg/kg-day	2.00E-01	mg/kg-day	Weight	1000	I	3/7/2006
Trichloroethene	Subchronic	3.00E-04	mg/kg-day	3.00E-04	mg/kg-day	Liver/Kidney	3000	N	3/7/2006
Vinyl chloride	Chronic	3.00E-03	mg/kg-day	3.00E-03	mg/kg-day	Liver	30	I	3/7/2006
Chemical of Concern	Chronic/ Subchronic	Inhalation RfC	Inhalation RfC Units	Inhalation RfD	Inhalation RfD Units	Primary Target Organ	Combined Uncertainty/ Modifying Factors	Sources of RfC:RfD: Target Organ	Dates
Pathway:	Inhalation								
1,1,2,2-Tetrachloroethane	--	--	mg/m3	--	mg/kg-day	--	--	--	--
1,1,2-Trichloroethane	--	--	mg/m3	--	mg/kg-day	--	--	--	--
1,2-Dibromoethane	Chronic	9.00E-03	mg/m3	2.57E-03	mg/kg-day	Nasal	300	I	3/7/2006
1,2-Dichloroethane	--	2.42E+00	mg/m3	6.92E-01	mg/kg-day	--	--	A	3/7/2006
2,3,7,8-TCDD TEQ (Mammal)	--	--	mg/m3	--	mg/kg-day	--	--	--	--

**Table 7.B Non-Cancer Toxicity Data Summary  
Baseline Human Health Risk Assessment**

Chemical of Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Dermal RfD	Dermal RfD Units	Primary Target Organ	Combined Uncertainty/ Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ
2-Methylnaphthalene	--	--	mg/m3	--	mg/kg-day	--	--	--	--
Aldrin	--	--	mg/m3	--	mg/kg-day	--	--	--	--
Arsenic	--	--	mg/m3	--	mg/kg-day	--	--	--	--
Benzene	Chronic	3.00E-02	mg/m3	8.57E-03	mg/kg-day	Bone Marrow	300	I	3/7/2006
Benzo(a)anthracene	--	--	mg/m3	--	mg/kg-day	--	--	--	--
Benzo(a)pyrene	--	--	mg/m3	--	mg/kg-day	--	--	--	--
Benzo(b)fluoranthene	--	--	mg/m3	--	mg/kg-day	--	--	--	--
bis(2-Chloroethyl)ether	--	--	mg/m3	--	mg/kg-day	--	--	--	--
bis(2-Ethylhexyl)phthalate	--	--	mg/m3	--	mg/kg-day	--	--	--	--
Chloroform	Chronic	9.75E-02	mg/m3	2.78E-02	mg/kg-day	Liver/Kidney/CNS/GI tract/Reproduction	NA	PPRTV	3/7/2006
Dibenz(a,h)anthracene	--	--	mg/m3	--	mg/kg-day	--	--	--	--
Hexachlorobenzene	--	--	mg/m3	--	mg/kg-day	--	--	--	--
Hexachlorobutadiene	--	--	mg/m3	--	mg/kg-day	--	--	--	--
Indeno(1,2,3-cd)pyrene	--	--	mg/m3	--	mg/kg-day	--	--	--	--
Methylene chloride		3.00E+00	mg/m3	8.57E-01	mg/kg-day			H	3/7/2006
Naphthalene		3.00E-03	mg/m3	8.57E-04	mg/kg-day	Nasal	3000	I	3/7/2006
Pentachlorophenol	--	--	mg/m3	--	mg/kg-day	--	--	--	--
Tetrachloroethene	Chronic	2.71E-01	mg/m3	7.74E-02	mg/kg-day	Neurological	NA	A	3/7/2006
Total PCBs	--	--	mg/m3	--	mg/kg-day	--	--	--	--
Total Xylenes	Subchronic	1.00E-01	mg/m3	2.86E-02	mg/kg-day	Neurological	300	I	3/7/2006
Trichloroethene	Subchronic	--	mg/m3	--	mg/kg-day	CNS	1000	N	3/7/2006
Vinyl chloride	Chronic	1.00E-01	mg/m3	2.86E-02	mg/kg-day	Liver	30	I	3/7/2006

**Table 8. Carcinogenic Exposure Routes  
Baseline Human Health Risk Assessment**

Exposure Point	Exposure Area	Exposure Point Concentration (mg/kg)	Receptor	Chemical of Concern	Carcinogenic Risk			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Earthen Impoundment - Oil Pits	20.8	Industrial Worker	Arsenic	5.50E-06	1.30E-08	2.20E-06	7.60E-06
Surface Soil	Earthen Impoundment - Oil Pits	960	Industrial Worker	1,1,2,2-Tetrachloroethane	3.40E-05	8.40E-09	---	3.40E-05
Surface Soil	Earthen Impoundment - Oil Pits	1200	Industrial Worker	1,1,2-Trichloroethane	1.20E-05	2.90E-09	---	1.20E-05
Surface Soil	Earthen Impoundment - Oil Pits	45	Industrial Worker	1,2-Dibromoethane	1.60E-05	5.90E-10	---	1.60E-05
Surface Soil	Earthen Impoundment - Oil Pits	4300	Industrial Worker	1,2-Dichloroethane	6.80E-05	1.70E-08	---	6.80E-05
Surface Soil	Earthen Impoundment - Oil Pits	1600	Industrial Worker	Benzene	1.50E-05	1.90E-09	---	1.50E-05
Surface Soil	Earthen Impoundment - Oil Pits	52	Industrial Worker	Chloroform	---	1.80E-10	---	1.80E-10
Surface Soil	Earthen Impoundment - Oil Pits	3100	Industrial Worker	Methylene chloride	4.10E-06	2.20E-10	---	4.10E-06
Surface Soil	Earthen Impoundment - Oil Pits	2700	Industrial Worker	Tetrachloroethene	2.50E-05	2.30E-10	---	2.50E-05
Surface Soil	Earthen Impoundment - Oil Pits	4300	Industrial Worker	Trichloroethene	8.30E-06	1.10E-09	---	8.30E-06
Surface Soil	Earthen Impoundment - Oil Pits	16	Industrial Worker	Vinyl chloride	4.20E-06	2.10E-11	---	4.20E-06
Surface Soil	Earthen Impoundment - Oil Pits	15	Industrial Worker	Benzo(a)anthracene	1.90E-06	2.00E-10	3.30E-06	5.20E-06
Surface Soil	Earthen Impoundment - Oil Pits	5.4	Industrial Worker	Benzo(a)pyrene	6.90E-06	7.00E-10	1.20E-05	1.90E-05
Surface Soil	Earthen Impoundment - Oil Pits	11	Industrial Worker	Benzo(b)fluoranthene	1.40E-06	1.40E-10	2.40E-06	3.80E-06
Surface Soil	Earthen Impoundment - Oil Pits	11	Industrial Worker	bis(2-Chloroethyl)ether	2.10E-06	5.40E-10	---	2.10E-06
Surface Soil	Earthen Impoundment - Oil Pits	66	Industrial Worker	Hexachlorobenzene	1.80E-05	4.60E-09	2.40E-05	4.30E-05
Surface Soil	Earthen Impoundment - Oil Pits	390	Industrial Worker	Hexachlorobutadiene	5.30E-06	1.30E-09	7.00E-06	1.20E-05
<b>Surface Soil Risk Total =</b>								<b>2.79E-04</b>
Surface Soil	Earthen Impoundment - Oil Pits	960	Construction Worker	1,1,2,2-Tetrachloroethane	1.10E-06	6.00E-11	---	1.10E-06
Surface Soil	Earthen Impoundment - Oil Pits	4300	Construction Worker	1,2-Dichloroethane	2.20E-06	1.20E-10	---	2.20E-06
Surface Soil	Earthen Impoundment - Oil Pits	4300	Construction Worker	Trichloroethene	2.60E-07	7.90E-12	---	2.60E-07
<b>Surface Soil Risk Total =</b>								<b>3.56E-06</b>
Surface Soil	Earthen Impoundment - Oil Pits	4300	Recreational Person	1,2-Dichloroethane	1.60E-06	1.50E-09	---	1.60E-06
Surface Soil	Earthen Impoundment - Oil Pits	5.4	Recreational Person	Benzo(a)pyrene	1.70E-07	6.30E-11	1.10E-06	1.20E-06
Surface Soil	Earthen Impoundment - Oil Pits	66	Recreational Person	Hexachlorobenzene	4.40E-07	4.10E-10	2.20E-06	2.60E-06
<b>Surface Soil Risk Total =</b>								<b>5.40E-06</b>
Surface Water	Earthen impoundment - Sludge Pit	0.587	Recreational Person	Arsenic	---	---	9.10E-06	9.10E-06
Surface Water	Earthen impoundment - Sludge Pit	0.015	Recreational Person	Vinyl chloride	---	---	2.20E-06	2.20E-06
Surface Water	Earthen impoundment - Sludge Pit	0.0018	Recreational Person	Benzo(a)anthracene	---	---	1.10E-05	1.10E-05
Surface Water	Earthen impoundment - Sludge Pit	0.094	Recreational Person	bis(2-Ethylhexyl)phthalate	---	---	1.30E-03	1.30E-03
Surface Water	Earthen impoundment - Sludge Pit	0.0022	Recreational Person	Hexachlorobenzene	---	---	3.10E-05	3.10E-05
Surface Water	Earthen impoundment - Sludge Pit	0.0049	Recreational Person	Pentachlorophenol	---	---	1.10E-06	1.10E-06
<b>Surface Water Risk Total =</b>								<b>1.35E-03</b>
Surface Soil	Laydown Area	0.000189	Industrial Worker	2,3,7,8-TCDD TEQ (Mammal)	5.00E-06	1.30E-09	2.00E-06	6.90E-06
Surface Soil	Laydown Area	49	Industrial Worker	Arsenic	1.30E-05	3.30E-08	5.10E-06	1.80E-05
Surface Soil	Laydown Area	219	Industrial Worker	Total PCBs	7.70E-05	2.00E-08	1.40E-04	2.20E-04
Surface Soil	Laydown Area	11	Industrial Worker	Benzo(a)anthracene	1.40E-06	1.50E-10	2.40E-06	3.80E-06
Surface Soil	Laydown Area	9.5	Industrial Worker	Benzo(a)pyrene	1.20E-05	1.30E-09	2.10E-05	3.30E-05
Surface Soil	Laydown Area	14	Industrial Worker	Benzo(b)fluoranthene	1.80E-06	1.90E-10	3.10E-06	4.90E-06
Surface Soil	Laydown Area	1.5	Industrial Worker	Dibenz(a,h)anthracene	1.90E-06	1.90E-10	3.30E-06	5.20E-06
Surface Soil	Laydown Area	94	Industrial Worker	Hexachlorobenzene	2.60E-05	6.90E-09	3.50E-05	6.10E-05
Surface Soil	Laydown Area	310	Industrial Worker	Hexachlorobutadiene	4.20E-06	1.10E-09	5.60E-06	9.80E-06

**Table 8. Carcinogenic Exposure Routes  
Baseline Human Health Risk Assessment**

Exposure Point	Exposure Area	Exposure Point Concentration (mg/kg)	Receptor	Chemical of Concern	Carcinogenic Risk			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Laydown Area	5.3	Industrial Worker	Indeno(1,2,3-cd)pyrene	6.80E-07	6.60E-11	1.20E-06	1.80E-06
<b>Surface Soil Risk Total =</b>					<b>3.64E-04</b>			
Surface Soil	Laydown Area	219	Construction Worker	Total PCBs	2.40E-06	1.40E-10	1.00E-06	3.40E-06
Surface Soil	Laydown Area	94	Construction Worker	Hexachlorobenzene	8.30E-07	4.90E-11	2.50E-07	1.10E-06
<b>Surface Soil Risk Total =</b>					<b>4.50E-06</b>			
Surface Soil	Laydown Area	219	Recreational Person	Total PCBs	1.80E-06	1.80E-09	1.30E-05	1.50E-05
Surface Soil	Laydown Area	9.5	Recreational Person	Benzo(a)pyrene	2.90E-07	1.20E-10	1.90E-06	2.20E-06
Surface Soil	Laydown Area	94	Recreational Person	Hexachlorobenzene	6.30E-07	6.20E-10	3.10E-06	3.80E-06
<b>Surface Soil Risk Total =</b>					<b>2.10E-05</b>			
Surface Soil	Cemetery	0.0047	Industrial Worker	2,3,7,8-TCDD TEQ (Mammal)	1.20E-04	2.60E-08	4.90E-05	1.70E-04
Surface Soil	Cemetery	7.6	Industrial Worker	Arsenic	2.00E-06	4.30E-09	7.90E-07	2.80E-06
Surface Soil	Cemetery	131	Industrial Worker	Total PCBs	4.60E-05	9.80E-09	8.50E-05	1.30E-04
Surface Soil	Cemetery	68	Industrial Worker	1,2-Dichloroethane	1.10E-06	2.30E-10	---	1.10E-06
Surface Soil	Cemetery	800	Industrial Worker	Benzene	7.70E-06	8.20E-10	---	7.70E-06
Surface Soil	Cemetery	39	Industrial Worker	Vinyl chloride	1.00E-05	4.50E-11	---	1.00E-05
Surface Soil	Cemetery	16	Industrial Worker	Benzo(a)anthracene	2.00E-06	1.80E-10	3.50E-06	5.50E-06
Surface Soil	Cemetery	7.5	Industrial Worker	Benzo(a)pyrene	9.60E-06	8.40E-10	1.60E-05	2.60E-05
Surface Soil	Cemetery	6	Industrial Worker	Benzo(b)fluoranthene	7.70E-07	6.80E-11	1.30E-06	2.10E-06
Surface Soil	Cemetery	2	Industrial Worker	Hexachlorobenzene	5.60E-07	1.20E-10	7.40E-07	1.30E-06
Surface Soil	Cemetery	2.9	Industrial Worker	Indeno(1,2,3-cd)pyrene	3.70E-07	3.00E-11	6.30E-07	1.00E-06
Surface Soil	Cemetery	600	Industrial Worker	Naphthalene	---	---	---	---
<b>Surface Soil Risk Total =</b>					<b>3.58E-04</b>			
Surface Soil	Cemetery	0.0047	Construction Worker	2,3,7,8-TCDD TEQ (Mammal)	3.90E-06	1.90E-10	3.50E-07	4.30E-06
Surface Soil	Cemetery	131	Construction Worker	Total PCBs	1.50E-06	7.00E-11	6.10E-07	2.10E-06
<b>Surface Soil Risk Total =</b>					<b>6.40E-06</b>			
Surface Soil	Cemetery	0.0047	Recreational Person	2,3,7,8-TCDD TEQ (Mammal)	3.00E-06	2.30E-09	4.40E-06	7.30E-06
Surface Soil	Cemetery	131	Recreational Person	Total PCBs	1.10E-06	8.80E-10	7.60E-06	8.70E-06
Surface Soil	Cemetery	7.5	Recreational Person	Benzo(a)pyrene	2.30E-07	7.60E-11	1.50E-06	1.70E-06
<b>Surface Soil Risk Total =</b>					<b>1.77E-05</b>			
Subsurface Soil	Cemetery	370	Industrial Worker	1,2-Dichloroethane	---	3.90E-04	---	3.90E-04
Subsurface Soil	Cemetery	1000	Industrial Worker	Benzene	---	3.60E-04	---	3.60E-04
Subsurface Soil	Cemetery	2.3	Industrial Worker	Chloroform	---	2.50E-06	---	2.50E-06
Subsurface Soil	Cemetery	150	Industrial Worker	Methylene chloride	---	3.90E-06	---	3.90E-06
Subsurface Soil	Cemetery	2480	Industrial Worker	Total Xylenes	---	---	---	---
Subsurface Soil	Cemetery	79	Industrial Worker	Tetrachloroethene	---	2.40E-06	---	2.40E-06
Subsurface Soil	Cemetery	350	Industrial Worker	Trichloroethene	---	3.10E-05	---	3.10E-05
Subsurface Soil	Cemetery	39	Industrial Worker	Vinyl chloride	---	5.70E-05	---	5.70E-05
Subsurface Soil	Cemetery	9700	Industrial Worker	Naphthalene	---	---	---	---
<b>Subsurface Soil Risk Total =</b>					<b>8.47E-04</b>			
Subsurface Soil	Cemetery	7600	Construction Worker	2-Methylnaphthalene	---	---	---	---
Subsurface Soil	Cemetery	190	Construction Worker	Benzo(a)anthracene	7.70E-07	1.60E-11	3.00E-07	1.10E-06
Subsurface Soil	Cemetery	62	Construction Worker	Benzo(a)pyrene	2.50E-06	5.00E-11	9.80E-07	3.50E-06

**Table 8. Carcinogenic Exposure Routes  
Baseline Human Health Risk Assessment**

Exposure Point	Exposure Area	Exposure Point Concentration (mg/kg)	Receptor	Chemical of Concern	Carcinogenic Risk			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
<b>Subsurface Soil Risk Total =</b>					<b>4.60E-06</b>			
Subsurface Soil	Cemetery	370	Recreational Person	1,2-Dichloroethane	---	3.50E-05	---	3.50E-05
Subsurface Soil	Cemetery	1000	Recreational Person	Benzene	---	3.30E-05	---	3.30E-05
Subsurface Soil	Cemetery	350	Recreational Person	Trichloroethene	---	2.80E-06	---	2.80E-06
Subsurface Soil	Cemetery	39	Recreational Person	Vinyl chloride	---	5.10E-06	---	5.10E-06
Subsurface Soil	Cemetery	9700	Recreational Person	Naphthalene	---	---	---	---
<b>Subsurface Soil Risk Total =</b>					<b>7.59E-05</b>			
Surface Soil	Maintenance Pits Area	0.00094587	Industrial Worker	2,3,7,8-TCDD TEQ (Mammal)	2.50E-05	4.80E-09	9.80E-06	3.50E-05
Surface Soil	Maintenance Pits Area	6.86	Industrial Worker	Arsenic	1.80E-06	3.60E-09	7.10E-07	2.50E-06
Surface Soil	Maintenance Pits Area	0.91	Industrial Worker	Aldrin	2.70E-06	5.40E-10	3.60E-06	6.30E-06
Surface Soil	Maintenance Pits Area	54.39	Industrial Worker	Total PCBs	1.90E-05	3.70E-09	3.50E-05	5.40E-05
Surface Soil	Maintenance Pits Area	26	Industrial Worker	Benzo(a)anthracene	3.30E-06	2.70E-10	5.70E-06	9.00E-06
Surface Soil	Maintenance Pits Area	12	Industrial Worker	Benzo(a)pyrene	1.50E-05	1.20E-09	2.60E-05	4.20E-05
Surface Soil	Maintenance Pits Area	13	Industrial Worker	Benzo(b)fluoranthene	1.70E-06	1.40E-10	2.80E-06	4.50E-06
Surface Soil	Maintenance Pits Area	1.4	Industrial Worker	Dibenz(a,h)anthracene	1.80E-06	1.40E-10	3.10E-06	4.90E-06
Surface Soil	Maintenance Pits Area	1.9	Industrial Worker	Hexachlorobenzene	5.30E-07	1.10E-10	7.00E-07	1.20E-06
Surface Soil	Maintenance Pits Area	3.8	Industrial Worker	Indeno(1,2,3-cd)pyrene	4.80E-07	3.60E-11	8.30E-07	1.30E-06
<b>Surface Soil Risk Total =</b>					<b>1.61E-04</b>			
Surface Soil	Maintenance Pits Area	54.39	Construction Worker	Total PCBs	6.00E-07	2.70E-11	2.50E-07	8.60E-07
<b>Surface Soil Risk Total =</b>					<b>8.60E-07</b>			
Surface Soil	Maintenance Pits Area	0.00094587	Recreational Person	2,3,7,8-TCDD TEQ (Mammal)	5.90E-07	4.30E-10	8.80E-07	1.50E-06
Surface Soil	Maintenance Pits Area	54.39	Recreational Person	Total PCBs	4.60E-07	3.40E-10	3.20E-06	3.60E-06
Surface Soil	Maintenance Pits Area	12	Recreational Person	Benzo(a)pyrene	3.70E-07	1.10E-10	2.40E-06	2.70E-06
<b>Surface Soil Risk Total =</b>					<b>7.80E-06</b>			
Subsurface Soil	Maintenance Pits Area	7.7	Industrial Worker	1,2-Dichloroethane	---	7.40E-06	---	7.40E-06
Subsurface Soil	Maintenance Pits Area	77	Industrial Worker	Benzene	---	2.60E-05	---	2.60E-05
Subsurface Soil	Maintenance Pits Area	63	Industrial Worker	Methylene chloride	---	1.50E-06	---	1.50E-06
Subsurface Soil	Maintenance Pits Area	2390	Industrial Worker	Total Xylenes	---	---	---	---
Subsurface Soil	Maintenance Pits Area	58	Industrial Worker	Tetrachloroethene	---	1.60E-06	---	1.60E-06
Subsurface Soil	Maintenance Pits Area	320	Industrial Worker	Trichloroethene	---	2.60E-05	---	2.60E-05
Subsurface Soil	Maintenance Pits Area	64	Industrial Worker	Hexachlorobenzene	---	1.70E-05	---	1.70E-05
Subsurface Soil	Maintenance Pits Area	600	Industrial Worker	Hexachlorobutadiene	---	1.10E-04	---	1.10E-04
Subsurface Soil	Maintenance Pits Area	610	Industrial Worker	Naphthalene	---	---	---	---
<b>Subsurface Soil Risk Total =</b>					<b>1.90E-04</b>			
Subsurface Soil	Maintenance Pits Area	600	Construction Worker	Hexachlorobutadiene	2.60E-07	1.10E-11	7.80E-08	3.40E-07
<b>Subsurface Soil Risk Total =</b>					<b>3.40E-07</b>			
Subsurface Soil	Maintenance Pits Area	77	Recreational Person	Benzene	---	2.30E-06	---	2.30E-06
Subsurface Soil	Maintenance Pits Area	320	Recreational Person	Trichloroethene	---	2.30E-06	---	2.30E-06
Subsurface Soil	Maintenance Pits Area	64	Recreational Person	Hexachlorobenzene	---	1.50E-06	---	1.50E-06
Subsurface Soil	Maintenance Pits Area	600	Recreational Person	Hexachlorobutadiene	---	9.50E-06	---	9.50E-06
<b>Subsurface Soil Risk Total =</b>					<b>1.56E-05</b>			
Subsurface Soil	Tank 800	0.003409	Industrial Worker	2,3,7,8-TCDD TEQ (Mammal)	---	1.00E-06	---	1.00E-06

**Table 8. Carcinogenic Exposure Routes  
Baseline Human Health Risk Assessment**

Exposure Point	Exposure Area	Exposure Point Concentration (mg/kg)	Receptor	Chemical of Concern	Carcinogenic Risk			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Subsurface Soil	Tank 800	7.8	Industrial Worker	Aldrin	---	5.40E-06	---	5.40E-06
Subsurface Soil	Tank 800	121.89	Industrial Worker	Total PCBs	---	1.30E-05	---	1.30E-05
Subsurface Soil	Tank 800	55	Industrial Worker	1,2-Dichloroethane	---	6.00E-05	---	6.00E-05
Subsurface Soil	Tank 800	190	Industrial Worker	Benzene	---	7.30E-05	---	7.30E-05
Subsurface Soil	Tank 800	61	Industrial Worker	Methylene chloride	---	1.70E-06	---	1.70E-06
Subsurface Soil	Tank 800	1850	Industrial Worker	Total Xylenes	---	---	---	---
Subsurface Soil	Tank 800	170	Industrial Worker	Tetrachloroethene	---	5.40E-06	---	5.40E-06
Subsurface Soil	Tank 800	510	Industrial Worker	Trichloroethene	---	4.70E-05	---	4.70E-05
Subsurface Soil	Tank 800	230	Industrial Worker	Hexachlorobenzene	---	7.10E-05	---	7.10E-05
Subsurface Soil	Tank 800	2200	Industrial Worker	Hexachlorobutadiene	---	4.40E-04	---	4.40E-04
Subsurface Soil	Tank 800	2700	Industrial Worker	Naphthalene	---	---	---	---
<b>Subsurface Soil Risk Total =</b>								<b>7.18E-04</b>
Subsurface Soil	Tank 800	0.003409	Construction Worker	2,3,7,8-TCDD TEQ (Mammal)	2.80E-06	1.40E-10	2.50E-07	3.10E-06
Subsurface Soil	Tank 800	121.89	Construction Worker	Total PCBs	1.30E-06	6.90E-11	5.70E-07	1.90E-06
Subsurface Soil	Tank 800	27	Construction Worker	Benzo(a)pyrene	1.10E-06	2.30E-11	4.30E-07	1.50E-06
Subsurface Soil	Tank 800	230	Construction Worker	Hexachlorobenzene	2.00E-06	1.00E-10	6.10E-07	2.60E-06
Subsurface Soil	Tank 800	2200	Construction Worker	Hexachlorobutadiene	9.50E-07	4.80E-11	2.80E-07	1.20E-06
<b>Subsurface Soil Risk Total =</b>								<b>1.03E-05</b>
Subsurface Soil	Tank 800	121.89	Recreational Person	Total PCBs	---	1.20E-06	---	1.20E-06
Subsurface Soil	Tank 800	55	Recreational Person	1,2-Dichloroethane	---	5.40E-06	---	5.40E-06
Subsurface Soil	Tank 800	190	Recreational Person	Benzene	---	6.60E-06	---	6.60E-06
Subsurface Soil	Tank 800	510	Recreational Person	Trichloroethene	---	4.20E-06	---	4.20E-06
Subsurface Soil	Tank 800	230	Recreational Person	Hexachlorobenzene	---	6.30E-06	---	6.30E-06
Subsurface Soil	Tank 800	2200	Recreational Person	Hexachlorobutadiene	---	4.00E-05	---	4.00E-05
Subsurface Soil	Tank 800	2700	Recreational Person	Naphthalene	---	---	---	---
<b>Subsurface Soil Risk Total =</b>								<b>6.37E-05</b>

Notes:

See Appendix A for Human Health PRG Calculations

mg/kg = Milligrams per kilogram

**Table 9. Non-Carcinogenic Exposure Routes  
Baseline Human Health Risk Assessment**

Exposure Point	Exposure Area	Exposure Point Concentration (mg/kg)	Receptor	Chemical of Potential Concern	Primary Target Organs	Non-Cancer Hazard			
						Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Earthen Impoundment - Oil Pits	20.8	Industrial Worker	Arsenic	Vascular syst.	3.40E-02	---	1.30E-02	4.70E-02
Surface Soil	Earthen Impoundment - Oil Pits	960	Industrial Worker	1,1,2,2-Tetrachloroethane	Respiratory	1.20E-02	---	---	1.20E-02
Surface Soil	Earthen Impoundment - Oil Pits	1200	Industrial Worker	1,1,2-Trichloroethane	Blood	1.50E-01	---	---	1.50E-01
Surface Soil	Earthen Impoundment - Oil Pits	45	Industrial Worker	1,2-Dibromoethane	Liver/Kidney/Nasal/Testes	2.40E-03	2.10E-06	---	2.40E-03
Surface Soil	Earthen Impoundment - Oil Pits	4300	Industrial Worker	1,2-Dichloroethane	---	---	7.50E-07	---	7.50E-07
Surface Soil	Earthen Impoundment - Oil Pits	1600	Industrial Worker	Benzene	Bone Marrow	2.00E-01	2.20E-05	---	2.00E-01
Surface Soil	Earthen Impoundment - Oil Pits	52	Industrial Worker	Chloroform	Liver/Kidney/CNS/GI tract/Reprod	2.50E-03	2.20E-07	---	2.50E-03
Surface Soil	Earthen Impoundment - Oil Pits	3100	Industrial Worker	Methylene chloride	Liver	2.50E-02	4.30E-07	---	2.50E-02
Surface Soil	Earthen Impoundment - Oil Pits	2700	Industrial Worker	Tetrachloroethene	Liver/Neurological	1.30E-01	4.20E-06	---	1.30E-01
Surface Soil	Earthen Impoundment - Oil Pits	4300	Industrial Worker	Trichloroethene	Liver/Kidney/CNS	7.00E+00	---	---	7.00E+00
Surface Soil	Earthen Impoundment - Oil Pits	16	Industrial Worker	Vinyl chloride	Liver	2.60E-03	6.70E-08	---	2.60E-03
Surface Soil	Earthen Impoundment - Oil Pits	15	Industrial Worker	Benzo(a)anthracene	---	---	---	---	---
Surface Soil	Earthen Impoundment - Oil Pits	5.4	Industrial Worker	Benzo(a)pyrene	---	---	---	---	---
Surface Soil	Earthen Impoundment - Oil Pits	11	Industrial Worker	Benzo(b)fluoranthene	---	---	---	---	---
Surface Soil	Earthen Impoundment - Oil Pits	11	Industrial Worker	bis(2-Chloroethyl)ether	---	---	---	---	---
Surface Soil	Earthen Impoundment - Oil Pits	66	Industrial Worker	Hexachlorobenzene	Liver	4.00E-02	---	5.30E-02	9.40E-02
Surface Soil	Earthen Impoundment - Oil Pits	390	Industrial Worker	Hexachlorobutadiene	Kidney	9.50E-01	---	1.30E+00	2.20E+00
<b>Surface Soil Risk Total =</b>									<b>9.87E+00</b>
Surface Soil	Earthen Impoundment - Oil Pits	960	Construction Worker	1,1,2,2-Tetrachloroethane	Respiratory	9.30E-03	---	---	9.30E-03
Surface Soil	Earthen Impoundment - Oil Pits	4300	Construction Worker	1,2-Dichloroethane	---	---	1.30E-07	---	1.30E-07
Surface Soil	Earthen Impoundment - Oil Pits	4300	Construction Worker	Trichloroethene	Liver/Kidney/CNS	5.60E+00	---	---	5.60E+00
<b>Surface Soil Risk Total =</b>									<b>5.61E+00</b>
Surface Soil	Earthen Impoundment - Oil Pits	4300	Recreational Person	1,2-Dichloroethane	---	---	6.70E-08	---	6.70E-08
Surface Soil	Earthen Impoundment - Oil Pits	5.4	Recreational Person	Benzo(a)pyrene	---	---	---	---	---
Surface Soil	Earthen Impoundment - Oil Pits	66	Recreational Person	Hexachlorobenzene	Liver	9.70E-04	---	4.80E-03	5.80E-03
Surface Water	Earthen impoundment - Sludge Pit	0.587	Recreational Person	Arsenic	Vascular syst.	---	---	5.70E-02	5.70E-02
Surface Water	Earthen impoundment - Sludge Pit	0.015	Recreational Person	Vinyl chloride	Liver	---	---	1.40E-03	1.40E-03
Surface Water	Earthen impoundment - Sludge Pit	0.0018	Recreational Person	Benzo(a)anthracene	---	---	---	---	---
Surface Water	Earthen impoundment - Sludge Pit	0.094	Recreational Person	bis(2-Ethylhexyl)phthalate	Liver	---	---	1.30E+01	1.30E+01
Surface Water	Earthen impoundment - Sludge Pit	0.0022	Recreational Person	Hexachlorobenzene	Liver	---	---	6.90E-02	6.90E-02
Surface Water	Earthen impoundment - Sludge Pit	0.0049	Recreational Person	Pentachlorophenol	Liver/Kidney	---	---	8.30E-04	8.30E-04
<b>Surface Water Risk Total =</b>									<b>1.31E+01</b>
Surface Soil	Laydown Area	0.000189	Industrial Worker	2,3,7,8-TCDD TEQ (Mammal)	---	---	---	---	---
Surface Soil	Laydown Area	49	Industrial Worker	Arsenic	Vascular syst.	8.00E-02	---	3.20E-02	1.10E-01
Surface Soil	Laydown Area	219	Industrial Worker	Total PCBs	Eyes	5.40E+00	---	9.90E+00	1.50E+01
Surface Soil	Laydown Area	11	Industrial Worker	Benzo(a)anthracene	---	---	---	---	---
Surface Soil	Laydown Area	9.5	Industrial Worker	Benzo(a)pyrene	---	---	---	---	---
Surface Soil	Laydown Area	14	Industrial Worker	Benzo(b)fluoranthene	---	---	---	---	---
Surface Soil	Laydown Area	1.5	Industrial Worker	Dibenz(a,h)anthracene	---	---	---	---	---
Surface Soil	Laydown Area	94	Industrial Worker	Hexachlorobenzene	Liver	5.70E-02	---	7.60E-02	1.30E-01
Surface Soil	Laydown Area	310	Industrial Worker	Hexachlorobutadiene	Kidney	7.60E-01	---	1.00E+00	1.80E+00
Surface Soil	Laydown Area	5.3	Industrial Worker	Indeno(1,2,3-cd)pyrene	---	---	---	---	---
<b>Surface Soil Risk Total =</b>									<b>17.04</b>
Surface Soil	Laydown Area	219	Construction Worker	Total PCBs	Eyes	4.20E+00	---	1.80E+00	6.00E+00
Surface Soil	Laydown Area	94	Construction Worker	Hexachlorobenzene	Liver	4.60E-02	---	1.40E-02	5.90E-02
<b>Surface Soil Risk Total =</b>									<b>6.06E+00</b>
Surface Soil	Laydown Area	219	Recreational Person	Total PCBs	Eyes	1.30E-01	---	8.90E-01	1.00E+00
Surface Soil	Laydown Area	9.5	Recreational Person	Benzo(a)pyrene	---	---	---	---	---
Surface Soil	Laydown Area	94	Recreational Person	Hexachlorobenzene	Liver	1.40E-03	---	6.80E-03	8.20E-03



**Table 9. Non-Carcinogenic Exposure Routes  
Baseline Human Health Risk Assessment**

Exposure Point	Exposure Area	Exposure Point Concentration (mg/kg)	Receptor	Chemical of Potential Concern	Primary Target Organs	Non-Cancer Hazard			Exposure Routes Total
						Ingestion	Inhalation	Dermal	
<b>Surface Soil Risk Total =</b>									<b>1.01E+00</b>
Surface Soil	Cemetery	0.0047	Industrial Worker	2,3,7,8-TCDD TEQ (Mammal)	---	---	---	---	---
Surface Soil	Cemetery	7.6	Industrial Worker	Arsenic	Vascular syst.	1.20E-02	---	4.90E-03	1.70E-02
Surface Soil	Cemetery	131	Industrial Worker	Total PCBs	Eyes	3.20E+00	---	5.90E+00	9.10E+00
Surface Soil	Cemetery	68	Industrial Worker	1,2-Dichloroethane	---	---	1.00E-08	---	1.00E-08
Surface Soil	Cemetery	800	Industrial Worker	Benzene	Bone Marrow	9.80E-02	9.80E-06	---	9.80E-02
Surface Soil	Cemetery	39	Industrial Worker	Vinyl chloride	Liver	6.40E-03	1.40E-07	---	6.40E-03
Surface Soil	Cemetery	16	Industrial Worker	Benzo(a)anthracene	---	---	---	---	---
Surface Soil	Cemetery	7.5	Industrial Worker	Benzo(a)pyrene	---	---	---	---	---
Surface Soil	Cemetery	6	Industrial Worker	Benzo(b)fluoranthene	---	---	---	---	---
Surface Soil	Cemetery	2	Industrial Worker	Hexachlorobenzene	Liver	1.20E-03	---	1.60E-03	2.80E-03
Surface Soil	Cemetery	2.9	Industrial Worker	Indeno(1,2,3-cd)pyrene	---	---	---	---	---
Surface Soil	Cemetery	600	Industrial Worker	Naphthalene	Nasal/Weight	1.50E-02	7.30E-05	2.50E-02	4.00E+00
<b>Surface Soil Risk Total =</b>									<b>1.32E+01</b>
Surface Soil	Cemetery	0.0047	Construction Worker	2,3,7,8-TCDD TEQ (Mammal)	---	---	---	---	---
Surface Soil	Cemetery	131	Construction Worker	Total PCBs	Eyes	2.50E+00	---	1.10E+00	3.60E+00
<b>Surface Soil Risk Total =</b>									<b>4.21E+00</b>
Surface Soil	Cemetery	0.0047	Recreational Person	2,3,7,8-TCDD TEQ (Mammal)	---	---	---	---	---
Surface Soil	Cemetery	131	Recreational Person	Total PCBs	Eyes	7.70E-02	---	5.30E-01	6.10E-01
Surface Soil	Cemetery	7.5	Recreational Person	Benzo(a)pyrene	---	---	---	---	---
<b>Subsurface Soil Risk Total =</b>									<b>3.06E+01</b>
Subsurface Soil	Cemetery	370	Industrial Worker	1,2-Dichloroethane	---	---	1.70E-02	---	1.70E-02
Subsurface Soil	Cemetery	1000	Industrial Worker	Benzene	Bone Marrow	---	4.40E+00	---	4.40E+00
Subsurface Soil	Cemetery	2.3	Industrial Worker	Chloroform	Liver/Kidney/CNS/GI tract/Reprod	---	3.20E-03	---	3.20E-03
Subsurface Soil	Cemetery	150	Industrial Worker	Methylene chloride	Liver	---	7.80E-03	---	7.80E-03
Subsurface Soil	Cemetery	2480	Industrial Worker	Total Xylenes	Neurological/Weight	---	1.90E+00	---	1.90E+00
Subsurface Soil	Cemetery	79	Industrial Worker	Tetrachloroethene	Liver/Neurological	---	4.20E-02	---	4.20E-02
Subsurface Soil	Cemetery	350	Industrial Worker	Trichloroethene	---	---	---	---	---
Subsurface Soil	Cemetery	39	Industrial Worker	Vinyl chloride	Liver	---	1.80E-01	---	1.80E-01
Subsurface Soil	Cemetery	9700	Industrial Worker	Naphthalene	Nasal/Weight	---	2.40E+01	---	2.40E+01
<b>Subsurface Soil Risk Total =</b>									<b>1.00E+00</b>
Subsurface Soil	Cemetery	7600	Construction Worker	2-Methylnaphthalene	Heart	7.40E-01	---	2.90E-01	1.00E+00
Subsurface Soil	Cemetery	190	Construction Worker	Benzo(a)anthracene	---	---	---	---	---
Subsurface Soil	Cemetery	62	Construction Worker	Benzo(a)pyrene	---	---	---	---	---
<b>Subsurface Soil Risk Total =</b>									<b>2.61E+00</b>
Subsurface Soil	Cemetery	370	Recreational Person	1,2-Dichloroethane	---	---	1.50E-03	---	1.50E-03
Subsurface Soil	Cemetery	1000	Recreational Person	Benzene	Bone Marrow	---	3.90E-01	---	3.90E-01
Subsurface Soil	Cemetery	350	Recreational Person	Trichloroethene	---	---	---	---	---
Subsurface Soil	Cemetery	39	Recreational Person	Vinyl chloride	Liver	---	1.60E-02	---	1.60E-02
Subsurface Soil	Cemetery	9700	Recreational Person	Naphthalene	Nasal/Weight	---	2.20E+00	---	2.20E+00
<b>Surface Soil Risk Total =</b>									<b>2.61E+00</b>
Surface Soil	Maintenance Pits Area	0.00094587	Industrial Worker	2,3,7,8-TCDD TEQ (Mammal)	---	---	---	---	---
Surface Soil	Maintenance Pits Area	6.86	Industrial Worker	Arsenic	Vascular syst.	1.10E-02	---	4.40E-03	1.60E-02
Surface Soil	Maintenance Pits Area	0.91	Industrial Worker	Aldrin	Liver	1.50E-02	---	2.00E-02	3.40E-02
Surface Soil	Maintenance Pits Area	54.39	Industrial Worker	Total PCBs	Eyes	1.30E+00	---	2.50E+00	3.80E+00
Surface Soil	Maintenance Pits Area	26	Industrial Worker	Benzo(a)anthracene	---	---	---	---	---
Surface Soil	Maintenance Pits Area	12	Industrial Worker	Benzo(a)pyrene	---	---	---	---	---
Surface Soil	Maintenance Pits Area	13	Industrial Worker	Benzo(b)fluoranthene	---	---	---	---	---
Surface Soil	Maintenance Pits Area	1.4	Industrial Worker	Dibenz(a,h)anthracene	---	---	---	---	---

**Table 9. Non-Carcinogenic Exposure Routes  
Baseline Human Health Risk Assessment**

Exposure Point	Exposure Area	Exposure Point Concentration (mg/kg)	Receptor	Chemical of Potential Concern	Primary Target Organs	Non-Cancer Hazard			
						Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Maintenance Pits Area	1.9	Industrial Worker	Hexachlorobenzene	Liver	1.20E-03	---	1.50E-03	2.70E-03
Surface Soil	Maintenance Pits Area	3.8	Industrial Worker	Indeno(1,2,3-cd)pyrene	---	---	---	---	---
<b>Surface Soil Risk Total =</b>						<b>3.8527</b>			
Surface Soil	Maintenance Pits Area	54.39	Construction Worker	Total PCBs	Eyes	1.10E+00	---	4.40E-01	1.50E+00
<b>Surface Soil Risk Total =</b>						<b>1.50E+00</b>			
Surface Soil	Maintenance Pits Area	0.00094587	Recreational Person	2,3,7,8-TCDD TEQ (Mammal)	---	---	---	---	---
Surface Soil	Maintenance Pits Area	54.39	Recreational Person	Total PCBs	Eyes	3.20E-02	---	2.20E-01	2.50E-01
Surface Soil	Maintenance Pits Area	12	Recreational Person	Benzo(a)pyrene	---	---	---	---	---
<b>Surface Soil Risk Total =</b>						<b>2.50E-01</b>			
Subsurface Soil	Maintenance Pits Area	7.7	Industrial Worker	1,2-Dichloroethane	---	---	3.30E-04	---	3.30E-04
Subsurface Soil	Maintenance Pits Area	77	Industrial Worker	Benzene	Bone Marrow	---	3.10E-01	---	3.10E-01
Subsurface Soil	Maintenance Pits Area	63	Industrial Worker	Methylene chloride	Liver	---	3.00E-03	---	3.00E-03
Subsurface Soil	Maintenance Pits Area	2390	Industrial Worker	Total Xylenes	Neurological/Weight	---	1.70E+00	---	1.70E+00
Subsurface Soil	Maintenance Pits Area	58	Industrial Worker	Tetrachloroethene	Liver/Neurological	---	2.90E-02	---	2.90E-02
Subsurface Soil	Maintenance Pits Area	320	Industrial Worker	Trichloroethene	---	---	---	---	---
Subsurface Soil	Maintenance Pits Area	64	Industrial Worker	Hexachlorobenzene	---	---	---	---	---
Subsurface Soil	Maintenance Pits Area	600	Industrial Worker	Hexachlorobutadiene	---	---	---	---	---
Subsurface Soil	Maintenance Pits Area	610	Industrial Worker	Naphthalene	Nasal/Weight	---	1.40E+00	---	1.40E+00
<b>Subsurface Soil Risk Total =</b>						<b>3.44E+00</b>			
Subsurface Soil	Maintenance Pits Area	600	Construction Worker	Hexachlorobutadiene	Kidney	1.20E+00	---	3.50E-01	1.50E+00
<b>Subsurface Soil Risk Total =</b>						<b>1.50E+00</b>			
Subsurface Soil	Maintenance Pits Area	77	Recreational Person	Benzene	Bone Marrow	---	2.80E-02	---	2.80E-02
Subsurface Soil	Maintenance Pits Area	320	Recreational Person	Trichloroethene	---	---	---	---	---
Subsurface Soil	Maintenance Pits Area	64	Recreational Person	Hexachlorobenzene	---	---	---	---	---
Subsurface Soil	Maintenance Pits Area	600	Recreational Person	Hexachlorobutadiene	---	---	---	---	---
<b>Subsurface Soil Risk Total =</b>						<b>2.80E-02</b>			
Subsurface Soil	Tank 800	0.003409	Industrial Worker	2,3,7,8-TCDD TEQ (Mammal)	---	---	---	---	---
Subsurface Soil	Tank 800	7.8	Industrial Worker	Aldrin	---	---	---	---	---
Subsurface Soil	Tank 800	121.89	Industrial Worker	Total PCBs	---	---	---	---	---
Subsurface Soil	Tank 800	55	Industrial Worker	1,2-Dichloroethane	---	---	2.70E-03	---	2.70E-03
Subsurface Soil	Tank 800	190	Industrial Worker	Benzene	Bone Marrow	---	8.70E-01	---	8.70E-01
Subsurface Soil	Tank 800	61	Industrial Worker	Methylene chloride	Liver	---	3.30E-03	---	3.30E-03
Subsurface Soil	Tank 800	1850	Industrial Worker	Total Xylenes	Neurological/Weight	---	1.50E+00	---	1.50E+00
Subsurface Soil	Tank 800	170	Industrial Worker	Tetrachloroethene	Liver/Neurological	---	9.60E-02	---	9.60E-02
Subsurface Soil	Tank 800	510	Industrial Worker	Trichloroethene	---	---	---	---	---
Subsurface Soil	Tank 800	230	Industrial Worker	Hexachlorobenzene	---	---	---	---	---
Subsurface Soil	Tank 800	2200	Industrial Worker	Hexachlorobutadiene	---	---	---	---	---
Subsurface Soil	Tank 800	2700	Industrial Worker	Naphthalene	Nasal/Weight	---	7.10E+00	---	7.10E+00
<b>Subsurface Soil Risk Total =</b>						<b>9.57E+00</b>			
Subsurface Soil	Tank 800	0.003409	Construction Worker	2,3,7,8-TCDD TEQ (Mammal)	---	---	---	---	---
Subsurface Soil	Tank 800	121.89	Construction Worker	Total PCBs	Eyes	2.40E+00	---	9.90E-01	3.40E+00
Subsurface Soil	Tank 800	27	Construction Worker	Benzo(a)pyrene	---	---	---	---	---
Subsurface Soil	Tank 800	230	Construction Worker	Hexachlorobenzene	Liver	1.10E-01	---	3.30E-02	1.40E-01
Subsurface Soil	Tank 800	2200	Construction Worker	Hexachlorobutadiene	Kidney	4.30E+00	---	1.30E+00	5.50E+00
<b>Subsurface Soil Risk Total =</b>						<b>9.04E+00</b>			
Subsurface Soil	Tank 800	121.89	Recreational Person	Total PCBs	---	---	---	---	---
Subsurface Soil	Tank 800	55	Recreational Person	1,2-Dichloroethane	---	---	2.40E-04	---	2.40E-04
Subsurface Soil	Tank 800	190	Recreational Person	Benzene	Bone Marrow	---	7.90E-02	---	7.90E-02
Subsurface Soil	Tank 800	510	Recreational Person	Trichloroethene	---	---	---	---	---

**Table 9. Non-Carcinogenic Exposure Routes  
Baseline Human Health Risk Assessment**

Exposure Point	Exposure Area	Exposure Point Concentration (mg/kg)	Receptor	Chemical of Potential Concern	Primary Target Organs	Non-Cancer Hazard			
						Ingestion	Inhalation	Dermal	Exposure Routes Total
Subsurface Soil	Tank 800	230	Recreational Person	Hexachlorobenzene	---	---	---	---	---
Subsurface Soil	Tank 800	2200	Recreational Person	Hexachlorobutadiene	---	---	---	---	---
Subsurface Soil	Tank 800	2700	Recreational Person	Naphthalene	Nasal/Weight	---	0.64	---	0.64
<b>Subsurface Soil Risk Total =</b>									<b>7.19E-01</b>

Notes:

See Appendix A for Human Health PRG Calculations

mg/kg = Milligrams per kilogram

**Table 10. Ecological Summary  
Baseline Ecological Risk Assessment**

Exposure Point	Contaminant of Concern	NOAEL Based HQ	LOAEL Based HQ	Average HQ	Midpoint LOAEL/NOAEL PRGs (all receptors)	NOAEL Based HQ	LOAEL Based HQ	Average HQ	Midpoint LOAEL/NOAEL PRGs (mobile receptors)
Laydown Area	2,3,7,8-TCDD TEQ (Mammal)	---	---	---	3.19E-05 <sup>6</sup>	1.60E+02	1.60E+01	8.80E+01	<b>2.80E-04<sup>4</sup></b>
Laydown Area	2,3,7,8-TCDD TEQ (Avian)	---	---	---	5.20E-05 <sup>6</sup>	---	---	---	<b>5.20E-05<sup>6</sup></b>
Laydown Area	2-Methylnaphthalene	1.20E+02	2.40E+01	7.20E+01	8.0 <sup>1</sup>	1.20E+02	2.40E+01	7.20E+01	<b>8.1<sup>1</sup></b>
Laydown Area	Hexachlorobenzene	5.90E+00	2.60E+00	4.25E+00	8.0 <sup>2</sup>	2.00E+01	1.00E+01	1.50E+01	<b>9.5<sup>1</sup></b>
Laydown Area	Hexachlorobutadiene	2.20E+02	2.20E+01	1.21E+02	2.5 <sup>3</sup>	2.10E+01	---	---	<b>60<sup>1</sup></b>
Laydown Area	High Molecular Weight PAHs	5.60E+01	1.10E+01	3.35E+01	5 <sup>3</sup>	2.40E+02	9.60E+00	1.25E+02	<b>5.6<sup>1</sup></b>
Laydown Area	Phenanthrene	9.90E+01	2.00E+01	5.95E+01	10.5 <sup>1</sup>	9.90E+01	2.00E+01	5.95E+01	<b>10.5<sup>1</sup></b>
Laydown Area	Total PCBs	4.40E+04	9.80E+03	2.69E+04	0.055 <sup>3</sup>	9.00E+03	1.80E+03	5.40E+03	<b>1.35<sup>1</sup></b>
Oil Pit Area	Hexachlorobutadiene	7.10E+01	7.10E+00	3.91E+01	2.5 <sup>3</sup>	6.80E+00	---	---	<b>725<sup>1</sup></b>
Oil Pit Area	High Molecular Weight PAHs	9.30E+00	1.90E+00	5.60E+00	5.0 <sup>3</sup>	4.00E+01	1.60E+00	2.08E+01	<b>70<sup>1</sup></b>
Cemetery Area	High Molecular Weight PAHs	6.30E+00	1.30E+00	3.80E+00	5.0 <sup>3</sup>	2.70E+01	1.10E+00	1.41E+01	<b>19.2<sup>1</sup></b>
Tank 800 Area	bis(2-Ethylhexyl)phthalate	2.90E+02	1.20E+01	1.51E+02	<b>33<sup>1</sup></b>	2.90E+02	1.20E+01	1.51E+02	33 <sup>1</sup>
Tank 800 Area	Cadmium	6.50E+01	6.50E+00	3.58E+01	<b>1.3<sup>3</sup></b>	8.90E+01	6.40E+00	4.77E+01	9.5 <sup>1</sup>
Tank 800 Area	Chromium	---	---	---	<b>30<sup>5</sup></b>	2.70E+02	5.40E+01	1.62E+02	90 <sup>1</sup>
Tank 800 Area	Copper	1.00E+01	7.90E+00	8.95E+00	<b>115<sup>3</sup></b>	1.60E+00	1.20E+00	1.40E+00	4,100 <sup>1</sup>
Tank 800 Area	High Molecular Weight PAHs	1.10E+01	2.20E+00	6.60E+00	<b>5<sup>3</sup></b>	4.80E+01	1.90E+00	2.50E+01	14 <sup>1</sup>
Tank 800 Area	Nickel	2.00E+01	4.10E+00	1.21E+01	<b>10.5<sup>3</sup></b>	7.30E-01	5.30E-01	6.30E-01	2,700 <sup>1</sup>
Tank 800 Area	Zinc	---	---	---	<b>30<sup>5</sup></b>	---	---	---	30 <sup>5</sup>

***Bold-italicized values are considered the default PRGs for to surface soils from 0 - 6 inches below ground surface. Portions of the Tank 800 Area that will not be covered by either the Subtitle C Landfill or by a minimum of 6 inches of soil will be subject to ecological PRGs for all receptors. Otherwise, ecological PRGs for mobile receptors apply.***

<sup>1</sup> Red-winged Blackbird

<sup>2</sup> Deer Mouse

<sup>3</sup> Least Shrew

<sup>4</sup> Raccoon

<sup>5</sup> State Background

<sup>6</sup> Borrow Pit Background

**Table 11. Occurrence, Distribution, and Selection of Chemicals of Concern  
Baseline Ecological Risk Assessment**

Exposure Medium: Soil									
Chemical of Potential Concern	Area of Concern	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	95% UCL of the Mean (mg/kg)	Background Concentration (mg/kg)	Screening Toxicity Value (mg/kg) Invertebrate/Plant	Screening Toxicity Value Source Invertebrate/Plant	HQ Value Invertebrate/Plant	COC Flag (Y or N)
2,3,7,8-TCDD TEQ (Mammal)	Laydown Area	1.89E-04	1.89E-04	1.89E-04	NV	NA	NA	NA	NA
2,3,7,8-TCDD TEQ (Avian)	Laydown Area	1.77E-04	1.77E-04	1.77E-04	NV	NA	NA	NA	NA
2-Methylnaphthalene	Laydown Area	7.20E-03	1.30E+02	3.59E+03	NV	3.24 / NV	EPA Region 5 / NA	4.01E+01 / NA	Y
Hexachlorobenzene	Laydown Area	3.10E-03	9.40E+01	3.25E+01	NV	0.199 / NV	EPA Region 5 / NA	4.72E+02 / NA	Y
Hexachlorobutadiene	Laydown Area	2.00E-03	2.90E+02	1.44E+07	NV	0.0398 / NV	EPA Region 5 / NA	7.29E+03 / NA	Y
High Molecular Weight PAHs	Laydown Area	1.26E-02	1.60E+02	1.57E+03	NV	25 / 1.2	EPA Region 6 / EPA Region 6	6.40E+00 / 1.33E+02	Y
Phenanthrene	Laydown Area	3.40E-03	1.40E+02	3.14E+03	NV	45.7 / NV	EPA Region 5 / NA	3.06E+00 / NA	Y
Total PCBs	Laydown Area	6.00E-03	2.19E+02	5.92E+01	NV	NV / 40	NA / TCEQ 2005	NA / 5.48E+00	Y
Hexachlorobutadiene	Oil Pit Area	9.30E+01	9.30E+01	9.30E+01	NV	0.0398 / NV	EPA Region 5 / NA	2.34E+03 / NA	Y
High Molecular Weight PAHs	Oil Pit Area	2.65E+01	2.65E+01	2.65E+01	NV	25 / 1.2	EPA Region 6 / EPA Region 6	1.06E+00 / 2.21E+01	Y
High Molecular Weight PAHs	Cemetery Area	2.25E-01	1.79E+01	2.09E+01	NV	25 / 1.2	EPA Region 6 / EPA Region 6	7.16E-01 / 1.49E+01	Y
bis(2-Ethylhexyl)phthalate	Tank 800 Area	2.40E-01	4.40E+02	1.13E+05	NV	0.925 / NV	EPA Region 5 / NA	4.76E+02 / NA	Y
Cadmium	Tank 800 Area	1.40E-01	2.78E+01	2.60E+02	NV	140 / 32	TCEQ 2005 / TCEQ 2005	1.99E-01 / 8.69E-01	N
Chromium	Tank 800 Area	1.16E+01	1.34E+03	2.14E+03	30	0.4 / 1	TCEQ 2005 / TCEQ 2005	3.35E+93 / 1.34E+03	Y
Copper	Tank 800 Area	5.80E+00	5.42E+02	5.92E+02	15	61 / 100	TCEQ 2005 / TCEQ 2005	8.89E+00 / 5.42E+00	Y
High Molecular Weight PAHs	Tank 800 Area	1.63E-01	3.17E+01	1.03E+02	NV	25 / 1.2	EPA Region 6 / EPA Region 6	1.27E+00 / 2.64E+01	Y
Nickel	Tank 800 Area	6.00E+00	1.37E+02	1.27E+02	10	200 / 30	TCEQ 2005 / TCEQ 2005	6.85E-01 / 4.57E+00	Y
Zinc	Tank 800 Area	2.78E+01	1.54E+03	2.75E+03	30	120 / 190	TCEQ 2005 / TCEQ 2005	1.28E+01 / 8.11E+00	Y

Notes:

mg/kg = milligrams per kilogram

Hazard Quotient (HQ) = Maximum Concentration/Screening Toxicity Value.

**Table 12. Summary of Remedial Investigation and Risk Assessment Results**

<b>Site Area/Media</b>	<b>RI Conclusions</b>	<b>BHHRA Conclusions</b>	<b>BERA Conclusions</b>	<b>Remedial Action Objectives</b>	<b>Remedial Alternative Component</b>
Sludge	Primary sources of contamination are Earthen Impoundment (Sludge Pit and Oil Pit), Unit 100 API Separator, sludge and oils in Unit 1200 API Separator, and aboveground tanks.	Source material not evaluated; overlying surface water in Sludge Pit and soil in Oil Pit estimated to present risk to human health.	Source material not evaluated; overlying soil in Oil Pit estimated to present risk to ecological receptors.	<ol style="list-style-type: none"> <li>1. Prevent potential direct contact/inhalation by nature conservancy workers</li> <li>2. Prevent release to surface soils and sediments above human and ecological risk values</li> <li>3. Prevent migration to ground water</li> <li>4. Prevent release to surface water</li> </ol>	Solidification and consolidation in engineered containment area
Ground water	Ground water does not meet TCEQ criteria for potable water. Impacted ground water is localized in few areas within the Site boundaries	Estimated not to present unacceptable risk to human health	Not evaluated; incomplete pathway	<ol style="list-style-type: none"> <li>1. Prevent migration to Site boundaries in concentrations exceeding Texas Class 3 ground water Protective Concentration Levels.</li> </ol>	No action with monitoring
Surface soils	Impacted soil limited to Laydown Area, Cemetery Area, Tank 800 Area, and Oil Pit	Laydown Area, Cemetery Area, and Oil Pit estimated to present a risk to human health	Laydown Area, Cemetery Area, Tank 800, and Oil Pit estimated to present risk to ecological receptors	<ol style="list-style-type: none"> <li>1. Prevent ingestion/direct contact/inhalation by nature conservancy workers</li> <li>2. Prevent migration to ground water and surface water</li> <li>3. Prevent potential ingestion by ecological receptors</li> <li>4. Prevent potential ingestion by avian and mammalian receptors of soil invertebrates, terrestrial plants, and/or other prey that have accumulated COPCs from soil.</li> </ol>	Consolidation in engineered containment area
Subsurface soils	Impacted subsurface soils limited to Cemetery Area, Maintenance Area-Pits, Maintenance Area-900, and Tank 800 Area	Cemetery Area and Tank 800 estimated to present risk to human health	Not evaluated; incomplete pathway	<ol style="list-style-type: none"> <li>1. Prevent inhalation by nature conservancy workers</li> </ol>	Consolidation in engineered containment area
Freshwater Pond sediments and surface water		Estimated not to present unacceptable risk to human health	Estimated not to present unacceptable risk to ecological receptors	None	None
Drainage Ditch sediments and surface water		Not evaluated since contact recreation not a complete exposure pathway for recreational user	Estimated not to present unacceptable risk to ecological receptors	None	None
Marsh Area sediments and surface water		Estimated not to present unacceptable risk to human health	Estimated not to present unacceptable risk to ecological receptors	None	None

**Table 13. Comparative Evaluation of Alternatives**

Criteria	Alternative 1 No Action	Alternative 2 Engineered Containment of Unsolidified Sludges and RCRA Subtitle C Containment of Soils	Alternative 3 Engineered Containment of Solidified Sludges and RCRA Subtitle C Containment of Soils	Alternative 4 RCRA Subtitle C Containment of Solidified Sludges and Untreated Soils	Alternative 5 Slurry-Phase Bioremediation of Sludges and RCRA Subtitle C Containment of Treated Sludges and Untreated Soils
<b>Remedy Description</b>	No direct action would be taken; required by NCP	<ol style="list-style-type: none"> <li>1. Injection well disposal of water contained in tanks, separators, and Sludge Pit</li> <li>2. Construct Sludge Pit improvements to include subsurface barrier wall, ground water gradient recovery system, and enlarged perimeter berms</li> <li>3. Consolidate sludges in Sludge Pit and construct RCRA Subtitle C cap supported by solidified bridge cap</li> <li>4. Consolidate affected soils/debris in aboveground RCRA Subtitle C equivalent cell</li> <li>5. No action (with monitoring) for ground water</li> <li>6. Institutional controls</li> </ol>	<ol style="list-style-type: none"> <li>1. Injection well disposal of water contained in tanks, separators, and Sludge Pit</li> <li>2. Construct Sludge Pit improvements to include subsurface barrier wall, ground water gradient recovery system, and enlarged perimeter berms</li> <li>3. Consolidate/solidify sludges in Sludge Pit and construct RCRA Subtitle C cap</li> <li>4. Consolidate excess solidified sludge/affected soils/debris in aboveground RCRA Subtitle C equivalent cell</li> <li>5. No action (with monitoring) for ground water</li> <li>6. Institutional controls</li> </ol>	<ol style="list-style-type: none"> <li>1. Injection well disposal of water contained in tanks, separators, and Sludge Pit</li> <li>2. Construct Sludge Pit improvements to include subsurface barrier wall and enlarged perimeter berms</li> <li>3. Solidify sludges and consolidate solidified sludges/affected soils/debris in aboveground RCRA Subtitle C equivalent cell</li> <li>4. No action (with monitoring) for ground water</li> <li>5. Institutional controls</li> </ol>	<ol style="list-style-type: none"> <li>1. Injection well disposal of water contained in tanks, separators, and Sludge Pit</li> <li>2. Construct Sludge Pit improvements to include subsurface barrier wall and enlarged perimeter berms</li> <li>3. Slurry-phase bioremediation of consolidated sludges within Sludge Pit</li> <li>4. Consolidate solidified sludge residuals and affected soils in aboveground RCRA Subtitle C equivalent cell</li> <li>5. No action (with monitoring) for ground water</li> <li>6. Institutional controls</li> </ol>
<b>Overall Protection of Human Health and the Environment</b>	Provides no additional short- or long-term protection of human health and the environment. No risk above that currently existing at site is associated with implementation of this alternative.	Alternative reduces mobility of COPCs from sludge and impacted soils; removes potential for direct contact, ingestion, or inhalation from affected media; and removes potential for runoff to sediments, unimpacted soils, and surface water. Alternative is estimated to take 36 months to implement; technology and personnel are readily available.	Alternative reduces mobility of COPCs from sludge and impacted soils; removes potential for direct contact, ingestion, or inhalation from affected media; and removes potential for runoff to sediments, unimpacted soils, and surface water. Alternative is estimated to take 42 months to implement; technology and personnel are readily available.	Alternative reduces mobility of COPCs from sludge and impacted soils; removes potential for direct contact, ingestion, or inhalation from affected media; and removes potential for runoff to sediments, unimpacted soils, and surface water. Alternative is estimated to take 48 months to implement; technology and personnel are readily available.	Alternative reduces toxicity, mobility, and volume of COPCs from sludge, and reduces mobility of COPCs from impacted soils. Alternative is estimated to take 72 months to implement. Treatability study to evaluate the effectiveness and implementability of alternative has not been conducted.
<b>Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)</b>	Not compliant with floodplain protection ARAR since sludge is exposed.	Alternative 2 does not meet requirements of 40 CFR 264.228 since free liquids will not be eliminated by solidifying sludges through entire depth of Sludge Pit. Compliance with other ARARs is similar for alternatives.	Compliance with ARARs listed in Table 3 through Table 5 is similar for alternatives.	Compliance with ARARs listed in Table 3 through Table 5 is similar for alternatives.	Compliance with ARARs listed in Table 3 through Table 5 is similar for alternatives.

**Table 13. Comparative Evaluation of Alternatives**

Criteria	Alternative 1 No Action	Alternative 2 Engineered Containment of Unsolidified Sludges and RCRA Subtitle C Containment of Soils	Alternative 3 Engineered Containment of Solidified Sludges and RCRA Subtitle C Containment of Soils	Alternative 4 RCRA Subtitle C Containment of Solidified Sludges and Untreated Soils	Alternative 5 Slurry-Phase Bioremediation of Sludges and RCRA Subtitle C Containment of Treated Sludges and Untreated Soils
<b>Long-Term Effectiveness and Permanence</b>	Long-term effectiveness and permanence cannot be evaluated. Remedy relies on maintenance of <i>status quo</i> that could be altered with change in site conditions.	Adequacy and reliability of RCRA Subtitle C equivalent cell for soils is equivalent in Alternatives 2 and 3. Potential risk to long-term effectiveness is settlement/collapse of bridge cap with subsequent failure of RCRA Subtitle C cap and release of sludge.	Adequacy and reliability of RCRA Subtitle C equivalent cell for soils is equivalent in Alternatives 2 and 3. Solidified sludge remains in Sludge Pit potentially reducing permanence of remedy.	Adequacy and reliability of RCRA Subtitle C equivalent cell for soils and solidified sludge is well documented.	Adequacy and reliability of RCRA Subtitle C equivalent cell for soils and treated sludge residuals is well documented.
<b>Reduction of Contaminant Toxicity, Mobility, or Volume</b>	Does not provide for reduction in contaminant toxicity, mobility, or volume. Tank contents, sludge, and affected soils would remain on site without containment or treatment.	Alternative relies primarily on engineered containment to reduce mobility of COPCs in sludge. Layer of solidified sludge provides a bridge cap to support RCRA Subtitle C cap; unsolidified sludge remains in paleochannel. Alternative relies primarily on RCRA Subtitle C equivalent cell to reduce mobility of COPCs in soil.	Alternative relies primarily on engineered containment and solidification of sludges to reduce mobility of COPCs in sludge. Sludge is solidified through depth of the Sludge Pit; solidified sludge remains in paleochannel. Alternative relies primarily on aboveground engineered containment area to reduce mobility of COPCs in soil.	Alternative relies primarily on RCRA Subtitle C equivalent cell to reduce mobility of COPCs in sludge and soils. Mobility is also reduced by solidification of sludges.	Toxicity, mobility, and volume of sludge are reduced by bioremediation. Alternative relies primarily on RCRA Subtitle C equivalent cell to reduce mobility of COPCs in soils and treated sludge residuals.
<b>Short-Term Effectiveness</b>	Has minimal short-term impact since no direct remedial construction activities would occur and no incremental risk to workers, community, and environment would accrue.	Estimated that alternative can be implemented and completed within 36 months. In situ solidification presents minimal exposure to community unless uncontrolled temperature reactions increase volatile emissions. Additional exposures are minimized since sludge is not removed from Sludge Pit during implementation.	Estimated that alternative can be implemented and completed within 42 months. In situ solidification presents minimal exposure to community unless uncontrolled temperature reactions increase volatile emissions. Additional exposures are minimized since sludge is not removed from Sludge Pit during implementation.	Estimated that alternative can be implemented and completed within 48 months. Removal of sludge after solidification may present a slightly greater potential for exposure to remediation workers and community during implementation, but can be managed through engineering controls.	Estimated that alternative can be implemented and completed within 72 months. Properly operated slurry phase bioremediation process has minimal risks to community and environment. However, due to length of time to implement remedy, exposed sludge remains at Site for a longer period.
<b>Implementability</b>	Easily implementable as it involves no direct construction activity.	Barrier walls, ground water recovery systems, solidification, and RCRA Subtitle C caps and cells are readily available technologies. Contractors and pozzolanic reagents are readily available.	Barrier walls, ground water recovery systems, solidification, and RCRA Subtitle C caps and cells are readily available technologies. Contractors and pozzolanic reagents are readily available.	Solidification and RCRA Subtitle C equivalent cells are readily available technologies. Contractors and pozzolanic reagents are readily available.	Requires construction and operation of a slurry-phase bioremediation system. System would require additional treatability and pilot studies prior to implementation as well as additional design effort.



Table 14. Alternatives for Each Medium

Medium	Treatment Technology	Comments	Alternative 1 No Action	Alternative 2 Engineered Containment of Unsolidified Sludges and RCRA Subtitle C Containment Soils	Alternative 3 Engineered Containment of Solidified Sludges and RCRA Subtitle C Containment of Soils	Alternative 4 RCRA Subtitle C Containment of Solidified Sludges and Untreated Soils	Alternative 5 Slurry-Phase Bioremediation of Sludges and RCRA Subtitle C Containment of Treated Sludges and Untreated Soils
Sludge	Excavation	Visible sludges underlying soil to PRGs		X (Outside Sludge Pit)	X (Outside Sludge Pit)	X	X
	Disposal/RCRA Subtitle C Cap	On-site in ground		X	X		
	RCRA Subtitle C equivalent cell	On-site above ground				X	X (Residuals)
	Disposal	Off-site					
	Containment Treatment	Solidification Bioremediation		X (Bridge only)	X	X	X (Residuals) X
Soil	Excavation	Soil above 10 <sup>-4</sup> Risk or with potential to leach		X	X	X	X
	RCRA Subtitle C equivalent cell	On-site above ground		X	X	X	X
Ground Water	No Action with Monitoring	All monitoring wells per schedule		X	X	X	X
	Barrier Wall	Groundwater infiltration				X	X
	Barrier Wall	All water above 10 <sup>-5</sup> Risk		X	X		X
	Collection with deep well injection	All water above 10 <sup>-4</sup> Risk		X	X		X

**Table 15. Contaminants of Concern - Ground Water**

<b>Contaminants of Concern</b>	<b>Remediation Levels<sup>1</sup> (mg/L)</b>
<b>Metals<sup>2</sup></b>	
Aluminum	7.3E+03
Arsenic	1.0E+00
Cadmium	5.0E-01
Mercury	2.0E-01
Selenium	5.0E+00
Silver	3.7E+01
Zinc	2.2E+03
<b>Volatile Organic Compounds</b>	
1,1,2-Trichloroethane	5.0E-01
1,2-Dichloroethane	5.0E-01
cis-1,2-Dichloroethylene	7.0E+00
trans-1,2-Dichloroethylene	1.0E+01
Benzene	5.0E-01
Methylene chloride (Chloromethane)	1.6E+01
Trichloroethene	5.0E-01
Vinyl chloride	2.0E-01
<b>Semivolatile Organic Compounds</b>	
Naphthalene	1.5E+02
<sup>1</sup> Based on Texas Commission on Environmental Quality Class 3 Groundwater Protective Concentration Levels (PCLs), Commercial/Industrial, March 25, 2009 <sup>2</sup> Metals concentrations should also consider background levels mg/L - milligram(s) per liter	

**Table 16.A ARARs and TBCs (Location-Specific)**

ARAR / TBC	Regulatory Citation	Description
<b>Floodplain and Wetlands Protection</b>		
Section 404(b)(1) Guidelines for the Specification of Disposal Sites for Dredged or Fill Material	40 CFR 230	Designates procedures for the protection of wetlands including the evaluation of sites and the issuance of General Permits. Portions of the MSC Superfund Site and the Marsh Area adjacent to the Site contain wetlands.
Location Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities	40 CFR 264.18	A facility located in a 100-year floodplain must be designed, constructed, operated, and maintained to prevent washout of any hazardous waste by a 100-year flood. Standard would serve as an ARAR for treatment units. Surface water run on/run off control would be maintained for the Site but non-treatment areas would not be protected from 100-year flood. The MSC Superfund Site is located within a floodplain
<b>Protected Species</b>		
Endangered and Threatened Wildlife and Plants	50 CFR 17	Identifies those species of wildlife and plants determined to be endangered or threatened with extinction and also carry over the species and subspecies of wildlife designated as endangered under the Endangered Species Conservation Act of 1969. Statute requires that proposed actions minimize effects on endangered species. One protected bird species potentially exists on-site.
Threatened and Endangered Nongame Species	31 TAC 65.175 and 65.176	Provides lists of threatened and endangered species.
<b>Surface Water</b>		
Texas Surface Water Quality Standards (Site-Specific Uses and Criteria)	30 TAC 307.7 and Appendix A	Sets surface water quality standards for Segment 2439 (Lower Galveston Bay).
<b>Cemeteries</b>		
Cemeteries and Crematories	Texas Health and Safety Code Chapter 711	Describes requirements for removal of remains, for an unknown or abandoned cemetery, rights for access to cemetery, and historic cemeteries. The Campbell Bayou Cemetery is located within the boundaries of the MSC Superfund Site.

**Table 16.A ARARs and TBCs (Location-Specific)**

<b>ARAR / TBC</b>	<b>Regulatory Citation</b>	<b>Description</b>
Historic Preservation Act (HPA)	40 CFR Part 800	Requires Federal agencies to take into account the effects of their undertakings on historic properties.

Notes:

ARAR – Applicable or relevant and appropriate requirements

CFR – Code of Federal Regulations

HPA – Historic Preservation Act

MSC – Malone Service Company

TAC – Texas Administrative Code

State regulations are not included in this table if they are referencing Federal regulations.

**Table 16.B ARARs and TBCs (Chemical-Specific)**

ARAR / TBC	Regulatory Citation	Description
<b>Waste</b>		
Identification and Listing of Hazardous Waste	40 CFR 261.1 to 40 CFR 261.38	Defines a hazardous waste as exhibiting the characteristics of hazardous wastes, is a mixture of a solid waste and hazardous waste, or is a listed hazardous waste.
<b>Air</b>		
National Primary and Secondary Ambient Air Quality Standards (NAAQS)	40 CFR 50.4, 50.6, 50.8, 50.9, 50.11, 50.12	NAAQS define levels of air quality to protect the public health or the public welfare from any known or anticipated adverse effects of a federally regulated pollutant. NAAQS are promulgated for sulfur dioxide, particulate matter (PM <sub>10</sub> and PM <sub>2.5</sub> ), nitrogen dioxide, carbon monoxide, ozone, and lead. Sulfur dioxide, nitrogen dioxide, and carbon monoxide apply only to incineration and not to other process options.
General Air Quality	30 TAC 101.4	Prohibits discharge from any source air contaminants in such concentration and of such duration that may be injurious to or to adversely affect human health or welfare, animal life, vegetation, or property, or as to interfere with the normal use and enjoyment of animal life, vegetation, or property.
<b>Risk-based Criteria</b>		
Texas Surface Water Quality Standards (Site-Specific Uses and Criteria)	30 TAC 307.6, Table 1 and Table 3	Serves as an ARAR to the extent that surface water remains on-site within the Sludge Pit.
PCDD/PCDF PCL	30 TAC 350.76(e) (3)	Sets critical soil PCL for 2,3,7,8-TCDD of 0.001 mg/kg for residential use and 0.005 mg/kg for commercial/industrial use.
PCDD/PDCF	2007 EPA Region 6 Human Health Medium Specific Screening Level	The 2,3,7,8-TCDD Human Health Medium Specific Screening Level for an outdoor industrial worker is 0.0000177 mg/kg.

Notes:

ARAR – Applicable or relevant and appropriate requirements

CFR – Code of Federal Regulations

TAC – Texas Administrative Code

State regulations are not included in this table if they are referencing Federal regulations.

**Table 16.C ARARs and TBCs (Action-Specific)**

ARAR / TBC	Regulatory Citation	Description
<b>General Remediation</b>		
Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities: Applicability	40 CFR 264.1(j)	Describes general facility requirements, preparedness and contingency requirements for remediation waste management sites that can be used in lieu of 40 CFR 261 Subparts B, C, and D and 40 CFR 265.101.
Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities: Subpart F: Releases from Solid Waste Management Units	40 CFR 264.92 - 264.95	Provides requirements for monitoring and responding to releases from Solid Waste Management Units.
Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities: Subpart F: Releases from Solid Waste Management Units	40 CFR 264.97	Provides general ground water monitoring requirements for releases from Solid Waste Management Units.
Worker Health and Safety for Remedial Action	40 CFR 300.150	Response actions under the NCP would comply with the provisions for response action worker safety and health in 29 CFR 1910.120.
Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution, in Commerce and Use Prohibitions	40 CFR 761.61	Provides cleanup and disposal options for PCB remediation waste.
Facilities (Emissions and Distance Limitations)	30 TAC 106.262	Specifies distance limitations for emission points from off-plant receptors.
Permits by Rule (Remediation)	30 TAC 106.533	Provides conditions permitting by rule for equipment used to extract, handle, process, condition, reclaim, or destroy contaminants for the purpose of remediation.
Texas Surface Water Quality Standards (General Criteria)	30 TAC 307.4	Lists general criteria applicable to surface waters of the State for aesthetics, toxicity, nutrients, salinity, aquatic life uses and habitat.
Texas Surface Water Quality Standards (Toxic Materials)	30 TAC 307.6	Designates that waters of the State shall not be acutely toxic, chronically toxic to aquatic life, or be toxic to humans. Lists numerical criteria for aquatic life protection and human health

**Table 16.C ARARs and TBCs (Action-Specific)**

ARAR / TBC	Regulatory Citation	Description
		protection Designates that concentrations of toxic materials for which no numerical criteria have been established must not exceed LC <sub>50</sub> values.
Spill Prevention and Control	30 TAC Chapter 327	Defines reportable quantities in the event of a spill or release to environment, notification requirements, and actions required.
<b>Thermal Treatment</b>		
National Emissions Standards for Hazardous Air Pollutants (NESHAPs)	40 CFR 61	Lists requirements for emission of hazardous air pollutants during incineration (stationary sources).
NESHAPS for Hazardous Waste Combustors	40 CFR 63 Subpart EEE	Provides standards for emissions for PCDDs/PCDFs, mercury, lead, cadmium, arsenic, beryllium, chromium, carbon monoxide, hydrocarbons, hydrochloric acid, chlorine gas, particulate matter and requirements for destruction and removal efficiency for incinerators.
Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities: Subpart O: Incinerators	40 CFR 264.340 to 40 CFR 264.343	References 40 CFR 63 Subpart EEE and provides requirements for waste analysis and performance standards for treatment.
Land Disposal Restrictions (LDRs)	40 CFR 268, 40 CFR 268.4 and Subpart D (Treatment Standards)	Off-site shipments of hazardous wastes are restricted from land disposal without meeting treatment standards. Off-site shipments must contain a notice that wastes are restricted from land disposal without treatment. Treatment on-site within a thermal desorption unit and subsequent placement in a cell are restricted from land disposal without meeting treatment standards.
Incineration	30 TAC 111.121 - 111.129	Provides standards for the emissions from single-, dual-, and multiple chamber incinerators.
Control of Sulfur Dioxide – Net Ground Level Concentrations	30 TAC 112.3(b)	Specifically limits sulfur dioxide emissions from any source in Galveston County downwind at the property boundary (minus upwind concentrations) to 0.28 ppmw averaged over any 30-minute period.

**Table 16.C ARARs and TBCs (Action-Specific)**

<b>ARAR / TBC</b>	<b>Regulatory Citation</b>	<b>Description</b>
Vent Gas Control	30 TAC 115.121(a)(1) and 30 TAC 115.122(a)	Establishes the requirements for vent gas control and control requirements.
Industrial, Commercial, and Institutional Combustion Sources in Ozone Nonattainment Areas	30 TAC 117.201 - 117.223	Applies to combustion units located within Galveston County.
<b>Bioremediation</b>		
Industrial Wastewater	30 TAC 115.142	Establishes control requirements for VOCs in industrial wastewater treatment units. Exempts properly operated biotreatment units from requirements to reduce VOC content of wastewater by 90%.
<b>Underground Injection</b>		
Underground Injection Control Program	40 CFR 144	Provides minimum requirements for Class 1 injection wells.
Underground Injection Control Program: Criteria and Standards	40 CFR 146, Subparts A and B	Provides operating, monitoring, and reporting requirements for Class I injection wells. Includes requirements for plugging and abandoning Class 1 injection wells.
Hazardous Waste Injection Restrictions	40 CFR 148	Identifies wastes that are restricted from disposal into Class I wells and defines those circumstances under which a waste, otherwise prohibited from injection, may be injected.
Underground Injection Control; Standards for Class I Wells Other than Salt Cavern Solid Waste Disposal Wells	30 TAC 331.64(d)	Requires mechanical integrity testing of Class I injection wells.
<b>Landfills</b>		
Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities: Subpart K: Surface Impoundments	40 CFR 264.228	States requirements for closure of surface impoundments including the elimination of free liquids by removing liquid wastes or solidifying the remaining wastes and waste residues and stabilizing the remaining wastes to a bearing capacity sufficient to support final cover. Final cover requirements are also outlined.
Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities: Subpart N: Landfills	40 CFR 264.300 through 40 CFR 264.310	States requirements for liner system and exemptions for liner requirements; States requirements for surveying location, and monitoring and inspection of hazardous waste landfills. Only applies to alternatives that trigger LDRs (or placement).



**Table 16.C ARARs and TBCs (Action-Specific)**

<b>ARAR / TBC</b>	<b>Regulatory Citation</b>	<b>Description</b>
Deed Recordation of Waste Disposal	30 TAC 335.5	Requires deed recordation of portion or portions of the tract of land on which disposal of industrial solid waste or municipal hazardous waste occurs.
<b>Off-site Disposal</b>		
Criteria for Identifying the Characteristics of Hazardous Waste and for Listing Hazardous Waste	40 CFR 261.10 to 40 CFR 261.11	Provides the criteria for identifying a characteristic or listed waste.
Characteristics of Hazardous Waste	40 CFR 261.20 to 40 CFR 261.24	Solid waste is a hazardous waste if it exhibits any of the characteristics of ignitability, corrosivity, reactivity, and toxicity.
Waste Classification	30 TAC 335.505 to 30 TAC 335.508	Provides a procedure for implementation of Texas waste notification system and establishes standards for classification of industrial solid waste managed in Texas, including Class 1, Class 2 and Class 3 wastes.
Procedures for Planning and Implementing Off-Site Response Actions	40 CFR 300.440	Hazardous wastes generated from CERCLA cleanups must go to RCRA-permitted treatment, storage and disposal facilities that are in compliance with RCRA and State rules and that do not have releases to the environment.
Standards Applicable to Generators of Hazardous Waste: The Manifest	40 CFR 262 Subpart B	Provides requirements for the use of the manifest system.
Standards Applicable to Generators of Hazardous Waste: Pre-Transport Requirements	40 CFR 262 Subpart C	Provides requirements for pre-transport packaging, labeling, marking, placarding, and accumulation time limits.
Department of Transportation (DOT); Hazardous Materials Regulations	49 CFR 171 - 177	Packaging and pre-transport regulations that apply to persons that cause hazardous materials to be transported.
<b>Ground Water Management</b>		
Technical Requirements--Standards for Capping and Plugging of Wells and Plugging Wells that Penetrate Undesirable Water or Constituent Zones	Texas Administrative Code 76.1004	Describes standards for capping and plugging of wells and plugging wells that penetrate undesirable water or constituent zones.
<b>Water Discharge</b>		
National Pollutant Discharge Elimination System Conditions Applicable to All Permits	40 CFR 122.41	Provides conditions that must be incorporated into NPDES permits. Relevant and appropriate to discharge of water from the Site.

**Table 16.C ARARs and TBCs (Action-Specific)**

ARAR / TBC	Regulatory Citation	Description
National Pollutant Discharge Elimination System Establishing Limitations, Standards and Permit Conditions	40 CFR 122.44	Provides conditions that must be incorporated into NPDES permits. Relevant and appropriate to discharge of water from the Site.
Effluent Guidelines and Standards – Landfills Point Source Category	40 CFR 445	Provides for discharge of wastewater from landfills subject to provisions of 40 CFR 264 Subpart N and 40 CFR 265 Subpart N.
Texas Hazardous Metals Discharge Limits	30 TAC 319.22	Sets numerical limitations on discharge of hazardous metals to inland or tidal waters.
General Permit to Discharge Wastes	TXR050000	Describes effluent limitations for industrial facilities that discharge storm water associated with industrial activity.

Notes:

ARAR – Applicable or relevant and appropriate requirements

CFR – Code of Federal Regulations

TAC – Texas Administrative Code

State regulations are not included in this table if they are referencing Federal regulations.

**Table 17. Costs of Alternatives**

	<b>Alternative 1 No Action</b>	<b>Alternative 2 Engineered Containment of Unsolidified Sludges and RCRA Subtitle C Containment of Soils</b>	<b>Alternative 3 Engineered Containment of Solidified Sludges and RCRA Subtitle C Containment of Soils</b>	<b>Alternative 4 RCRA Subtitle C Containment of Solidified Sludges and Untreated Soils</b>	<b>Alternative 5 Slurry-Phase Bioremediation of Sludges and RCRA Subtitle C Containment of Treated Sludges and Untreated Soils</b>
<b>Capital Cost</b>	No capital costs associated with this alternative.	\$24,900,000	\$35,400,000	\$52,900,000	\$82,600,000
<b>O&amp;M Cost (Present Worth)</b>	No O&M costs associated with this alternative.	\$6,300,000	\$6,400,000	\$3,500,000	\$3,200,000
<b>Total Cost</b>	Not Applicable	\$31,200,000	\$41,800,000	\$56,400,000	\$85,800,000

**Table 18 – Remedial Alternative 4 Cost Summary (4.5% Discount Factor)**

<b>CONSTRUCTION CAPITAL COSTS</b>	
<b>Phase 1: Pre-Construction/Tank Demolition/Tank Contents Management</b>	
Plan Preparation and Submittals	\$90,900
Mobilization/Demobilization and Construct Project Facilities/Utilities	\$427,600
Transfer Tank Water to Deep Well	\$43,850
Transfer Tanks Sludges to Sludge Pit	\$97,000
Tank/Piping Demolition	\$160,000
Hauling Scrap Metal to Precessor	\$40,000
Asbestos Abatement for Tank/Piping	\$297,167
Lead Paint Abatement Surcharge	\$10,000
Temporarily Relocate Cemetery Monuments	\$51,970
Road Improvement	\$147,360
<b>Phase 2: Excavate and Consolidate Soils and Sludges</b>	
Mobilization/Demobilization	\$46,920
Construct Slurry Wall around Sludge Pit	\$705,312
Construction RCRA Subtitle C Cell	\$11,523,280
Improve Perimeter Berm System for the Sludge Pit	\$233,902
Excavate and Transfer Sludges to Solidification Area	\$2,497,400
Solidify Sludges	\$15,090,038
Excavate, Transfer and Place Treated Sludges	\$1,991,526
Rework Sludges to Meet Performance Standards	\$690,975
Excavate, Transfer, and Place Affected Soil, Concrete Rubble	\$834,820
Backfill Excavated Areas with Clean Backfill to Ground Surface	\$1,744,200
<b>Phase 3: General Site Improvements</b>	
Mobilization/Demobilization	\$50,000
Construct Perimeter Drainage ditch	\$246,400
Shoreline Protection	\$1,083,700
Abandon Deep Wells (2)	\$400,000
Abandon Water/Monitoring Wells	\$150,000
Develop and Implement Ground Water Monitoring Program	\$236,988
Institutional Controls Plans and Measures	\$200,000
<b>General Construction Costs</b>	
Contingency - 10%	\$3,909,131
Project Management - 3%	\$1,290,013
Pre-Design Investigation, Remedial Design, Engineering Support - 10%	\$4,300,044
Construction Management - 5%	\$2,150,022
Health and Safety/Fence Line Air Monitoring - 4%	\$1,720,018
Third Party Quality Assurance/Quality Control - 1%	\$430,004
<b>CONSTRUCTION CAPITAL COSTS</b>	
<b>\$52,890,540</b>	
<b>ANNUAL OPERATION AND MAINTENANCE (O&amp;M) COSTS</b>	
General Site Maintenance	\$36,000
Leachate Management/Gas Monitoring	\$41,400
Ground Water Monitoring Year 1 (Quarterly)	\$166,287
Ground Water Monitoring Years 2-10 (Semiannually)	\$83,144
Ground Water Monitoring Years 11-30 (Annually)	\$41,572
<b>CUMULATIVE NET PRESENT VALUE (NPV) O&amp;M COST (4.5% DF)</b>	
Annual O&M NPV (Year 1)	\$348,625
Annual O&M NPV (Years 2-10)	\$1,669,476
Annual O&M NPV (Years 11-30)	\$1,489,809
<b>TOTAL NPV O&amp;M COST (YEARS 1-30)</b>	
<b>\$3,507,910</b>	
<b>TOTAL COST: CONSTRUCTION CAPITAL AND O&amp;M (NPV)</b>	
<b>\$56,398,450</b>	
FEASIBILITY STUDY RANGE (-30%)	\$39,478,915
FEASIBILITY STUDY RANGE (+50%)	\$84,597,674

**Table 19 – Remedial Alternative 4 Cost Summary (7.0% Discount Factor)**

<b>CONSTRUCTION CAPITAL COSTS</b>	
<b>Phase 1: Pre-Construction/Tank Demolition/Tank Contents Management</b>	
Plan Preparation and Submittals	\$90,900
Mobilization/Demobilization and Construct Project Facilities/Utilities	\$427,600
Transfer Tank Water to Deep Well	\$43,850
Transfer Tanks Sludges to Sludge Pit	\$97,000
Tank/Piping Demolition	\$160,000
Hauling Scrap Metal to Processor	\$40,000
Asbestos Abatement for Tank/Piping	\$297,167
Lead Paint Abatement Surcharge	\$10,000
Temporarily Relocate Cemetery Monuments	\$51,970
Road Improvement	\$147,360
<b>Phase 2: Excavate and Consolidate Soils and Sludges</b>	
Mobilization/Demobilization	\$46,920
Construct Slurry Wall around Sludge Pit	\$705,312
Construction RCRA Subtitle C Cell	\$11,523,280
Improve Perimeter Berm System for the Sludge Pit	\$233,902
Excavate and Transfer Sludges to Solidification Area	\$2,497,400
Solidify Sludges	\$15,090,038
Excavate, Transfer and Place Treated Sludges	\$1,991,526
Rework Sludges to Meet Performance Standards	\$690,975
Excavate, Transfer, and Place Affected Soil, Concrete Rubble	\$834,820
Backfill Excavated Areas with Clean Backfill to Ground Surface	\$1,744,200
<b>Phase 3: General Site Improvements</b>	
Mobilization/Demobilization	\$50,000
Construct Perimeter Drainage ditch	\$246,400
Shoreline Protection	\$1,083,700
Abandon Deep Wells (2)	\$400,000
Abandon Water/Monitoring Wells	\$150,000
Develop and Implement Ground Water Monitoring Program	\$236,988
Institutional Controls Plans and Measures	\$200,000
<b>General Construction Costs</b>	
Contingency - 10%	\$3,909,131
Project Management - 3%	\$1,290,013
Pre-Design Investigation, Remedial Design, Engineering Support - 10%	\$4,300,044
Construction Management - 5%	\$2,150,022
Health and Safety/Fence Line Air Monitoring - 4%	\$1,720,018
Third Party Quality Assurance/Quality Control - 1%	\$430,004
<b>CONSTRUCTION CAPITAL COSTS</b>	
<b>\$52,890,540</b>	
<b>ANNUAL OPERATION AND MAINTENANCE (O&amp;M) COSTS</b>	
General Site Maintenance	\$36,000
Leachate Management/Gas Monitoring	\$41,400
Ground Water Monitoring Year 1 (Quarterly)	\$166,287
Ground Water Monitoring Years 2-10 (Semiannually)	\$83,144
Ground Water Monitoring Years 11-30 (Annually)	\$41,572
<b>CUMULATIVE NET PRESENT VALUE (NPV) O&amp;M COST (7.0% DF)</b>	
Annual O&M NPV (Year 1)	\$340,479
Annual O&M NPV (Years 2-10)	\$1,461,438
Annual O&M NPV (Years 11-30)	\$957,873
<b>TOTAL NPV O&amp;M COST (YEARS 1-30)</b>	
<b>\$2,759,790</b>	
<b>TOTAL COST: CONSTRUCTION CAPITAL AND O&amp;M (NPV)</b>	
<b>\$55,650,330</b>	
FEASIBILITY STUDY RANGE (-30%)	
\$38,955,231	
FEASIBILITY STUDY RANGE (+50%)	
\$83,475,495	

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## **Figures**

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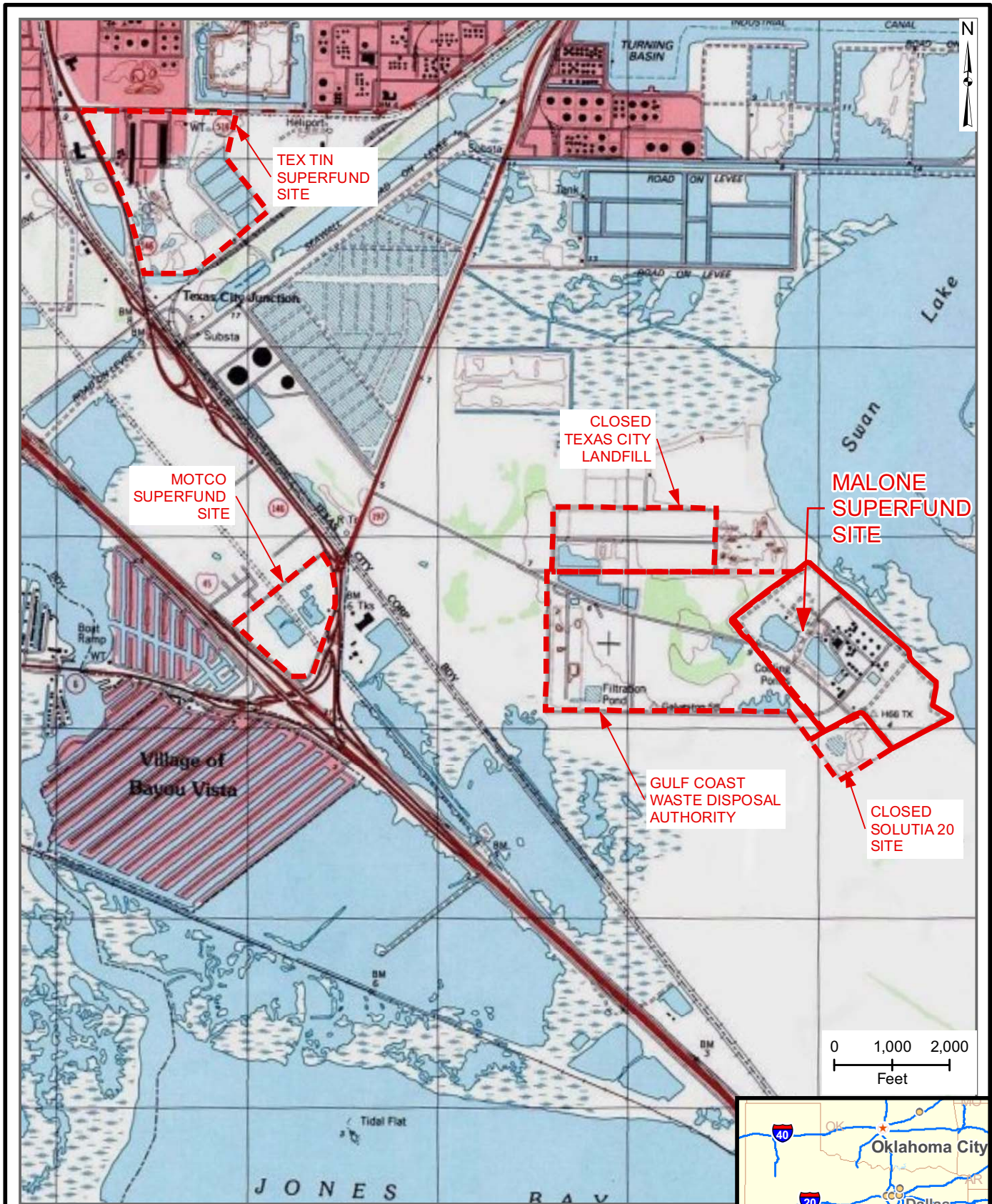
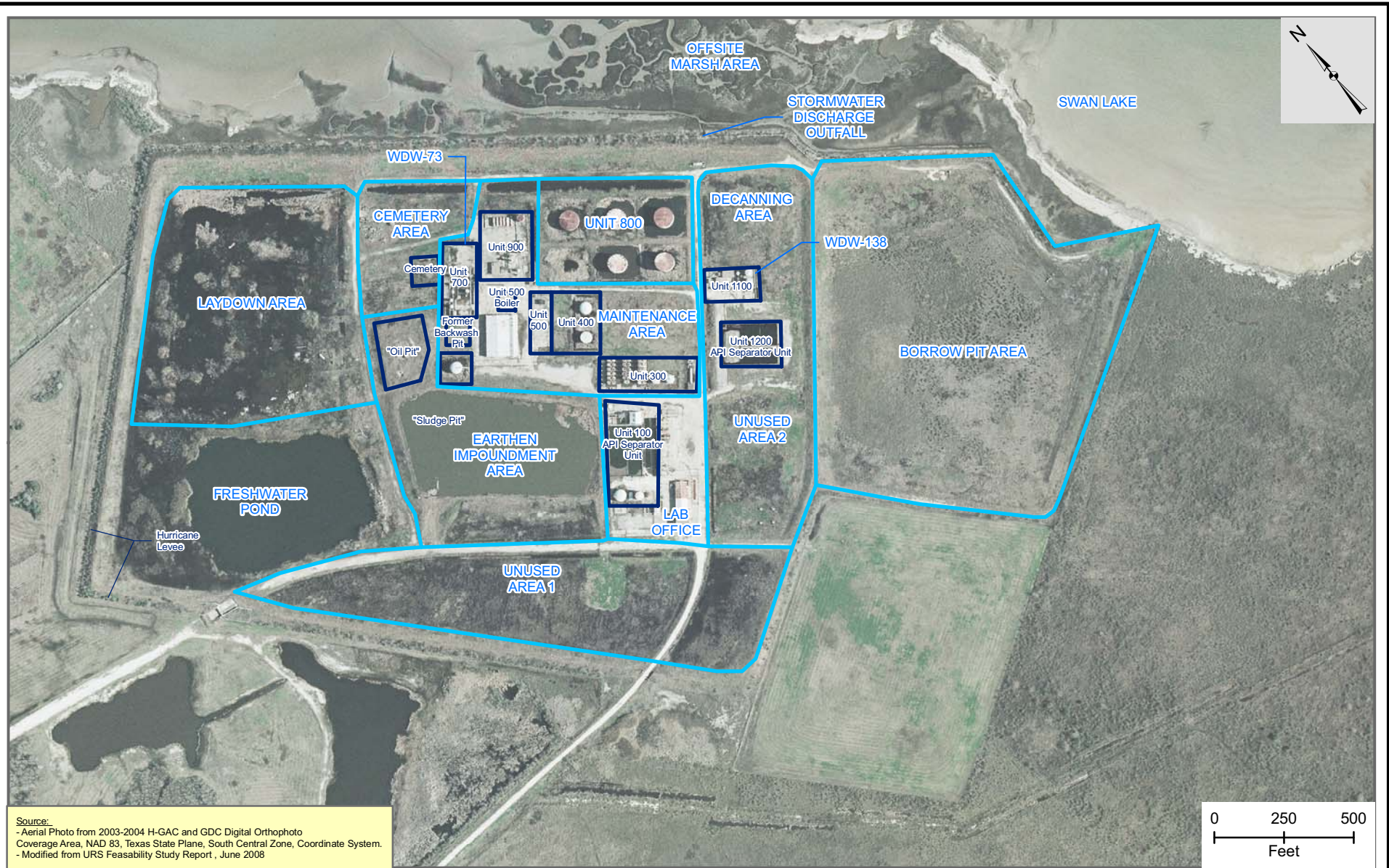


Figure 1 – Site Location Map  
 Malone Services Company  
 Superfund Site  
 Texas City, Galveston County, Texas



Source: USGS, Valentine and Davis Dam, 100,000 scale quadrangle topographic map, 1972.





Source:  
 - Aerial Photo from 2003-2004 H-GAC and GDC Digital Orthophoto Coverage Area, NAD 83, Texas State Plane, South Central Zone, Coordinate System.  
 - Modified from URS Feasibility Study Report, June 2008

**Legend:**

- SiteFeatures\_Line
- SiteFeatures

**Figure 2 – Investigative Areas**

Malone Service Company  
 Superfund Site

Texas City, Galveston County, Texas



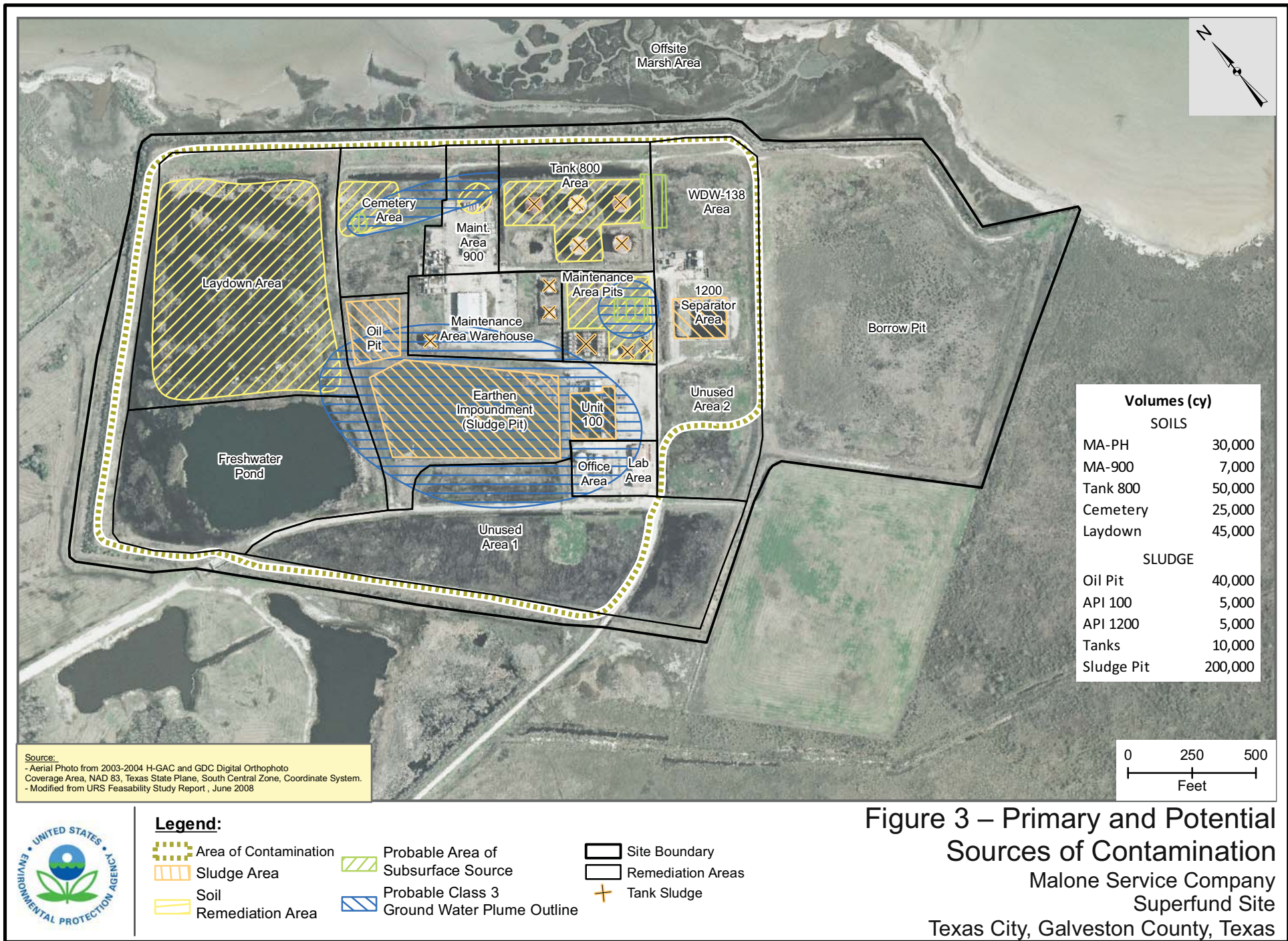
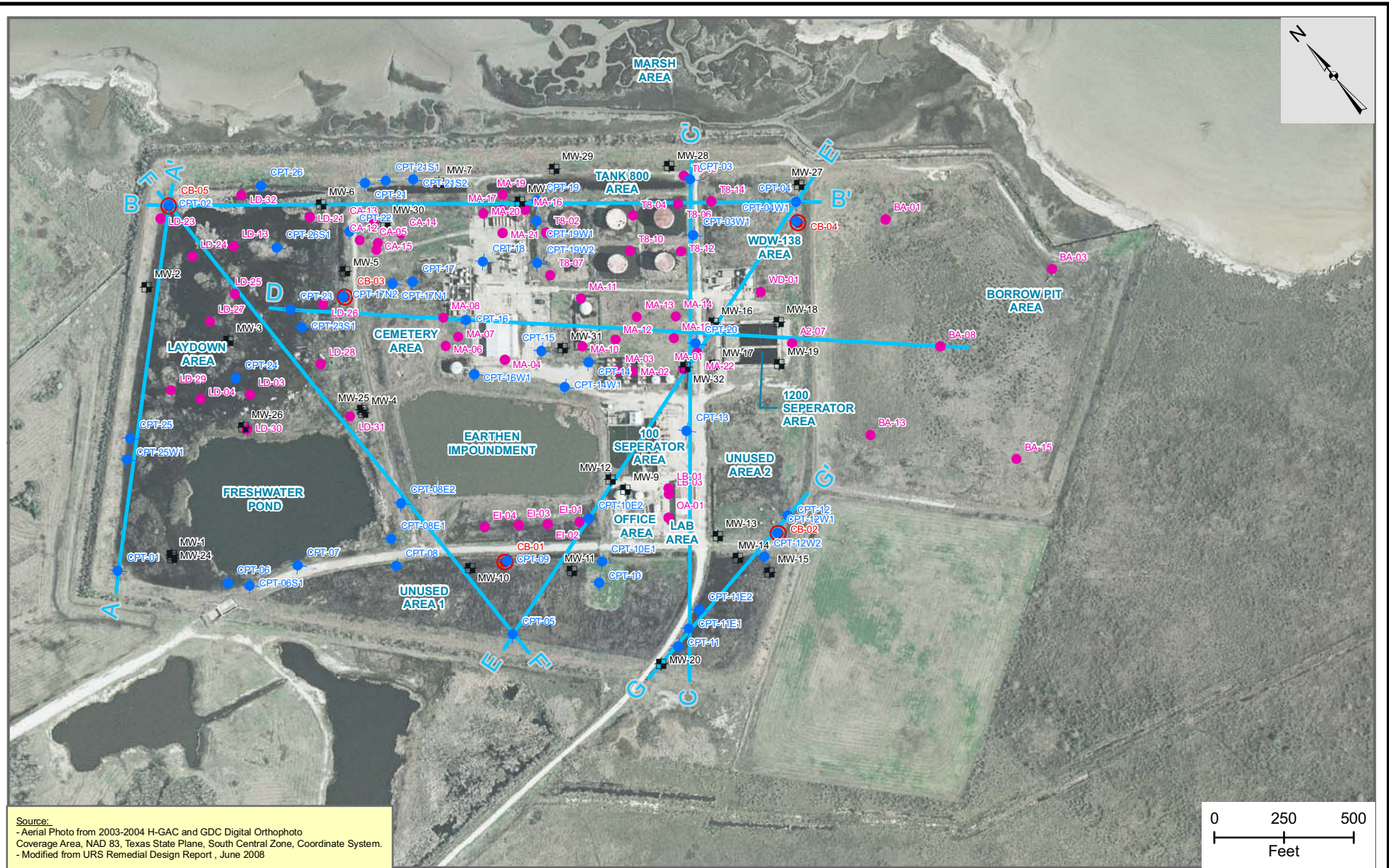
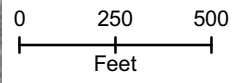


Figure 3 – Primary and Potential Sources of Contamination  
 Malone Service Company  
 Superfund Site  
 Texas City, Galveston County, Texas



Source:  
 - Aerial Photo from 2003-2004 H-GAC and GDC Digital Orthophoto  
 Coverage Area, NAD 83, Texas State Plane, South Central Zone, Coordinate System.  
 - Modified from URS Remedial Design Report, June 2008



- Legend:**
- ◆ Monitor Well Location
  - Soil Bore Location
  - Correlation Soil Bore Location
  - CPT Location
  - Cross-Section Location

**Figure 4 – Cross-Section Locations**

Malone Service Company  
 Superfund Site  
 Texas City, Galveston County, Texas

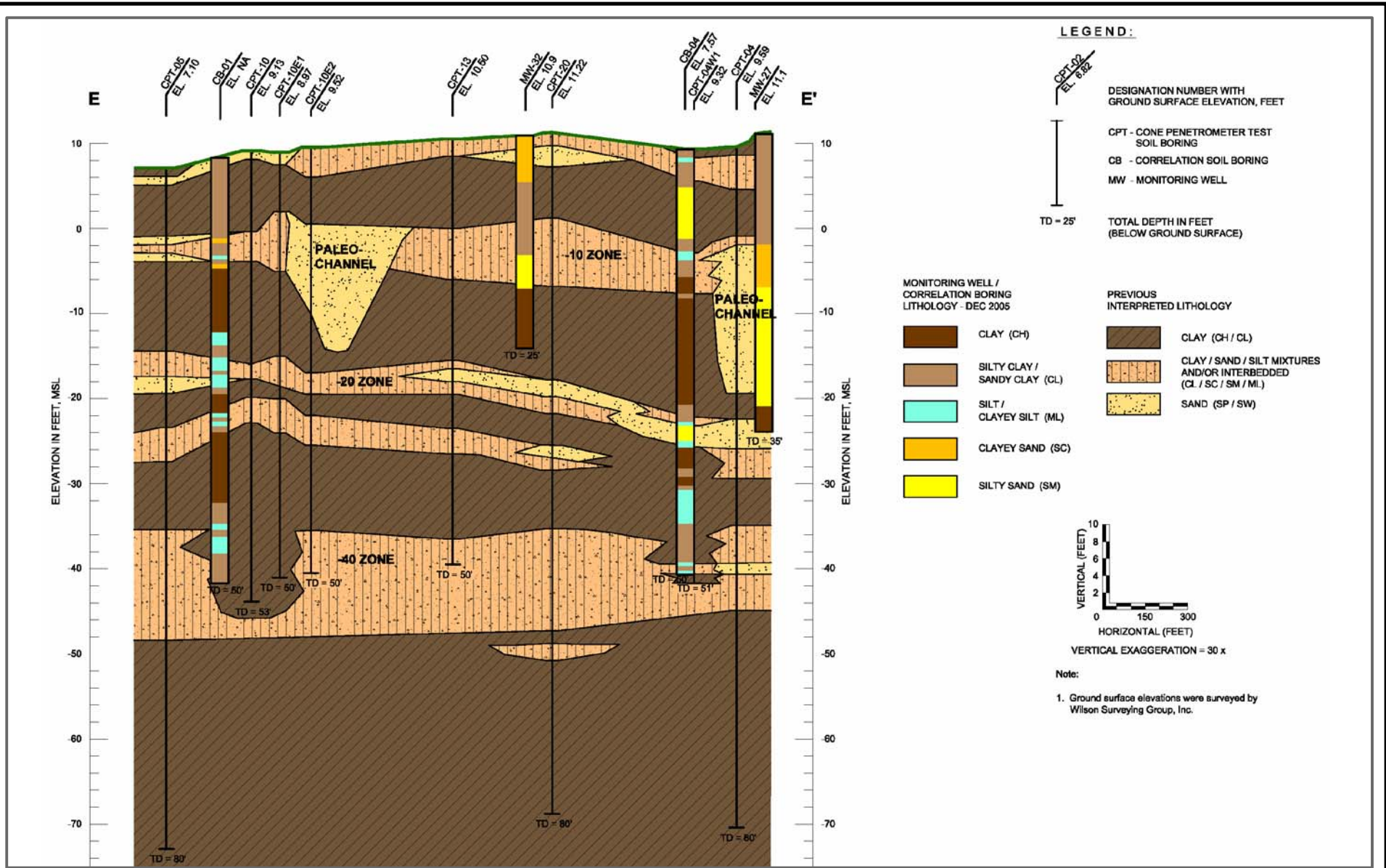


Figure 5 – Cross-Section E-E'

Malone Service Company  
Superfund Site

Texas City, Galveston County, Texas



Source:  
Modified from URS Remedial Investigation Report, February 2006.

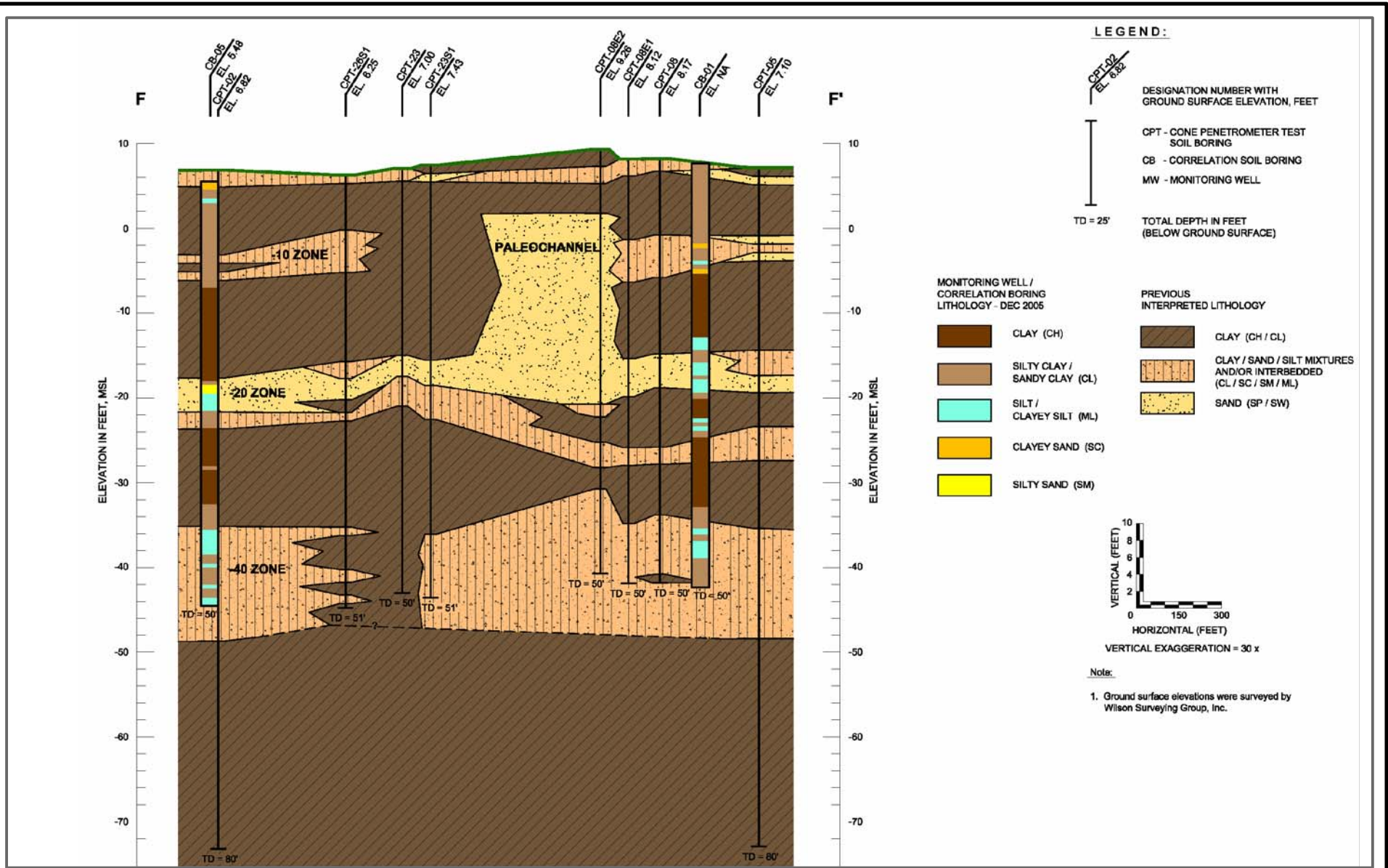
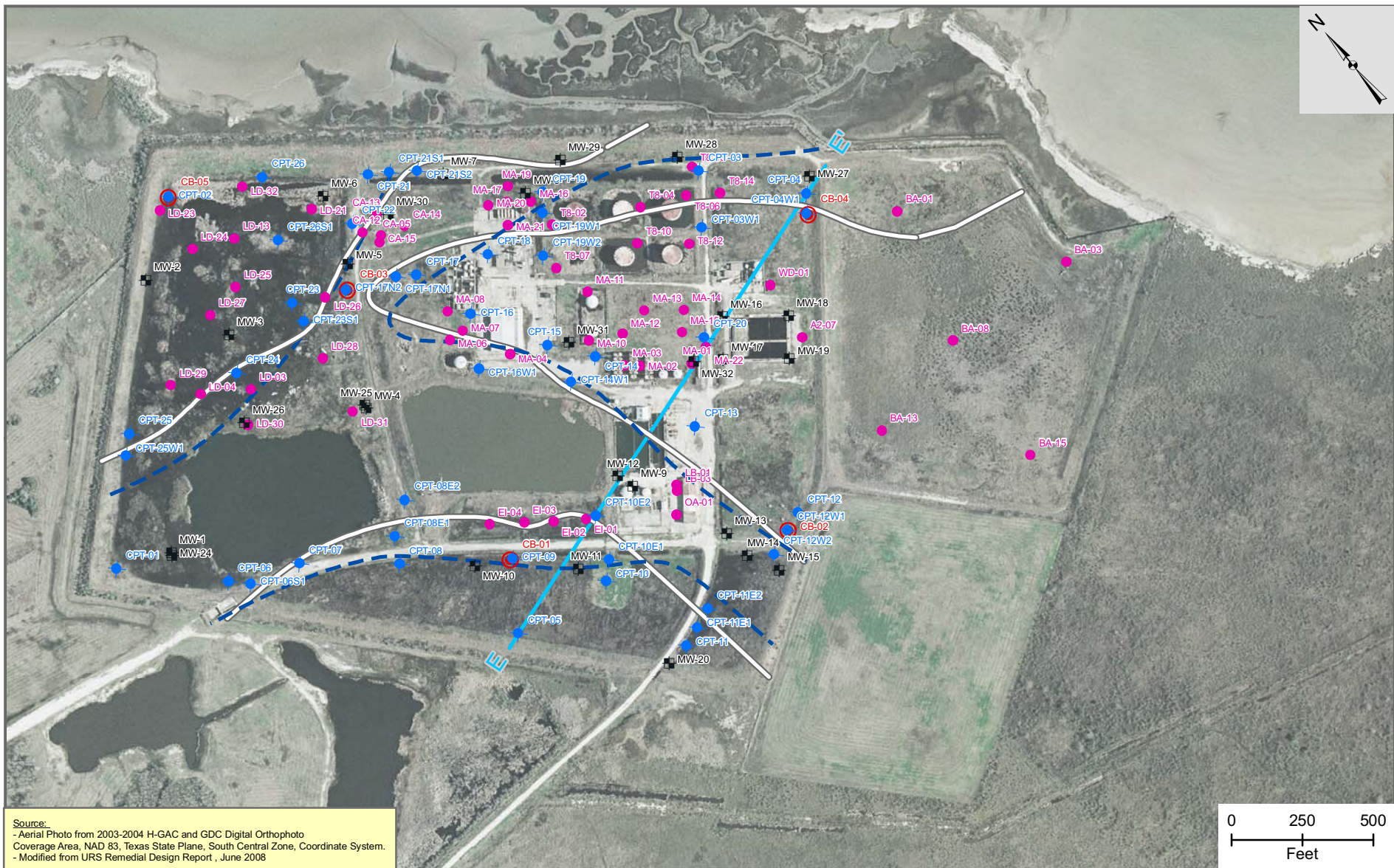


Figure 6 – Cross-Section F-F'  
 Malone Service Company  
 Superfund Site  
 Texas City, Galveston County, Texas



Source:  
 Modified from URS Remedial Investigation Report, February 2006.



**Legend:**

- ❖ Monitor Well Location
- CPT Location
- Soil Bore Location
- Correlation Soil Bore Location
- Paleochannel (URS 2006)
- - - Paleochannel (ECA 1986)
- Cross-Section Location

**Figure 7 – Paleochannel Location**

Malone Service Company  
 Superfund Site  
 Texas City, Galveston County, Texas

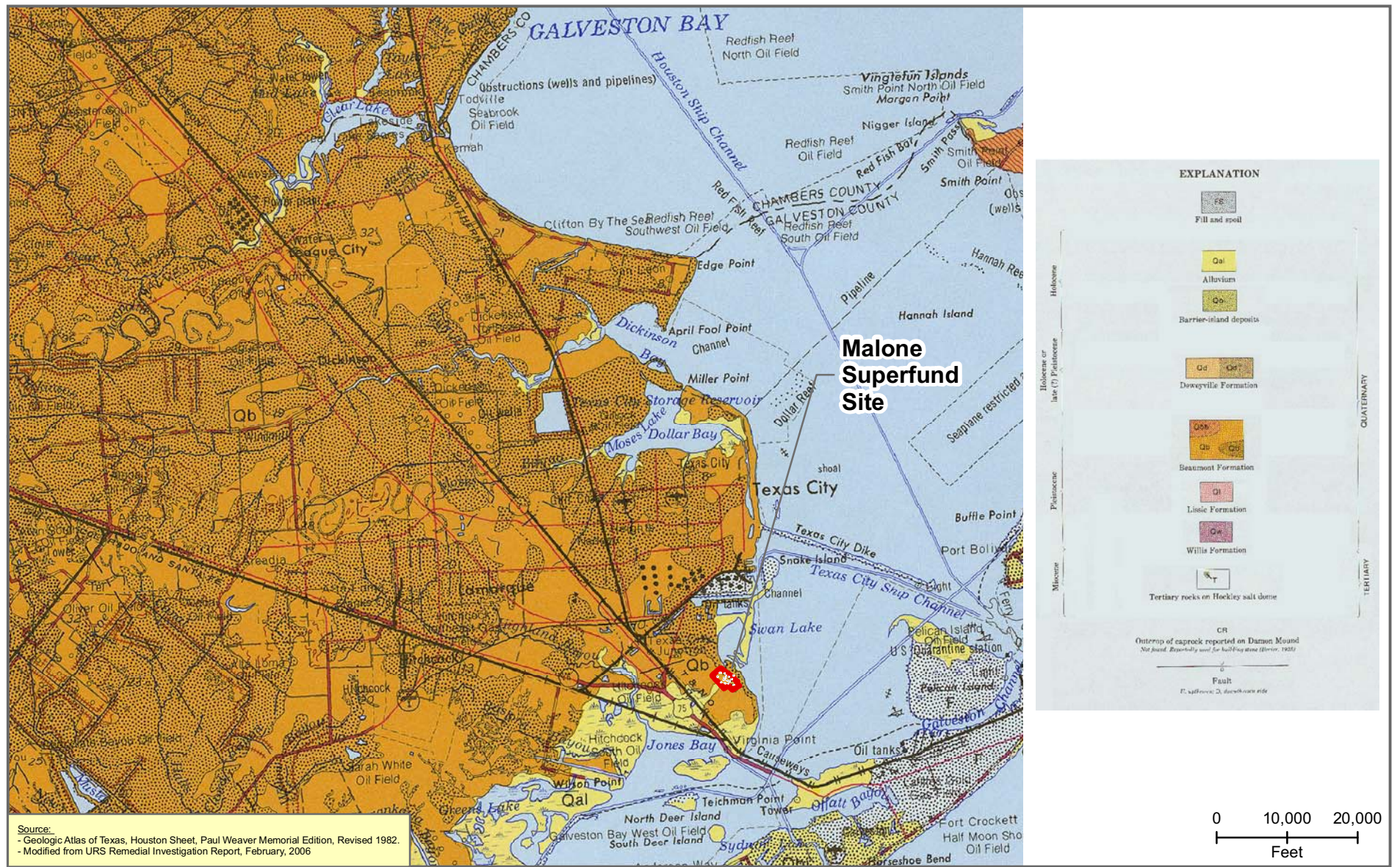
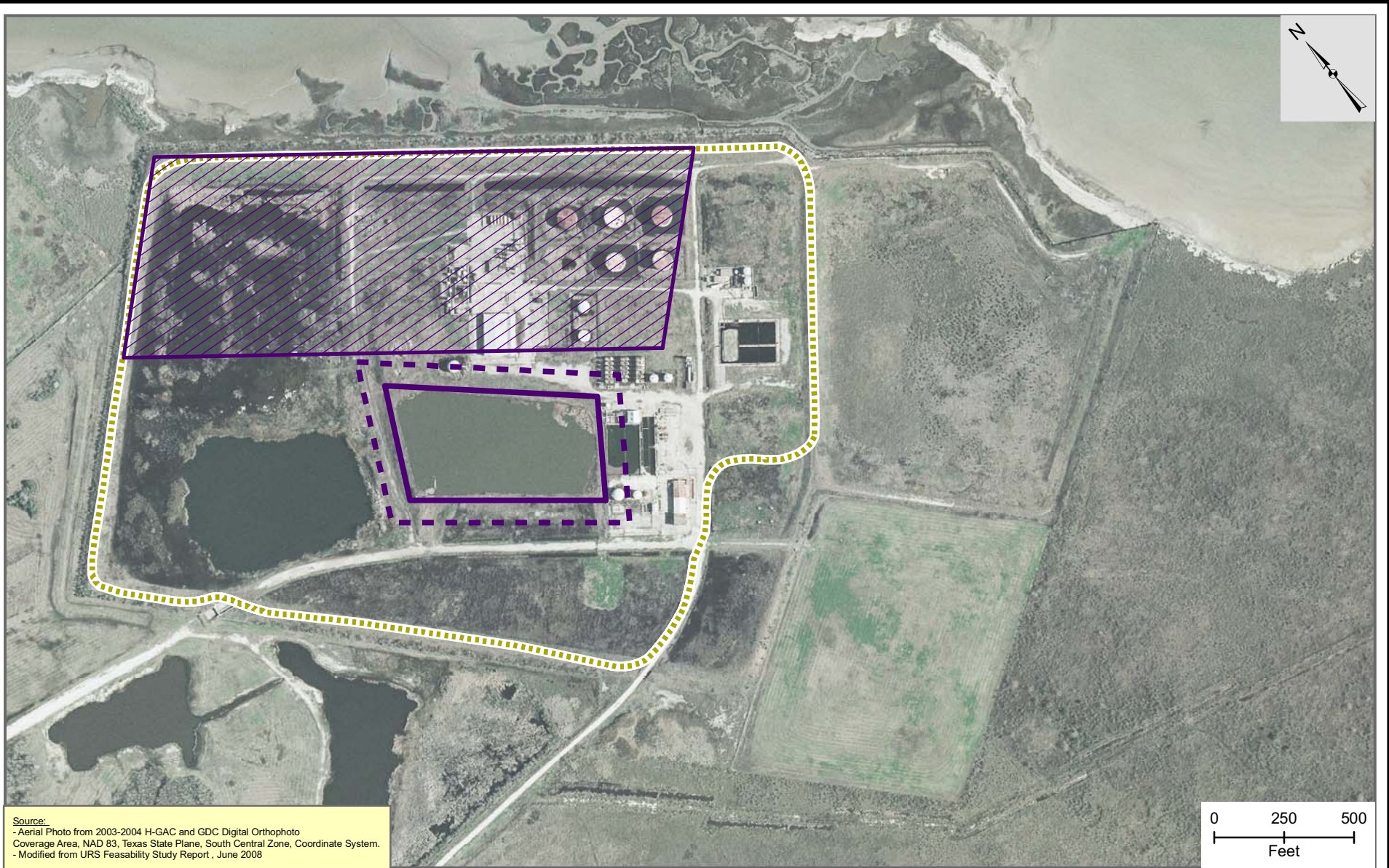


Figure 8 – Geologic Map

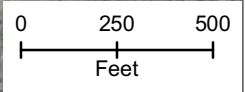
Malone Service Company  
Superfund Site

Texas City, Galveston County, Texas









Source:  
 - Aerial Photo from 2003-2004 H-GAC and GDC Digital Orthophoto  
 Coverage Area, NAD 83, Texas State Plane, South Central Zone, Coordinate System.  
 - Modified from URS Feasibility Study Report, June 2008



**Legend:**

-  Barrier Wall
-  Excavated Sludge Pit
-  RCRA Subtitle C Cell
-  Area of Contamination

**Figure 9 – Containment Design Layout**

Malone Service Company  
 Superfund Site  
 Texas City, Galveston County, Texas





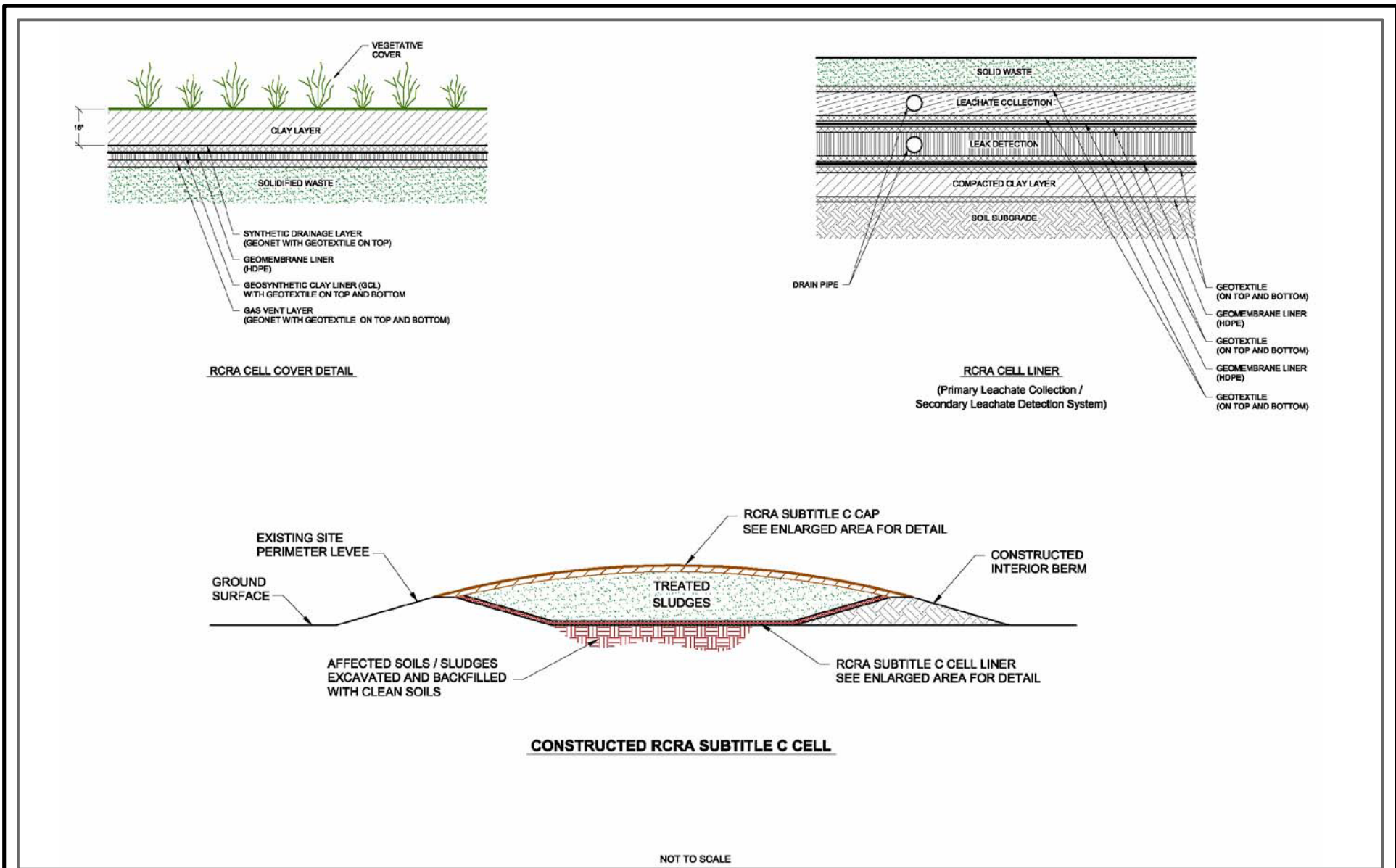


Figure 10 – RCRA Subtitle C Cell

Malone Service Company  
Superfund Site

Texas City, Galveston County, Texas



Source:  
Modified from URS Remedial Investigation Report, February 2006.

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## **Appendix A – Administrative Record File Index**

The following documents are contained in the Administrative Record:

1. Site Specific Plans (URS, 2004)
2. Data Evaluation Report (URS, 2004)
3. Final RI Report (URS, 2006)
4. Baseline Human Health Risk Assessment (URS, 2006)
5. Baseline Ecological Risk Assessment (URS, 2007)
6. Treatability Study (Shaw, 2008)
7. Final FS Report (URS, 2008)
8. Final Proposed Plan (EPA, 2009)
9. Selected EPA Guidance (Varies)

**Prepared for**  
**United States Environmental Protection Agency**  
**Region 6**

**RECORD OF DECISION ADMINISTRATIVE RECORD**  
**for**  
**MALONE SERVICE COMPANY SUPERFUND SITE**

**EPA ID No. TXD980864789**  
**SSID: GZ**

**GS09K99BHD0010**  
**Task Order No. T0703BG1026**

**David Abshire**  
**Remedial Project Manager**  
**U.S. EPA Region 6**

**Prepared by**

**Science Applications International Corporation**  
**555 Republic Drive, Suite 300**  
**Plano, TX 75074**

**October 1, 2009**

## PREAMBLE

The purpose of this document is to provide the public with an index to the Administrative Record File (AR File) for the U.S. Environmental Protection Agency's (EPA) selected remedial action to respond to conditions at the Malone Service Company Superfund Site (the "Site"). EPA's action is authorized by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. Section 9601 et seq.

Section 113 (j)(1) of CERCLA, 42 U.S.C. Section 9613 (j)(1), provides that judicial review of the adequacy of a CERCLA response action shall be limited to the Administrative Record (AR). Section 113 (k)(1) of CERCLA, 42 U.S.C. Section 9613 (k)(1), requires the EPA to establish an AR upon which it shall base the selection of its remedial actions. As the EPA decides what to do at the site of a release of hazardous substances, it compiles documents concerning the site and its decision into an "AR File." This means that documents may be added to the AR File from time to time. After the EPA Regional Administrator or the Administrator's delegate signs the Action Memorandum or the Record of Decision memorializing the selection of the action, the documents which form the basis for the selection of the response action are then known as the Administrative Record "AR."

Section 113(k)(1) of CERCLA requires the EPA to make the AR File available to the public at or near the site of the response action. Accordingly, the EPA has established a repository where the AR File may be reviewed near the Site at:

Moore Memorial Public Library  
1701 9<sup>th</sup> Avenue North  
Texas City, Texas 77590  
Contact: Beth Steiner  
Telephone: (409) 643-5979

and

Texas Commission on Environmental Quality  
Records Management Center  
12100 Park 35 Circle  
Building E  
Austin, Texas 78753  
Contact: Joe Shields  
Telephone: (512) 239-2463 or 1- (800) 633-9363

The public also may review the AR File at the EPA Region 6 office in Dallas, Texas, by contacting the Remedial Project Manager at the address listed below. The AR File is available for public review during normal business hours. The AR File is treated as a non-circulating reference document. Any document in the AR File may be photocopied according to the procedures used at the repository or at the EPA Region 6 office. This index and the AR File were compiled in accordance with the EPA's Final Guidance on Administrative Records for Selecting CERCLA Response Actions, Office of Solid Waste and Emergency Response (OSWER) Directive Number 9833.3A1 (December 3, 1990).

Documents listed as bibliographic sources for other documents in the AR File might not be listed separately in the index. Where a document is listed in the index but not located among the documents which the EPA has made available in the repository, the EPA may, upon request, include the document in the repository or make the document available for review at an alternate location. This applies to documents such as verified sampling data, chain of custody forms, guidance and policy documents, as well as voluminous site-specific reports. It does not apply to documents in EPA's confidential file. (Copies of guidance documents also can be obtained by calling the RCRA/Superfund/Title 3 Hotline at (800) 424-9346.)

These requests should be addressed to:

David Abshire  
Remedial Project Manager  
U.S. EPA Region 6  
1445 Ross Avenue  
Dallas, Texas 75202-2733  
(214) 665-7188

The EPA response selection guidance compendium index has not been updated since March 22, 1991 (see CERCLA Administrative Records: First Update of the Compendium of Documents Used for Selecting CERCLA Response Actions [March 22, 1991]); accordingly, it is not included here. Moreover, based on resource considerations, the Region 6 Superfund Division Director has decided not to maintain a Region 6 compendium of response selection guidance. Instead, consistent with 40 CFR Section 300.805(a)(2) and 300.810(a)(2) and OSWER Directive No. 9833.3A-1 (page 37), the AR File Index includes listings of all guidance documents which may form a basis for the selection of the response action in question.

The documents included in the AR File index are arranged predominantly in chronological order. The AR File index helps locate and retrieve documents in the file. It also provides an overview of the response action history. The index includes the following information for each document:

- **Doc ID**- The document identifier number.
- **Date** - The date the document was published and/or released. "01/01/2525" means no date was recorded.
- **Pages** - Total number of printed pages in the document, including attachments.
- **Title** - Descriptive heading of the document.
- **Document Type** - General identification, (e.g. correspondence, Remedial Investigation Report, Record of Decision.)
- **Author** - Name of originator, and the name of the organization that the author is affiliated with. If either the originator name or the organization name is not identified, then the field is captured with the letters "N/A".
- **Addressee**- Name and affiliation of the addressee. If either the originator name or the organization name is not identified, then the field is captured with the letters "N/A".

# ADMINISTRATIVE RECORD INDEX

10/01/2009

Region Id: 06

## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

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**Region Id:** 06

**Docid:** 945905

**Bates:** 000001                      **To:** 000042

**Date:** 04/28/1986

**Pages:** 42

**Title:** [INORGANIC ANALYSES DATA PACKAGE FOR CASE NO. 5424]

**Doc Type:** QA / QC  
SAMPLING / ANALYSIS

<u>Name</u>	<u>Organization</u>
<b>Author:</b> NONE,	NONE

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	NONE

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**Region Id:** 06

**Docid:** 217301

**Bates:** 000043                      **To:** 000228

**Date:** 10/01/1988

**Pages:** 186

**Title:** GUIDANCE FOR CONDUCTING REMEDIAL INVESTIGATIONS AND FEASIBILITY STUDIES UNDER CERLCA - EPA/540/G-89/004 - OSWER DIRECTIVE 9355.3-01

**Doc Type:** REPORT / STUDY  
ELECTRONIC RECORD

<u>Name</u>	<u>Organization</u>
<b>Author:</b> NONE,	U.S. ENVIRONMENTAL PROTECTION AGENCY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	NONE

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**Region Id:** 06

**Docid:** 217311

**Bates:** 000229                      **To:** 000515

**Date:** 12/01/1989

**Pages:** 287

**Title:** RISK ASSESSMENT GUIDANCE FOR SUPERFUND VOLUME I - HUMAN HEALTH EVALUATION MANUAL (PART A) - EPA/540/1-89/002

**Doc Type:** REPORT / STUDY  
ELECTRONIC RECORD

<u>Name</u>	<u>Organization</u>
<b>Author:</b> NONE,	U.S. ENVIRONMENTAL PROTECTION AGENCY

<u>Name</u>	<u>Organization</u>
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# ADMINISTRATIVE RECORD INDEX

10/01/2009

Region Id: 06

## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

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<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	NONE

---

**Region Id:** 06

**Docid:** 133794

**Bates:** 000516                      **To:** 000522

**Date:** 09/15/1994

**Pages:** 7

**Title:** REMOVAL ASSESSMENT REPORT FOR MALONE SERVICE COMPANY - RUNOFF CHARACTERIZATION

**Doc Type:** REPORT / STUDY

<u>Name</u>	<u>Organization</u>
<b>Author:</b> NONE,	ECOLOGY & ENVIRONMENT INCORPORATED

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> THOMPSON, HENRY	EPA REGION 6, PROGRAM MANAGEMENT BRANCH

---

**Region Id:** 06

**Docid:** 217320

**Bates:** 000523                      **To:** 000752

**Date:** 06/01/1997

**Pages:** 230

**Title:** ECOLOGICAL RISK ASSESSMENT GUIDANCE FOR SUPERFUND: PROCESS FOR DESIGNING AND CONDUCTING ECOLOGICAL RISK ASSESSMENTS - EPA 540-R-97-006

**Doc Type:** REPORT / STUDY  
ELECTRONIC RECORD

<u>Name</u>	<u>Organization</u>
<b>Author:</b> NONE,	U.S. ENVIRONMENTAL PROTECTION AGENCY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	NONE

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# ADMINISTRATIVE RECORD INDEX

10/01/2009

Region Id: 06

## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

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**Region Id:** 06

**Docid:** 141429

**Bates:** 000753                      **To:** 000807

**Date:** 01/29/1998

**Pages:** 55

**Title:** REMOVAL ASSESSMENT REPORT FOR MALONE SERVICES COMPANY SITE

**Doc Type:** REPORT / STUDY

<u>Name</u>	<u>Organization</u>
<b>Author:</b> NONE ,	ECOLOGY & ENVIRONMENT INCORPORATED

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> HAMMACK, PATRICK L	U.S. ENVIRONMENTAL PROTECTION AGENCY
REESE, SHARON M	U.S. ENVIRONMENTAL PROTECTION AGENCY
QUINA, CHRISTOPHER	U.S. ENVIRONMENTAL PROTECTION AGENCY
THOMPSON JR., HENRY	U.S. ENVIRONMENTAL PROTECTION AGENCY

---

**Region Id:** 06

**Docid:** 908401

**Bates:** 000808                      **To:** 003084

**Date:** 10/01/1998

**Pages:** 2277

**Title:** [SCREENING SITE INSPECTION REPORT VOLUMES I, II, AND III OF THE FOR MALONE SERVICE COMPANY SUPERFUND SITE]

**Doc Type:** REPORT / STUDY  
SAMPLING / ANALYSIS

<u>Name</u>	<u>Organization</u>
<b>Author:</b> NEWBERRY, WESLEY G	TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
SMITH, CATRIONA V	TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
KENNEDY, JOHNNY	TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
SEILS, ALLEN	TEXAS NATURAL RESOURCES CONSERVATION COMMISSION

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> RHOTENBERRY, WILLIAM	U.S. ENVIRONMENTAL PROTECTION AGENCY

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10/01/2009

Region Id: 06

## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

---

**Region Id:** 06

**Docid:** 138325

**Bates:** 003085                      **To:** 003086

**Date:** 06/07/1999

**Pages:** 2

**Title:** [REQUEST FROM TNRC FOR AN EPA LEAD EMERGENCY RESPONSE ACTION AND FOR EPA TO PERFORM A HAZARD RANKING SYSTEM PACKAGE (HRS) AT MALONE SERVICE COMPANY SITE]

**Doc Type:** CORRESPONDENCE

<u>Name</u>	<u>Organization</u>
<b>Author:</b> PEDDE, RONALD R	TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> GAZDA, CHARLES A	U.S. ENVIRONMENTAL PROTECTION AGENCY

---

**Region Id:** 06

**Docid:** 138326

**Bates:** 003087                      **To:** 003087

**Date:** 07/28/1999

**Pages:** 1

**Title:** [MAYOR CHARLES T. DOYLE OF TEXAS CITY REQUEST TO GOVERNOR OF TEXAS GEORGE W. BUSH FOR ASSISTANCE IN URGING THE USEPA TO PLACE THE MALONE PROPERTY ON THEIR NATIONAL PRIORITIES LIST]

**Doc Type:** CORRESPONDENCE

<u>Name</u>	<u>Organization</u>
<b>Author:</b> DOYLE, CHARLES T	CITY OF TEXAS CITY TEXAS

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> BUSH, GEORGE W	TEXAS STATE OF

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**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

---

**Region Id:** 06

**Docid:** 138327

**Bates:** 003088                      **To:** 003088

**Date:** 08/10/1999

**Pages:** 1

**Title:** [ATTORNEY GENERAL OF TEXAS, JOHN CORNYN'S RESPONSE TO MAYOR DOYLE'S REQUEST FOR ASSISTANCE IN GETTING THE MALONE SERVICE COMPANY SITE ON THE EPA NATIONAL PRIORITIES LIST]

**Doc Type:** CORRESPONDENCE

	<u>Name</u>	<u>Organization</u>
<b>Author:</b>	CORNYN, JOHN	TEXAS STATE OF
<b>Addressee:</b>	DOYLE, CHARLES T	CITY OF TEXAS CITY TEXAS

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**Region Id:** 06

**Docid:** 922348

**Bates:** 003089                      **To:** 004359

**Date:** 10/20/1999

**Pages:** 1271

**Title:** [HAZARDOUS RANKING SYSTEM DOCUMENTATION RECORD FOR THE MALONE SERVICE COMPANY INCORPORATED SITE]

**Doc Type:** REPORT / STUDY

	<u>Name</u>	<u>Organization</u>
<b>Author:</b>	NONE,	U.S. ENVIRONMENTAL PROTECTION AGENCY
<b>Addressee:</b>	NONE,	NONE

---

**Region Id:** 06

**Docid:** 138329

**Bates:** 004359.001                      **To:** 004359.029

**Date:** 10/26/1999

**Pages:** 29

**Title:** [REQUEST FOR APPROVAL OF AN EMERGENCY EXEMPTION TO THE STATUTORY TWO MILLION DOLLAR LIMIT]

**Doc Type:** ACTION MEMORANDUM

	<u>Name</u>	<u>Organization</u>
<b>Author:</b>	ZEHNER, WARREN	U.S. ENVIRONMENTAL PROTECTION AGENCY
<b>Addressee:</b>	KNUDSON, MYRON O	U.S. ENVIRONMENTAL PROTECTION AGENCY

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## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
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**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

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**Region Id:** 06

**Docid:** 138330

**Bates:** 004360                      **To:** 004361

**Date:** 11/06/1999

**Pages:** 2

**Title:** POLLUTION REPORT (POLREP) NO. 1 FOR MALONE SERVICE COMPANY SUPERFUND SITE

**Doc Type:** REPORT / STUDY

<u>Name</u>	<u>Organization</u>
<b>Author:</b> ZEHNER, WARREN	U.S. ENVIRONMENTAL PROTECTION AGENCY
<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> GAZDA, CHARLES A	U.S. ENVIRONMENTAL PROTECTION AGENCY

---

**Region Id:** 06

**Docid:** 138331

**Bates:** 004362                      **To:** 004363

**Date:** 11/13/1999

**Pages:** 2

**Title:** POLLUTION REPORT (POLREP) NO. 2 FOR MALONE SERVICE COMPANY SUPERFUND SITE

**Doc Type:** REPORT / STUDY

<u>Name</u>	<u>Organization</u>
<b>Author:</b> ZEHNER, WARREN	U.S. ENVIRONMENTAL PROTECTION AGENCY
<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> GAZDA, CHARLES A	U.S. ENVIRONMENTAL PROTECTION AGENCY

---

**Region Id:** 06

**Docid:** 138333

**Bates:** 004364                      **To:** 004365

**Date:** 11/20/1999

**Pages:** 2

**Title:** POLLUTION REPORT (POLREP) NO. 3 FOR MALONE SERVICE COMPANY SUPERFUND SITE

**Doc Type:** REPORT / STUDY

<u>Name</u>	<u>Organization</u>
<b>Author:</b> ZEHNER, WARREN	U.S. ENVIRONMENTAL PROTECTION AGENCY
<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> GAZDA, CHARLES A	U.S. ENVIRONMENTAL PROTECTION AGENCY

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**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
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**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

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**Region Id:** 06

**Docid:** 138334

**Bates:** 004366                      **To:** 004367

**Date:** 12/04/1999

**Pages:** 2

**Title:** POLLUTION REPORT (POLREP) NO. 4 FOR MALONE SERVICE COMPANY SUPERFUND SITE

**Doc Type:** REPORT / STUDY

<u>Name</u>	<u>Organization</u>
<b>Author:</b> ZEHNER, WARREN	U.S. ENVIRONMENTAL PROTECTION AGENCY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> GAZDA, CHARLES A	U.S. ENVIRONMENTAL PROTECTION AGENCY

---

**Region Id:** 06

**Docid:** 138335

**Bates:** 004368                      **To:** 004369

**Date:** 12/11/1999

**Pages:** 2

**Title:** POLLUTION REPORT (POLREP) NO. 5 FOR MALONE SERVICE COMPANY SUPERFUND SITE

**Doc Type:** REPORT / STUDY

<u>Name</u>	<u>Organization</u>
<b>Author:</b> ZEHNER, WARREN	U.S. ENVIRONMENTAL PROTECTION AGENCY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> GAZDA, CHARLES A	U.S. ENVIRONMENTAL PROTECTION AGENCY

---

**Region Id:** 06

**Docid:** 138336

**Bates:** 004370                      **To:** 004371

**Date:** 12/17/1999

**Pages:** 2

**Title:** POLLUTION REPORT (POLREP) NO. 6 FOR MALONE SERVICE COMPANY SUPERFUND SITE

**Doc Type:** REPORT / STUDY

<u>Name</u>	<u>Organization</u>
<b>Author:</b> ZEHNER, WARREN	U.S. ENVIRONMENTAL PROTECTION AGENCY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> GAZDA, CHARLES A	U.S. ENVIRONMENTAL PROTECTION AGENCY

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**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
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**SSID:** GZ  
**Action:** RECORD OF DECISION

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**Region Id:** 06

**Docid:** 138337

**Bates:** 004372                      **To:** 004373

**Date:** 01/01/2000

**Pages:** 2

**Title:** POLLUTION REPORT (POLREP) NO. 7 FOR MALONE SERVICE COMPANY SUPERFUND SITE

**Doc Type:** REPORT / STUDY

<u>Name</u>	<u>Organization</u>
<b>Author:</b> ZEHNER, WARREN	U.S. ENVIRONMENTAL PROTECTION AGENCY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> GAZDA, CHARLES A	U.S. ENVIRONMENTAL PROTECTION AGENCY

---

**Region Id:** 06

**Docid:** 138338

**Bates:** 004374                      **To:** 004375

**Date:** 01/08/2000

**Pages:** 2

**Title:** POLLUTION REPORT (POLREP) NO. 8 FOR MALONE SERVICE COMPANY SUPERFUND SITE

**Doc Type:** REPORT / STUDY

<u>Name</u>	<u>Organization</u>
<b>Author:</b> ZEHNER, WARREN	U.S. ENVIRONMENTAL PROTECTION AGENCY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> GAZDA, CHARLES A	U.S. ENVIRONMENTAL PROTECTION AGENCY

---

**Region Id:** 06

**Docid:** 138339

**Bates:** 004376                      **To:** 004377

**Date:** 01/15/2000

**Pages:** 2

**Title:** POLLUTION REPORT (POLREP) NO. 9 FOR MALONE SERVICE COMPANY SUPERFUND SITE

**Doc Type:** REPORT / STUDY

<u>Name</u>	<u>Organization</u>
<b>Author:</b> ZEHNER, WARREN	U.S. ENVIRONMENTAL PROTECTION AGENCY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> GAZDA, CHARLES A	U.S. ENVIRONMENTAL PROTECTION AGENCY

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**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
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**SSID:** GZ  
**Action:** RECORD OF DECISION

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**Region Id:** 06

**Docid:** 138340

**Bates:** 004378                      **To:** 004379

**Date:** 01/22/2000

**Pages:** 2

**Title:** POLLUTION REPORT (POLREP) NO. 10 FOR MALONE SERVICE COMPANY SUPERFUND SITE

**Doc Type:** REPORT / STUDY

<u>Name</u>	<u>Organization</u>
<b>Author:</b> ZEHNER, WARREN	U.S. ENVIRONMENTAL PROTECTION AGENCY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> GAZDA, CHARLES A	U.S. ENVIRONMENTAL PROTECTION AGENCY

---

**Region Id:** 06

**Docid:** 138341

**Bates:** 004380                      **To:** 004381

**Date:** 02/12/2000

**Pages:** 2

**Title:** POLLUTION REPORT (POLREP) NO. 11 FOR MALONE SERVICE COMPANY SUPERFUND SITE

**Doc Type:** REPORT / STUDY

<u>Name</u>	<u>Organization</u>
<b>Author:</b> ZEHNER, WARREN	U.S. ENVIRONMENTAL PROTECTION AGENCY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> GAZDA, CHARLES A	U.S. ENVIRONMENTAL PROTECTION AGENCY

---

**Region Id:** 06

**Docid:** 138342

**Bates:** 004382                      **To:** 004383

**Date:** 02/19/2000

**Pages:** 2

**Title:** POLLUTION REPORT (POLREP) NO. 12 FOR MALONE SERVICE COMPANY SUPERFUND SITE

**Doc Type:** REPORT / STUDY

<u>Name</u>	<u>Organization</u>
<b>Author:</b> ZEHNER, WARREN	U.S. ENVIRONMENTAL PROTECTION AGENCY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> GAZDA, CHARLES A	U.S. ENVIRONMENTAL PROTECTION AGENCY



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## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
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**SSID:** GZ  
**Action:** RECORD OF DECISION

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**Region Id:** 06

**Docid:** 138343

**Bates:** 004384                      **To:** 004385

**Date:** 02/26/2000

**Pages:** 2

**Title:** POLLUTION REPORT (POLREP) NO. 13 FOR MALONE SERVICE COMPANY SUPERFUND SITE

**Doc Type:** REPORT / STUDY

<u>Name</u>	<u>Organization</u>
<b>Author:</b> ZEHNER, WARREN	U.S. ENVIRONMENTAL PROTECTION AGENCY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> GAZDA, CHARLES A	U.S. ENVIRONMENTAL PROTECTION AGENCY

---

**Region Id:** 06

**Docid:** 138344

**Bates:** 004386                      **To:** 004387

**Date:** 03/11/2000

**Pages:** 2

**Title:** POLLUTION REPORT (POLREP) NO. 14 FOR MALONE SERVICE COMPANY SUPERFUND SITE

**Doc Type:** REPORT / STUDY

<u>Name</u>	<u>Organization</u>
<b>Author:</b> ZEHNER, WARREN	U.S. ENVIRONMENTAL PROTECTION AGENCY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> GAZDA, CHARLES A	U.S. ENVIRONMENTAL PROTECTION AGENCY

---

**Region Id:** 06

**Docid:** 138345

**Bates:** 004388                      **To:** 004389

**Date:** 03/18/2000

**Pages:** 2

**Title:** POLLUTION REPORT (POLREP) NO. 15 FOR MALONE SERVICE COMPANY SUPERFUND SITE

**Doc Type:** REPORT / STUDY

<u>Name</u>	<u>Organization</u>
<b>Author:</b> ZEHNER, WARREN	U.S. ENVIRONMENTAL PROTECTION AGENCY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> GAZDA, CHARLES A	U.S. ENVIRONMENTAL PROTECTION AGENCY

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**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
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**SSID:** GZ  
**Action:** RECORD OF DECISION

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**Region Id:** 06

**Docid:** 138346

**Bates:** 004390                      **To:** 004391

**Date:** 03/25/2000

**Pages:** 2

**Title:** POLLUTION REPORT (POLREP) NO. 16 FOR MALONE SERVICE COMPANY SUPERFUND SITE

**Doc Type:** REPORT / STUDY

<u>Name</u>	<u>Organization</u>
<b>Author:</b> ZEHNER, WARREN	U.S. ENVIRONMENTAL PROTECTION AGENCY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> GAZDA, CHARLES A	U.S. ENVIRONMENTAL PROTECTION AGENCY

---

**Region Id:** 06

**Docid:** 138347

**Bates:** 004392                      **To:** 004393

**Date:** 04/08/2000

**Pages:** 2

**Title:** POLLUTION REPORT (POLREP) NO. 17 FOR MALONE SERVICE COMPANY SUPERFUND SITE

**Doc Type:** REPORT / STUDY

<u>Name</u>	<u>Organization</u>
<b>Author:</b> ZEHNER, WARREN	U.S. ENVIRONMENTAL PROTECTION AGENCY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> GAZDA, CHARLES A	U.S. ENVIRONMENTAL PROTECTION AGENCY

---

**Region Id:** 06

**Docid:** 138348

**Bates:** 004394                      **To:** 004395

**Date:** 04/15/2000

**Pages:** 2

**Title:** POLLUTION REPORT (POLREP) NO. 18 FOR MALONE SERVICE COMPANY SUPERFUND SITE

**Doc Type:** REPORT / STUDY

<u>Name</u>	<u>Organization</u>
<b>Author:</b> ZEHNER, WARREN	U.S. ENVIRONMENTAL PROTECTION AGENCY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> GAZDA, CHARLES A	U.S. ENVIRONMENTAL PROTECTION AGENCY

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**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
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**SSID:** GZ  
**Action:** RECORD OF DECISION

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**Region Id:** 06

**Docid:** 138349

**Bates:** 004396                      **To:** 004397

**Date:** 04/22/2000

**Pages:** 2

**Title:** POLLUTION REPORT (POLREP) NO. 19 FOR MALONE SERVICE COMPANY SUPERFUND SITE

**Doc Type:** REPORT / STUDY

<u>Name</u>	<u>Organization</u>
<b>Author:</b> ZEHNER, WARREN	U.S. ENVIRONMENTAL PROTECTION AGENCY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> GAZDA, CHARLES A	U.S. ENVIRONMENTAL PROTECTION AGENCY

---

**Region Id:** 06

**Docid:** 901640

**Bates:** 004398                      **To:** 004399

**Date:** 04/28/2000

**Pages:** 2

**Title:** [MALONE SERVICE COMPANY SITE FACT SHEET: U.S. EPA COMPLETES STABILIZATION EFFORTS AT FORMER RECLAMATION PLANT]

**Doc Type:** FACTSHEET

<u>Name</u>	<u>Organization</u>
<b>Author:</b> NONE,	U.S. ENVIRONMENTAL PROTECTION AGENCY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	NONE

---

**Region Id:** 06

**Docid:** 138350

**Bates:** 004400                      **To:** 004401

**Date:** 05/06/2000

**Pages:** 2

**Title:** POLLUTION REPORT (POLREP) NO. 20 FOR MALONE SERVICE COMPANY SUPERFUND SITE

**Doc Type:** REPORT / STUDY

<u>Name</u>	<u>Organization</u>
<b>Author:</b> ZEHNER, WARREN	U.S. ENVIRONMENTAL PROTECTION AGENCY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> GAZDA, CHARLES A	U.S. ENVIRONMENTAL PROTECTION AGENCY

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**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
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**Action:** RECORD OF DECISION

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**Region Id:** 06

**Docid:** 138351

**Bates:** 004402                      **To:** 004403

**Date:** 05/13/2000

**Pages:** 2

**Title:** POLLUTION REPORT (POLREP) NO. 21 FOR MALONE SERVICE COMPANY SUPERFUND SITE

**Doc Type:** REPORT / STUDY

<u>Name</u>	<u>Organization</u>
<b>Author:</b> ZEHNER, WARREN	U.S. ENVIRONMENTAL PROTECTION AGENCY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> GAZDA, CHARLES A	U.S. ENVIRONMENTAL PROTECTION AGENCY

---

**Region Id:** 06

**Docid:** 138352

**Bates:** 004404                      **To:** 004405

**Date:** 05/18/2000

**Pages:** 2

**Title:** [POLLUTION REPORT (POLREP) NO. 22 FOR MALONE SERVICE COMPANY SUPERFUND SITE]

**Doc Type:** REPORT / STUDY

<u>Name</u>	<u>Organization</u>
<b>Author:</b> ZEHNER, WARREN	U.S. ENVIRONMENTAL PROTECTION AGENCY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> GAZDA, CHARLES A	U.S. ENVIRONMENTAL PROTECTION AGENCY

---

**Region Id:** 06

**Docid:** 138353

**Bates:** 004406                      **To:** 004407

**Date:** 05/27/2000

**Pages:** 2

**Title:** POLLUTION REPORT (POLREP) NO. 23 FOR MALONE SERVICE COMPANY SUPERFUND SITE

**Doc Type:** REPORT / STUDY

<u>Name</u>	<u>Organization</u>
<b>Author:</b> ZEHNER, WARREN	U.S. ENVIRONMENTAL PROTECTION AGENCY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> GAZDA, CHARLES A	U.S. ENVIRONMENTAL PROTECTION AGENCY

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**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
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**SSID:** GZ  
**Action:** RECORD OF DECISION

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**Region Id:** 06

**Docid:** 138323

**Bates:** 004408

**To:** 004429

**Date:** 06/07/2000

**Pages:** 22

**Title:** [REMOVAL ACTION ADMINISTRATIVE RECORD FOR THE MALONE SERVICE COMPANY]

**Doc Type:** INDEX

<u>Name</u>	<u>Organization</u>
<b>Author:</b> NONE,	TECHLAW INCORPORATED
<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	U.S. ENVIRONMENTAL PROTECTION AGENCY

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**Region Id:** 06

**Docid:** 911139

**Bates:** 004430

**To:** 004431

**Date:** 11/20/2000

**Pages:** 2

**Title:** [REGARDING U.S. DEPARTMENT OF THE INTERIOR RECEIVING AND REVIEWING PRELIMINARY INFORMATION PROVIDED FROM EPA]

**Doc Type:** CORRESPONDENCE

<u>Name</u>	<u>Organization</u>
<b>Author:</b> SEKAVEC, GLENN B	UNITED STATES DEPARTMENT OF INTERIOR
<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> ABSHIRE, CHARLES	U.S. ENVIRONMENTAL PROTECTION AGENCY

---

**Region Id:** 06

**Docid:** 902992

**Bates:** 004432

**To:** 004432

**Date:** 06/01/2001

**Pages:** 1

**Title:** [U.S. EPA PUBLIC NOTICES JUNE 2001 - MALONE SERVICE COMPANY SITE PLACED ON NATIONAL PRIORITIES LIST]

**Doc Type:** NOTICE

<u>Name</u>	<u>Organization</u>
<b>Author:</b> NONE,	U.S. ENVIRONMENTAL PROTECTION AGENCY
<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	NONE

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**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
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**Action:** RECORD OF DECISION

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**Region Id:** 06

**Docid:** 914518

**Bates:** 004433                      **To:** 004434

**Date:** 06/14/2001

**Pages:** 2

**Title:** [MALONE SERVICES SITE IN TEXAS CITY ADDED TO SUPERFUND PRIORITIES LIST]

**Doc Type:** PRESS RELEASE

<u>Name</u>	<u>Organization</u>
<b>Author:</b> NONE,	U.S. ENVIRONMENTAL PROTECTION AGENCY
<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	NONE

---

**Region Id:** 06

**Docid:** 914519

**Bates:** 004435                      **To:** 004438

**Date:** 06/26/2001

**Pages:** 4

**Title:** [FOLLOW-UP REGARDING THE ADDITION OF MALONE SERVICES COMPANY ADDITION TO NATIONAL PRIORITIES LISTING]

**Doc Type:** CORRESPONDENCE

<u>Name</u>	<u>Organization</u>
<b>Author:</b> NONE,	NONE
<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	NONE

---

**Region Id:** 06

**Docid:** 926209

**Bates:** 004439                      **To:** 004440

**Date:** 09/10/2001

**Pages:** 2

**Title:** ACCESS ORDER / AGREEMENT FOR TRACY HOLLISTER OF SOUTHEAST TEXAS ENVIRONMENTAL

**Doc Type:** ACCESS AGREEMENT

<u>Name</u>	<u>Organization</u>
<b>Author:</b> HOLLISTER, TRACY L	SOUTHEAST TEXAS ENVIRONMENTAL
<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	U.S. ENVIRONMENTAL PROTECTION AGENCY

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**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

---

**Region Id:** 06

**Docid:** 861507

**Bates:** 004441                      **To:** 004825

**Date:** 12/01/2001

**Pages:** 385

**Title:** RISK ASSESSMENT GUIDANCE FOR SUPERFUND: VOLUME III - PART A, PROCESS FOR CONDUCTING PROBABILISTIC RISK ASSESSMENT - EPA 540-R-02-002 / OSWER 9285.7-45

**Doc Type:** ELECTRONIC RECORD  
REPORT / STUDY

	<u>Name</u>	<u>Organization</u>
<b>Author:</b> NONE,		U.S. ENVIRONMENTAL PROTECTION AGENCY
<b>Addressee:</b> NONE,		NONE

---

**Region Id:** 06

**Docid:** 928444

**Bates:** 004826                      **To:** 004862

**Date:** 01/30/2002

**Pages:** 37

**Title:** [PUBLIC HEALTH ASSESSMENT FOR THE MALONE SERVICE COMPANY - SWAN LAKE PLANT SUPERFUND SITE]

**Doc Type:** HEALTH ASSESSMENT

	<u>Name</u>	<u>Organization</u>
<b>Author:</b> NONE,		TEXAS DEPARTMENT OF HEALTH
<b>Addressee:</b> NONE,		U.S. ENVIRONMENTAL PROTECTION AGENCY

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# ADMINISTRATIVE RECORD INDEX

10/01/2009

Region Id: 06

## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

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**Region Id:** 06

**Docid:** 917600

**Bates:** 004862.001      **To:** 004862.003

**Date:** 09/26/2002

**Pages:** 3

**Title:** REQUEST FOR APPROVAL OF A CEILING INCREASE AND EMERGENCY AND CONSISTENCY EXEMPTIONS TO THE STATUTORY 12 MONTH TIME LIMIT TO CONDUCT A TIME-CRITICAL REMOVAL ACTION AT THE MALONE SERVICE COMPANY SITE

**Doc Type:** ACTION MEMORANDUM

<u>Name</u>	<u>Organization</u>
<b>Author:</b> ZEHNER, WARREN	U.S. ENVIRONMENTAL PROTECTION AGENCY
<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> KNUDSON, MYRON O	U.S. ENVIRONMENTAL PROTECTION AGENCY

---

**Region Id:** 06

**Docid:** 922711

**Bates:** 004863      **To:** 004863

**Date:** 05/01/2003

**Pages:** 1

**Title:** [U.S. EPA REGION 6 PUBLIC NOTICE: U.S. EPA REGION 6 RECEIVES LETTER OF INTENT TO APPLY FOR THE SITE TECHNICAL ASSISTANCE GRANT]

**Doc Type:** FACTSHEET  
ELECTRONIC RECORD

<u>Name</u>	<u>Organization</u>
<b>Author:</b> NONE,	U. S. ENVIRONMENTAL PROTECTION AGENCY ENVIRONMENTAL RESEARCH LABORATORY
<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	NONE



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## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

---

**Region Id:** 06

**Docid:** 190543

**Bates:** 004864                      **To:** 004974

**Date:** 09/29/2003

**Pages:** 111

**Title:** ADMINISTRATIVE ORDER ON CONSENT FOR THE REMEDIAL INVESTIGATION / FEASIBILITY STUDY AND SPECIFIED REMOVAL ACTIONS FOR THE MALONE SERVICE COMPANY SUPERFUND SITE [U.S. EPA VS MALONE SERVICE COMPANY, ET AL - DOCKET NO. CERCLA 06-18-03]

**Doc Type:** ADMINISTRATIVE ORDER (AOC)

<u>Name</u>	<u>Organization</u>
<b>Author:</b> BERNARDO, NAN	BASF CORPORATION
CARAVELLO, HALINA E	BAKER PETROLITE
FINLEY, G S	BAKER HUGHES OILFIELD OPERATIONS INCORPORATED
KNUDSON, MYRON O	U.S. ENVIRONMENTAL PROTECTION AGENCY
LINDLEY, STEVEN J	CHAMPION TECHNOLOGIES INCORPORATED
WALES, JOAN L	ATLANTIC RICHFIELD COMPANY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	NONE

---

**Region Id:** 06

**Docid:** 184881

**Bates:** 004975                      **To:** 005021

**Date:** 03/01/2004

**Pages:** 47

**Title:** FINAL STORMWATER MANAGEMENT PLAN FOR STORM WATER MANAGEMENT AT THE MALONE SERVICE COMPANY SUPERFUND SITE

**Doc Type:** WORK PLAN / AMENDMENT  
ELECTRONIC RECORD

<u>Name</u>	<u>Organization</u>
<b>Author:</b> NONE,	URS CORPORATION

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	NONE

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10/01/2009

Region Id: 06

## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

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**Region Id:** 06

**Docid:** 166441

**Bates:** 005022                      **To:** 005247

**Date:** 04/01/2004

**Pages:** 226

**Title:** [PRELIMINARY SITE CHARACTERIZATION REPORT FOR THE MALONE SERVICE COMPANY SUPERFUND SITE]

**Doc Type:** REPORT / STUDY  
ELECTRONIC RECORD

	<u>Name</u>	<u>Organization</u>
<b>Author:</b>	NONE,	URS CONSULTANTS INCORPORATED
<b>Addressee:</b>	NONE,	U.S. ENVIRONMENTAL PROTECTION AGENCY

---

**Region Id:** 06

**Docid:** 181439

**Bates:** 005248                      **To:** 005841

**Date:** 04/21/2004

**Pages:** 594

**Title:** REMOVAL REPORT FOR THE MALONE SERVICES SITE

**Doc Type:** REPORT / STUDY  
ELECTRONIC RECORD

	<u>Name</u>	<u>Organization</u>
<b>Author:</b>	NONE, NONE,	URS CORPORATION SANDIA TECHNOLOGIES LLC
<b>Addressee:</b>	NONE,	NONE

---

**Region Id:** 06

**Docid:** 181436

**Bates:** 005842                      **To:** 005986

**Date:** 07/01/2004

**Pages:** 145

**Title:** PRELIMINARY REMEDIAL ALTERNATIVES EVALUATION REPORT FOR MALONE SERVICE COMPANY SUPERFUND SITE

**Doc Type:** WORK PLAN / AMENDMENT  
ELECTRONIC RECORD

	<u>Name</u>	<u>Organization</u>
<b>Author:</b>	NONE,	URS CORPORATION

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Region Id: 06

## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OUID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

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<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE, NONE	U.S. ENVIRONMENTAL PROTECTION AGENCY

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**Region Id:** 06

**Docid:** 190545

**Bates:** 005987                      **To:** 006022

**Date:** 07/19/2004

**Pages:** 36

**Title:** FIRST AMENDMENT TO THE ADMINISTRATIVE ORDER ON CONSENT FOR REMEDIAL INVESTIGATION / FEASIBILITY STUDY US EPA DOCKET NO. CERCLA 06-18-03

**Doc Type:** ADMINISTRATIVE ORDER (AOC)

<u>Name</u>	<u>Organization</u>
<b>Author:</b> BERNARDO, NAN	BASF CORPORATION
BOLEN, ZANE K	EXXONMOBIL REFINING AND SUPPLY COMPANY
COLEMAN, SAMUEL	U.S. ENVIRONMENTAL PROTECTION AGENCY
CARAVELLO, HALINA E	BAKER PETROLITE
GORDON, TURL	CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
KELLER, A L	ATLANTIC RICHFIELD CO.
MCLEMORE, PAULA	DIXIE CHEMICAL COMPANY, INCORPORATED
MARTIN, MARCUS	NL INDUSTRIES INC
SAVNER, DAVID A	GENERAL DYNAMICS CORPORATION
ROSS, LOREN	CHAMPION TECHNOLOGIES INCORPORATED
STANLEY, DON	GOODYEAR TIRE & RUBBER COMPANY

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<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	NONE

---

**Region Id:** 06

**Docid:** 173956

**Bates:** 006023                      **To:** 006454

**Date:** 08/16/2004

**Pages:** 432

**Title:** REMOVAL REPORT FOR THE MALONE SERVICES SITE

**Doc Type:** REPORT / STUDY  
ELECTRONIC RECORD

<u>Name</u>	<u>Organization</u>
<b>Author:</b> NONE,	WESTON SOLUTIONS INCORPORATED

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<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	U.S. ENVIRONMENTAL PROTECTION AGENCY

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# ADMINISTRATIVE RECORD INDEX

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## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

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**Region Id:** 06

**Docid:** 825369

**Bates:** 006455                      **To:** 006455

**Date:** 09/20/2004

**Pages:** 1

**Title:** [OFFER TO DISCUSS EPA'S OVERSIGHT EXPECTATIONS FOR UPCOMING ACTIVITIES]

**Doc Type:** CORRESPONDENCE

	<u>Name</u>	<u>Organization</u>
<b>Author:</b>	ABSHIRE, CHARLES D	U.S. ENVIRONMENTAL PROTECTION AGENCY
<b>Addressee:</b>	PUGA, ROBERTO	PROJECT NAVIGATOR LTD

---

**Region Id:** 06

**Docid:** 9093903

**Bates:** 006456                      **To:** 006487

**Date:** 11/19/2004

**Pages:** 32

**Title:** QUALITY ASSURANCE PROJECT PLAN FOR STORMWATER AT THE MALONE SERVICE COMPANY

**Doc Type:** ELECTRONIC RECORD  
WORK PLAN / AMENDMENT

	<u>Name</u>	<u>Organization</u>
<b>Author:</b>	RAMSDEN, DAVID K BASILE, BRENDA P	URS CORPORATION URS CORPORATION
<b>Addressee:</b>	NONE,	U.S. ENVIRONMENTAL PROTECTION AGENCY

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Region Id: 06

## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

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**Region Id:** 06

**Docid:** 9093914

**Bates:** 006488                      **To:** 006488

**Date:** 11/22/2004

**Pages:** 1

**Title:** [URS NOTIFICATION OF CHANGES TO VARIOUS STORMWATER PLANS AFTER CONVERSATION WITH TCEQ REGARDING THE MALONE SERVICE COMPANY]

**Doc Type:** ELECTRONIC RECORD  
MEMORANDUM

<u>Name</u>	<u>Organization</u>
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<b>Author:</b> BASILE, BRENDA P	URS CORPORATION
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<u>Name</u>	<u>Organization</u>
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<b>Addressee:</b> ETHEREDGE, ALAN	URS CORPORATION
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**Region Id:** 06

**Docid:** 825340

**Bates:** 006489                      **To:** 006492

**Date:** 12/23/2004

**Pages:** 4

**Title:** [STORMWATER MANAGEMENT ANALYTICAL DATA DECEMBER 2004 AT THE MALONE SERVICE COMPANY]

**Doc Type:** ELECTRONIC RECORD  
CORRESPONDENCE  
SAMPLING / ANALYSIS

<u>Name</u>	<u>Organization</u>
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<b>Author:</b> RAMSDEN, DAVID K	URS CORPORATION
BASILE, BRENDA P	URS CORPORATION

<u>Name</u>	<u>Organization</u>
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<b>Addressee:</b> ABSHIRE, DAVID C	U.S. ENVIRONMENTAL PROTECTION AGENCY
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Region Id: 06

## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

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**Region Id:** 06

**Docid:** 184882

**Bates:** 006493                      **To:** 006547

**Date:** 03/01/2005

**Pages:** 55

**Title:** FINAL SAMPLING AND ANALYSIS PLAN QUALITY ASSURANCE PROJECT PLAN FOR STORMWATER MANAGEMENT AT THE MALONE SERVICES COMPANY SUPERFUND SITE

**Doc Type:** WORK PLAN / AMENDMENT  
ELECTRONIC RECORD

<b>Name</b>	<b>Organization</b>
<b>Author:</b> NONE,	URS CORPORATION

<b>Name</b>	<b>Organization</b>
<b>Addressee:</b> NONE,	U.S. ENVIRONMENTAL PROTECTION AGENCY

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**Region Id:** 06

**Docid:** 184883

**Bates:** 006548                      **To:** 006811

**Date:** 03/01/2005

**Pages:** 264

**Title:** FINAL HEALTH AND SAFETY PLAN FOR STORMWATER MANAGEMENT AT THE MALONE SERVICES COMPANY SUPERFUND SITE

**Doc Type:** WORK PLAN / AMENDMENT  
ELECTRONIC RECORD

<b>Name</b>	<b>Organization</b>
<b>Author:</b> NONE,	URS CORPORATION

<b>Name</b>	<b>Organization</b>
<b>Addressee:</b> NONE,	U.S. ENVIRONMENTAL PROTECTION AGENCY

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**Region Id:** 06

**Docid:** 213874

**Bates:** 006812                      **To:** 006878

**Date:** 03/01/2005

**Pages:** 67

**Title:** FINAL OPERATIONS AND MAINTENANCE PLAN FOR STORMWATER MANAGEMENT AT THE MALONE SERVICE COMPANY SUPERFUND SITE

**Doc Type:** WORK PLAN / AMENDMENT  
ELECTRONIC RECORD

<b>Name</b>	<b>Organization</b>
<b>Author:</b> NONE,	URS CORPORATION

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Region Id: 06

## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

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<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	U.S. ENVIRONMENTAL PROTECTION AGENCY

---

**Region Id:** 06

**Docid:** 9093913

**Bates:** 006879                      **To:** 006879

**Date:** 03/01/2005

**Pages:** 1

**Title:** EQUIPMENT MAINTENANCE RECOMMENDATION SHEET FORM MDWF-6 (FOR OPERATIONS) AT THE MALONE SERVICE COMPANY

**Doc Type:** ELECTRONIC RECORD  
FORM

---

<u>Name</u>	<u>Organization</u>
<b>Author:</b> NONE,	NONE

---

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	NONE

---

**Region Id:** 06

**Docid:** 9093912

**Bates:** 006880                      **To:** 006880

**Date:** 03/01/2005

**Pages:** 1

**Title:** DISCHARGE/INJECTION DECISION FORM MDWF-5 FOR DEEP WELL OPERATIONS AT THE MALONE SERVICE COMPANY

**Doc Type:** ELECTRONIC RECORD  
FORM

---

<u>Name</u>	<u>Organization</u>
<b>Author:</b> NONE,	NONE

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<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	NONE

---

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Region Id: 06

## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

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**Region Id:** 06

**Docid:** 9093911

**Bates:** 006881                      **To:** 006881

**Date:** 03/01/2005

**Pages:** 1

**Title:** DAILY INJECTION MONITORING LOG MDWF-4 FOR DEEP WELL OPERATIONS AT THE MALONE SERVICE COMPANY

**Doc Type:** ELECTRONIC RECORD  
LOG / LOG BOOK

<b>Name</b>	<b>Organization</b>
<b>Author:</b> NONE,	NONE

<b>Name</b>	<b>Organization</b>
<b>Addressee:</b> NONE,	NONE

---

**Region Id:** 06

**Docid:** 9093910

**Bates:** 006882                      **To:** 006882

**Date:** 03/01/2005

**Pages:** 1

**Title:** [MALONE SERVICE COMPANY SUPERFUND SITE DEEP WELL OPERATIONS SHUTDOWN CHECKLIST MDWF-3 (BLANK FORM)]

**Doc Type:** ELECTRONIC RECORD  
FORM

<b>Name</b>	<b>Organization</b>
<b>Author:</b> NONE,	NONE

<b>Name</b>	<b>Organization</b>
<b>Addressee:</b> NONE,	NONE

---

**Region Id:** 06

**Docid:** 9093907

**Bates:** 006883                      **To:** 006949

**Date:** 03/01/2005

**Pages:** 67

**Title:** FINAL OPERATIONS AND MAINTENANCE PLAN FOR STORMWATER MANAGEMENT AT THE MALONE SERVICE COMPANY

**Doc Type:** ELECTRONIC RECORD  
WORK PLAN / AMENDMENT

<b>Name</b>	<b>Organization</b>
<b>Author:</b> NONE,	URS CORPORATION



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## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

---

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	U.S. ENVIRONMENTAL PROTECTION AGENCY

---

**Region Id:** 06

**Docid:** 9093901

**Bates:** 006950                      **To:** 006997

**Date:** 03/01/2005

**Pages:** 48

**Title:** FINAL STORMWATER MANAGEMENT PLAN FOR STORMWATER MANAGEMENT AT THE MALONE SERVICE COMPANY

**Doc Type:** ELECTRONIC RECORD  
WORK PLAN / AMENDMENT

---

<u>Name</u>	<u>Organization</u>
<b>Author:</b> NONE,	URS CORPORATION

---

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	U.S. ENVIRONMENTAL PROTECTION AGENCY

---

**Region Id:** 06

**Docid:** 825338

**Bates:** 006998                      **To:** 006998

**Date:** 03/15/2005

**Pages:** 1

**Title:** [TRANSMITTAL OF FINAL STORM WATER MANAGEMENT PLAN, DEEP WELL OPERATIONS AND MAINTENANCE PLAN, AND DEEP WELL OPERATIONS HEALTH AND SAFETY PLAN FOR MALONE SERVICE COMPANY]

**Doc Type:** ELECTRONIC RECORD  
CORRESPONDENCE

---

<u>Name</u>	<u>Organization</u>
<b>Author:</b> PUGA, ROBERTO	PROJECT NAVIGATOR LTD

---

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> ABSHIRE, DAVID C	U.S. ENVIRONMENTAL PROTECTION AGENCY

---

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## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

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**Region Id:** 06

**Docid:** 217240

**Bates:** 006999                      **To:** 007050

**Date:** 03/16/2005

**Pages:** 52

**Title:** MALONE SERVICES CORPORATION INJECTION WELL WDW-138 2005 MECHANICAL INTEGRITY TEST & BOTTOMHOLE PRESSURE SURVEY REPORT

**Doc Type:** ELECTRONIC RECORD  
REPORT / STUDY

<u>Name</u>	<u>Organization</u>
<b>Author:</b> NONE,	SANDIA TECHNOLOGIES LLC

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	URS CORPORATION

---

**Region Id:** 06

**Docid:** 825339

**Bates:** 007051                      **To:** 007051

**Date:** 03/22/2005

**Pages:** 1

**Title:** [EPA ACKNOWLEDGEMENT OF RECEIPT OF TCEQ'S AND EPA'S APPROVAL OF FINAL STORMWATER MANAGEMENT PLAN]

**Doc Type:** CORRESPONDENCE

<u>Name</u>	<u>Organization</u>
<b>Author:</b> ABSHIRE, CHARLES D	U.S. ENVIRONMENTAL PROTECTION AGENCY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> PUGA, ROBERTO	PROJECT NAVIGATOR LTD

---

**Region Id:** 06

**Docid:** 194893

**Bates:** 007052                      **To:** 007512

**Date:** 05/01/2005

**Pages:** 461

**Title:** FINAL REMEDIAL INVESTIGATION / FEASIBILITY STUDY WORK PLAN FOR MALONE SERVICE COMPANY SUPERFUND SITE

**Doc Type:** WORK PLAN / AMENDMENT  
ELECTRONIC RECORD

<u>Name</u>	<u>Organization</u>
<b>Author:</b> NONE,	URS CORPORATION

<u>Name</u>	<u>Organization</u>
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10/01/2009

Region Id: 06

## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

---

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	U.S. ENVIRONMENTAL PROTECTION AGENCY

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**Region Id:** 06

**Docid:** 194896

**Bates:** 007513                      **To:** 007924

**Date:** 05/01/2005

**Pages:** 412

**Title:** FINAL HEALTH AND SAFETY PLAN FOR REMEDIAL INVESTIGATION AT MALONE SERVICES COMPANY SUPERFUND SITE

**Doc Type:** WORK PLAN / AMENDMENT  
ELECTRONIC RECORD

---

<u>Name</u>	<u>Organization</u>
<b>Author:</b> NONE,	URS CORPORATION

---

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	U.S. ENVIRONMENTAL PROTECTION AGENCY

---

**Region Id:** 06

**Docid:** 865363

**Bates:** 007925                      **To:** 007950

**Date:** 05/01/2005

**Pages:** 26

**Title:** COMMUNITY INVOLVEMENT PLAN - MALONE SERVICES COMPANY SITE

**Doc Type:** ELECTRONIC RECORD  
COMMUNITY RELATIONS PLAN

---

<u>Name</u>	<u>Organization</u>
<b>Author:</b> NONE,	U.S. ENVIRONMENTAL PROTECTION AGENCY

---

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	NONE

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## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

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**Region Id:** 06

**Docid:** 825360

**Bates:** 007951                      **To:** 007951

**Date:** 05/10/2005

**Pages:** 1

**Title:** [RECEIPT OF TCEQ AND THE EPA'S APPROVAL OF WDW-138 2005 MECHANICAL INTEGRITY TEST AND BOTTOMHOLE PRESSURE SURVEY REPORT]

**Doc Type:** CORRESPONDENCE

<u>Name</u>	<u>Organization</u>
<b>Author:</b> ABSHIRE, CHARLES D	U.S. ENVIRONMENTAL PROTECTION AGENCY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> PUGA, ROBERTO	PROJECT NAVIGATOR LTD

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**Region Id:** 06

**Docid:** 194901

**Bates:** 007952                      **To:** 007956

**Date:** 05/13/2005

**Pages:** 5

**Title:** [MARCH 2005 AND APRIL 2005 MONTHLY PROGRESS REPORTS FOR MALONE SERVICE COMPANY SITE]

**Doc Type:** REPORT / STUDY  
ELECTRONIC RECORD

<u>Name</u>	<u>Organization</u>
<b>Author:</b> PUGA, ROBERTO	PROJECT NAVIGATOR LTD

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> ABSHIRE, CHARLES	U.S. ENVIRONMENTAL PROTECTION AGENCY

---

**Region Id:** 06

**Docid:** 194903

**Bates:** 007957                      **To:** 007959

**Date:** 06/15/2005

**Pages:** 3

**Title:** [MAY 2005 MONTHLY PROGRESS REPORT FOR MALONE SERVICE COMPANY SITE]

**Doc Type:** REPORT / STUDY  
ELECTRONIC RECORD

<u>Name</u>	<u>Organization</u>
<b>Author:</b> PUGA, ROBERTO	PROJECT NAVIGATOR LTD

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> ABSHIRE, CHARLES	U.S. ENVIRONMENTAL PROTECTION AGENCY

# ADMINISTRATIVE RECORD INDEX

10/01/2009

Region Id: 06

## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

---

**Region Id:** 06

**Docid:** 825346

**Bates:** 007960                      **To:** 007967

**Date:** 06/29/2005

**Pages:** 8

**Title:** [EPA COMMENTS ON THE FINAL WORK PLAN FOR THE REMEDIAL INVESTIGATION / FEASIBILITY STUDY AT THE MALONE SERVICE COMPANY]

**Doc Type:** ELECTRONIC RECORD  
CORRESPONDENCE

<u>Name</u>	<u>Organization</u>
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<b>Author:</b> ABSHIRE, DAVID C	U.S. ENVIRONMENTAL PROTECTION AGENCY
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<u>Name</u>	<u>Organization</u>
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<b>Addressee:</b> PUGA, ROBERTO	PROJECT NAVIGATOR LTD
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**Region Id:** 06

**Docid:** 194904

**Bates:** 007968                      **To:** 007970

**Date:** 07/15/2005

**Pages:** 3

**Title:** [JUNE 2005 MONTHLY PROGRESS REPORT MALONE SERVICE COMPANY SITE]

**Doc Type:** REPORT / STUDY  
ELECTRONIC RECORD

<u>Name</u>	<u>Organization</u>
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<b>Author:</b> PUGA, ROBERTO	PROJECT NAVIGATOR LTD
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<u>Name</u>	<u>Organization</u>
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<b>Addressee:</b> ABSHIRE, CHARLES	U.S. ENVIRONMENTAL PROTECTION AGENCY
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# ADMINISTRATIVE RECORD INDEX

10/01/2009

Region Id: 06

## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

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**Region Id:** 06

**Docid:** 194906

**Bates:** 007971                      **To:** 007973

**Date:** 08/15/2005

**Pages:** 3

**Title:** [JULY 2005 MONTHLY PROGRESS REPORT MALONE SERVICE COMPANY SITE]

**Doc Type:** REPORT / STUDY  
ELECTRONIC RECORD

<u>Name</u>	<u>Organization</u>
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<b>Author:</b> PUGA, ROBERTO	PROJECT NAVIGATOR LTD
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<u>Name</u>	<u>Organization</u>
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<b>Addressee:</b> ABSHIRE, CHARLES	U.S. ENVIRONMENTAL PROTECTION AGENCY
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**Region Id:** 06

**Docid:** 194907

**Bates:** 007974                      **To:** 007976

**Date:** 09/15/2005

**Pages:** 3

**Title:** [AUGUST 2005 MONTHLY PROGRESS REPORT MALONE SERVICE COMPANY SITE]

**Doc Type:** REPORT / STUDY  
ELECTRONIC RECORD

<u>Name</u>	<u>Organization</u>
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<b>Author:</b> PUGA, ROBERTO	PROJECT NAVIGATOR LTD
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<u>Name</u>	<u>Organization</u>
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<b>Addressee:</b> ABSHIRE, CHARLES	U.S. ENVIRONMENTAL PROTECTION AGENCY
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**Region Id:** 06

**Docid:** 194909

**Bates:** 007977                      **To:** 007981

**Date:** 10/17/2005

**Pages:** 5

**Title:** [SEPTEMBER 2005 MONTHLY PROGRESS REPORT MALONE SERVICE COMPANY SITE]

**Doc Type:** REPORT / STUDY  
ELECTRONIC RECORD

<u>Name</u>	<u>Organization</u>
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<b>Author:</b> PUGA, ROBERTO	PROJECT NAVIGATOR LTD
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<u>Name</u>	<u>Organization</u>
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<b>Addressee:</b> ABSHIRE, CHARLES	U.S. ENVIRONMENTAL PROTECTION AGENCY
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# ADMINISTRATIVE RECORD INDEX

10/01/2009

Region Id: 06

## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

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**Region Id:** 06

**Docid:** 194910

**Bates:** 007982                      **To:** 007984

**Date:** 11/15/2005

**Pages:** 3

**Title:** [OCTOBER 2005 MONTHLY PROGRESS REPORT MALONE SERVICE COMPANY SITE]

**Doc Type:** REPORT / STUDY  
ELECTRONIC RECORD

<u>Name</u>	<u>Organization</u>
<b>Author:</b> PUGA, ROBERTO	PROJECT NAVIGATOR LTD

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> ABSHIRE, CHARLES	U.S. ENVIRONMENTAL PROTECTION AGENCY

---

**Region Id:** 06

**Docid:** 865250

**Bates:** 007985                      **To:** 008030

**Date:** 03/29/2006

**Pages:** 46

**Title:** [MALONE SERVICE CORPORATION INJECTION WELL WDW-138 2006 MECHANICAL INTEGRITY TEST AND BOTTOMHOLE PRESSURE SURVEY REPORT]

**Doc Type:** ELECTRONIC RECORD

<u>Name</u>	<u>Organization</u>
<b>Author:</b> GRANT, MICHAEL	SANDIA TECHNOLOGIES LLC

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	NONE

---

**Region Id:** 06

**Docid:** 202779

**Bates:** 008031                      **To:** 009197

**Date:** 04/01/2006

**Pages:** 1167

**Title:** FINAL REMEDIAL INVESTIGATION REPORT FOR THE MALONE SERVICE COMPANY SUPERFUND SITE

**Doc Type:** REPORT / STUDY  
ELECTRONIC RECORD

<u>Name</u>	<u>Organization</u>
<b>Author:</b> NONE,	URS CONSULTANTS INCORPORATED

<u>Name</u>	<u>Organization</u>
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# ADMINISTRATIVE RECORD INDEX

10/01/2009

Region Id: 06

## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT

**CERCLIS:** TXD980864789

**OID:** 00

**SSID:** GZ

**Action:** RECORD OF DECISION

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<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	NONE

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**Region Id:** 06

**Docid:** 830623

**Bates:** 009198

**To:** 010868

**Date:** 06/01/2006

**Pages:** 1671

**Title:** FINAL BASELINE HUMAN HEALTH RISK ASSESSMENT AT MALONE SERVICE COMPANY SITE

**Doc Type:** ELECTRONIC RECORD  
REPORT / STUDY

<u>Name</u>	<u>Organization</u>
<b>Author:</b> NONE,	URS CORPORATION

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	MALONE COOPERATING PARTIES
NONE,	U.S. ENVIRONMENTAL PROTECTION AGENCY

---

**Region Id:** 06

**Docid:** 217244

**Bates:** 010869

**To:** 010870

**Date:** 06/13/2006

**Pages:** 2

**Title:** [EPA APPROVAL FOR FINAL REMEDIAL INVESTIGATION REPORT FOR MALONE SERVICE COMPANY]

**Doc Type:** ELECTRONIC RECORD  
CORRESPONDENCE

<u>Name</u>	<u>Organization</u>
<b>Author:</b> ABSHIRE, CHARLES D	U.S. ENVIRONMENTAL PROTECTION AGENCY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> PUGA, ROBERTO	PROJECT NAVIGATOR LTD

---



# ADMINISTRATIVE RECORD INDEX

10/01/2009

Region Id: 06

## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

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**Region Id:** 06

**Docid:** 825345

**Bates:** 010871                      **To:** 010871

**Date:** 06/14/2006

**Pages:** 1

**Title:** [EPA ACKNOWLEDGEMENT OF RECEIPT OF TCEQ'S AND EPA'S APPROVAL OF FINAL REMEDIAL INVESTIGATION REPORT DOCUMENT]

**Doc Type:** CORRESPONDENCE

<u>Name</u>	<u>Organization</u>
<b>Author:</b> ABSHIRE, CHARLES D	U.S. ENVIRONMENTAL PROTECTION AGENCY
<b>Addressee:</b> PUGA, ROBERTO	PROJECT NAVIGATOR LTD

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**Region Id:** 06

**Docid:** 830617

**Bates:** 010872                      **To:** 011561

**Date:** 07/01/2006

**Pages:** 690

**Title:** FINAL SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT - BASELINE ECOLOGICAL RISK ASSESSMENT PROBLEM FORMULATION - BASELINE ECOLOGICAL RISK ASSESSMENT WORKPLAN AT THE MALONE SERVICE COMPANY SUPERFUND SITE]

**Doc Type:** ELECTRONIC RECORD  
HEALTH ASSESSMENT

<u>Name</u>	<u>Organization</u>
<b>Author:</b> NONE,	URS CORPORATION
<b>Addressee:</b> NONE, NONE,	U.S. ENVIRONMENTAL PROTECTION AGENCY MALONE COOPERATING PARTIES

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# ADMINISTRATIVE RECORD INDEX

10/01/2009

Region Id: 06

## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

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**Region Id:** 06

**Docid:** 825370

**Bates:** 011562                      **To:** 011565

**Date:** 08/03/2006

**Pages:** 4

**Title:** [PROJECT NAVIGATOR, LIMITED REGARDING THE PROPOSED ACTIONS TO MANAGE THE LIQUID CONTENTS OF SELECTED ABOVE-GROUND TANKS AT THE MALONE SERVICES SUPERFUND SITE IN TEXAS CITY, TEXAS]

**Doc Type:** CORRESPONDENCE

	<u>Name</u>	<u>Organization</u>
<b>Author:</b>	PUGA, ROBERTO	PROJECT NAVIGATOR LTD
<b>Addressee:</b>	ABSHIRE, CHARLES D	U.S. ENVIRONMENTAL PROTECTION AGENCY

---

**Region Id:** 06

**Docid:** 825361

**Bates:** 011566                      **To:** 011567

**Date:** 08/09/2006

**Pages:** 2

**Title:** [EPA APPROVED THE MCP'S REQUEST TO CHARACTERIZE THE TANK CONTENTS AS OUTLINED IN ITS AUGUST 3, 2006 LETTER]

**Doc Type:** CORRESPONDENCE

	<u>Name</u>	<u>Organization</u>
<b>Author:</b>	ABSHIRE, CHARLES D	U.S. ENVIRONMENTAL PROTECTION AGENCY
<b>Addressee:</b>	PUGA, ROBERTO	PROJECT NAVIGATOR LTD

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**Region Id:** 06

**Docid:** 210035

**Bates:** 011568                      **To:** 011569

**Date:** 10/16/2006

**Pages:** 2

**Title:** [FINDINGS AND PAST DISCUSSIONS BETWEEN EPA AND MALONE COOPERATING PARTIES ON FINAL TREATABILITY STUDY REPORT]

**Doc Type:** REPORT / STUDY

	<u>Name</u>	<u>Organization</u>
<b>Author:</b>	ABSHIRE, CHARLES	U.S. ENVIRONMENTAL PROTECTION AGENCY
<b>Addressee:</b>	PUGA, ROBERTO	PROJECT NAVIGATOR LTD

# ADMINISTRATIVE RECORD INDEX

10/01/2009

Region Id: 06

## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

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**Region Id:** 06

**Docid:** 825330

**Bates:** 011570                      **To:** 011583

**Date:** 11/01/2006

**Pages:** 14

**Title:** TECHNICAL MEMORANDUM - EVALUATION: ARE LAND DISPOSAL RESTRICTIONS AN APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENT FOR MALONE SERVICE COMPANY

**Doc Type:** ELECTRONIC RECORD  
MEMORANDUM

<u>Name</u>	<u>Organization</u>
<b>Author:</b> NONE,	MALONE COOPERATING PARTIES

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	U.S. ENVIRONMENTAL PROTECTION AGENCY

---

**Region Id:** 06

**Docid:** 825373

**Bates:** 011584                      **To:** 011584

**Date:** 01/08/2007

**Pages:** 1

**Title:** [LAND DISPOSAL RESTRICTIONS DO NOT APPLY AT THE MALONE SERVICE COMPANY SUPERFUND SITE LOCATED IN TEXAS CITY, TEXAS]

**Doc Type:** CORRESPONDENCE

<u>Name</u>	<u>Organization</u>
<b>Author:</b> ABSHIRE, CHARLES D	U.S. ENVIRONMENTAL PROTECTION AGENCY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> PUGA, ROBERTO	PROJECT NAVIGATOR LTD

# ADMINISTRATIVE RECORD INDEX

10/01/2009

Region Id: 06

## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

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**Region Id:** 06

**Docid:** 826723

**Bates:** 011585                      **To:** 011585

**Date:** 03/07/2007

**Pages:** 1

**Title:** [TCEQ REVIEW OF SOLIDIFICATION/STABILIZATION TREATABILITY STUDY MALONE SERVICE COMPANY SUPERFUND SITE]

**Doc Type:** CORRESPONDENCE

<u>Name</u>	<u>Organization</u>
<b>Author:</b> DUKE, FAY	TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> ABSHIRE, DAVID C	U.S. ENVIRONMENTAL PROTECTION AGENCY

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**Region Id:** 06

**Docid:** 217251

**Bates:** 011586                      **To:** 011691

**Date:** 03/15/2007

**Pages:** 106

**Title:** MALONE SERVICE CORPORATION INJECTION WELL WDW-138 2007 MECHANICAL INTEGRITY TEST & BOTTOMHOLE PRESSURE SURVEY REPORT

**Doc Type:** ELECTRONIC RECORD  
REPORT / STUDY

<u>Name</u>	<u>Organization</u>
<b>Author:</b> NONE,	NONE

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	NONE

---

**Region Id:** 06

**Docid:** 9079073

**Bates:** 011692                      **To:** 011693

**Date:** 05/01/2001

**Pages:** 2

**Title:** [TCEQ TRANSMITTAL AND APPROVAL OF MALONE SERVICE CORPORATION INJECTION WELL WDW-138 2007 MECHANICAL INTEGRITY TEST & BOTTOMHOLE PRESSURE SURVEY REPORT]

**Doc Type:** ELECTRONIC RECORD  
CORRESPONDENCE

<u>Name</u>	<u>Organization</u>
<b>Author:</b> DUKE, FAY	TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

# ADMINISTRATIVE RECORD INDEX

10/01/2009

Region Id: 06

## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

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<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> ABSHIRE, CHARLES D	U.S. ENVIRONMENTAL PROTECTION AGENCY

---

**Region Id:** 06

**Docid:** 825344

**Bates:** 011694                      **To:** 011694

**Date:** 05/21/2007

**Pages:** 1

**Title:** [EPA HAS APPROVED THE FINAL BASELINE HUMAN HEALTH RISK ASSESSMENT REPORT FOR THE MALONE SERVICE COMPANY SUPERFUND SITE]

**Doc Type:** CORRESPONDENCE

<u>Name</u>	<u>Organization</u>
<b>Author:</b> ABSHIRE, CHARLES D	U.S. ENVIRONMENTAL PROTECTION AGENCY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> PUGA, ROBERTO	PROJECT NAVIGATOR LTD

---

**Region Id:** 06

**Docid:** 830616

**Bates:** 011695                      **To:** 012562

**Date:** 07/01/2007

**Pages:** 868

**Title:** FINAL BASELINE ECOLOGICAL RISK ASSESSMENT - MALONE SERVICE COMPANY SUPERFUND SITE

**Doc Type:** ELECTRONIC RECORD  
HEALTH ASSESSMENT

<u>Name</u>	<u>Organization</u>
<b>Author:</b> NONE,	URS CORPORATION

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE, NONE,	MALONE COOPERATING PARTIES U.S. ENVIRONMENTAL PROTECTION AGENCY

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# ADMINISTRATIVE RECORD INDEX

10/01/2009

Region Id: 06

## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

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**Region Id:** 06

**Docid:** 951052

**Bates:** 012563                      **To:** 012585

**Date:** 01/02/2007

**Pages:** 23

**Title:** [RESPONSE TO EPA, TRUSTEE, EA ENGINEERING AND TCEQ COMMENTS ON DRAFT  
BASELINE ECOLOGICAL RISK ASSESSMENT REPORT FOR MALONE SERVICE COMPANY  
SUPERFUND SITE]

**Doc Type:** ELECTRONIC RECORD  
CORRESPONDENCE  
HEALTH ASSESSMENT

**Name**

**Organization**

**Author:** PUGA, ROBERTO

PROJECT NAVIGATOR LTD

**Name**

**Organization**

**Addressee:** ABSHIRE, CHARLES D

U.S. ENVIRONMENTAL PROTECTION AGENCY

---

**Region Id:** 06

**Docid:** 217249

**Bates:** 012586                      **To:** 012586

**Date:** 07/02/2007

**Pages:** 1

**Title:** [TCEQ APPROVAL OF FINAL BASELINE ECOLOGICAL RISK ASSESSMENT REPORT FOR  
MALONE SERVICE COMPANY]

**Doc Type:** ELECTRONIC RECORD  
CORRESPONDENCE

**Name**

**Organization**

**Author:** DUKE, FAY

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

**Name**

**Organization**

**Addressee:** ABSHIRE, CHARLES D

U.S. ENVIRONMENTAL PROTECTION AGENCY

# ADMINISTRATIVE RECORD INDEX

10/01/2009

Region Id: 06

## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

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**Region Id:** 06

**Docid:** 825290

**Bates:** 012587                      **To:** 012588

**Date:** 07/02/2007

**Pages:** 2

**Title:** [TCEQ REVIEW OF DRAFT SUPPLEMENTAL TREATABILITY STUDY REPORT MALONE SERVICE COMPANY SUPERFUND SITE]

**Doc Type:** CORRESPONDENCE

<u>Name</u>	<u>Organization</u>
<b>Author:</b> DUKE, FAY	TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> ABSHIRE, CHARLES D	U.S. ENVIRONMENTAL PROTECTION AGENCY

---

**Region Id:** 06

**Docid:** 991247

**Bates:** 012589                      **To:** 012591

**Date:** 08/02/2007

**Pages:** 3

**Title:** EPA COMMENTS ON: DRAFT WORK PLAN - ADDITIONAL STABILIZATION /SOLIDIFICATION TREATABILITY STUDY FOR THE MALONE SERVICE COMPANY SUPERFUND SITE, TEXAS CITY, TEXAS

**Doc Type:** OTHER

<u>Name</u>	<u>Organization</u>
<b>Author:</b> NONE,	NONE

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	NONE

---

**Region Id:** 06

**Docid:** 825362

**Bates:** 012592                      **To:** 012592

**Date:** 09/17/2007

**Pages:** 1

**Title:** [TCEQ REVIEW OF ADDENDUM NO. 1 TO STORM WATER MANAGEMENT PLAN TO CONDUCT REMOVAL OF LIQUIDS FROM ON-SITE TANKS AT MALONE SERVICE COMPANY]

**Doc Type:** CORRESPONDENCE

<u>Name</u>	<u>Organization</u>
<b>Author:</b> DUKE, FAY	TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> ABSHIRE, CHARLES D	U.S. ENVIRONMENTAL PROTECTION AGENCY

# ADMINISTRATIVE RECORD INDEX

10/01/2009

Region Id: 06

## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

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**Region Id:** 06

**Docid:** 825343

**Bates:** 012593                      **To:** 012593

**Date:** 09/25/2007

**Pages:** 1

**Title:** [EPA APPROVED THE REVISED FINAL BASELINE ECOLOGICAL RISK ASSESSMENT DOCUMENT FOR THE MALONE SERVICE SITE]

**Doc Type:** CORRESPONDENCE

<u>Name</u>	<u>Organization</u>
<b>Author:</b> ABSHIRE, CHARLES D	U.S. ENVIRONMENTAL PROTECTION AGENCY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> PUGA, ROBERTO	PROJECT NAVIGATOR LTD

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**Region Id:** 06

**Docid:** 826399

**Bates:** 012594                      **To:** 014137

**Date:** 02/01/2008

**Pages:** 1544

**Title:** STABILIZATION/SOLIDIFICATION TREATABILITY STUDY REPORT FOR MALONE SERVICE COMPANY

**Doc Type:** ELECTRONIC RECORD  
REPORT / STUDY

<u>Name</u>	<u>Organization</u>
<b>Author:</b> NONE,	SHAW TECHNOLOGY APPLICATIONS LABORATORY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	U.S. ENVIRONMENTAL PROTECTION AGENCY

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10/01/2009

Region Id: 06

## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

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**Region Id:** 06

**Docid:** 826722

**Bates:** 014138                      **To:** 014138

**Date:** 03/11/2008

**Pages:** 1

**Title:** [EPA REVIEW OF THE STABILIZATION/SOLIDIFICATION TREATABILITY STUDY REPORT FOR THE MALONE SERVICE COMPANY SUPERFUND SITE IN TEXAS CITY, TEXAS]

**Doc Type:** CORRESPONDENCE

<u>Name</u>	<u>Organization</u>
<b>Author:</b> ABSHIRE, CHARLES D	U.S. ENVIRONMENTAL PROTECTION AGENCY
<b>Addressee:</b> PUGA, ROBERTO	PROJECT NAVIGATOR LTD

---

**Region Id:** 06

**Docid:** 865251

**Bates:** 014139                      **To:** 014189

**Date:** 03/25/2008

**Pages:** 51

**Title:** MALONE SERVICE CORPORATION INJECTION WELL WDW-138 2008 MECHANICAL INTEGRITY TEST & BOTTOMHOLE PRESSURE SURVEY REPORT

**Doc Type:** ELECTRONIC RECORD  
REPORT / STUDY

<u>Name</u>	<u>Organization</u>
<b>Author:</b> NONE,	SANDIA TECHNOLOGIES LLC
<b>Addressee:</b> NONE,	NONE

---

**Region Id:** 06

**Docid:** 9050758

**Bates:** 014190                      **To:** 014208

**Date:** 06/13/2008

**Pages:** 19

**Title:** [TRANSMITTAL OF FINAL FEASIBILITY STUDY WITH RESPONSE TO COMMENTS]

**Doc Type:** ELECTRONIC RECORD  
CORRESPONDENCE  
TABLE

<u>Name</u>	<u>Organization</u>
<b>Author:</b> PUGA, ROBERTO	PROJECT NAVIGATOR LTD

# ADMINISTRATIVE RECORD INDEX

10/01/2009

Region Id: 06

## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT

**CERCLIS:** TXD980864789

**OID:** 00

**SSID:** GZ

**Action:** RECORD OF DECISION

---

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> ABSHIRE, DAVID C	U.S. ENVIRONMENTAL PROTECTION AGENCY

---

**Region Id:** 06

**Docid:** 830615

**Bates:** 014209                      **To:** 014575

**Date:** 06/13/2008

**Pages:** 367

**Title:** FINAL FEASIBILITY STUDY FOR MALONE SERVICE COMPANY SUPERFUND SITE

**Doc Type:** REPORT / STUDY  
ELECTRONIC RECORD

<u>Name</u>	<u>Organization</u>
<b>Author:</b> PUGA, ROBERTO	PROJECT NAVIGATOR LTD

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> ABSHIRE, CHARLES D	U.S. ENVIRONMENTAL PROTECTION AGENCY

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**Region Id:** 06

**Docid:** 951054

**Bates:** 014576                      **To:** 014594

**Date:** 06/13/2008

**Pages:** 19

**Title:** [MALONE SERVICE COMPANY TABLE ONE: RESPONSE TO EPA COMMENTS]

**Doc Type:** REPORT / STUDY  
ELECTRONIC RECORD

<u>Name</u>	<u>Organization</u>
<b>Author:</b> PUGA, ROBERTO	PROJECT NAVIGATOR LTD

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE, NONE,	U.S. ENVIRONMENTAL PROTECTION AGENCY MALONE COOPERATING PARTIES

---

# ADMINISTRATIVE RECORD INDEX

10/01/2009

Region Id: 06

## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

---

**Region Id:** 06

**Docid:** 9059306

**Bates:** 014595                      **To:** 014657

**Date:** 07/01/2008

**Pages:** 63

**Title:** [TANK LIQUID CONSOLIDATION AND REMOVAL TECHNICAL MEMORANDUM STORM WATER MANAGEMENT - MALONE SERVICES COMPANY SUPERFUND SITE]

**Doc Type:** ELECTRONIC RECORD  
REPORT / STUDY

<u>Name</u>	<u>Organization</u>
<b>Author:</b> PUGA, ROBERTO	PROJECT NAVIGATOR LTD

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> ABSHIRE, CHARLES D	U.S. ENVIRONMENTAL PROTECTION AGENCY

---

**Region Id:** 06

**Docid:** 860961

**Bates:** 014658                      **To:** 014658

**Date:** 09/24/2008

**Pages:** 1

**Title:** [TEXAS HISTORICAL COMMISSION PROJECT REVIEW UNDER SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION ACT OF 1966 CAMPBELL BAYOU CEMETERY AT THE MALONE SERVICES SUPERFUND SITE]

**Doc Type:** ELECTRONIC RECORD  
CORRESPONDENCE

<u>Name</u>	<u>Organization</u>
<b>Author:</b> OAKS, F. LAWRENCE	TEXAS HISTORICAL COMMISSION

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> ABSHIRE, CHARLES D	U.S. ENVIRONMENTAL PROTECTION AGENCY

# ADMINISTRATIVE RECORD INDEX

10/01/2009

Region Id: 06

## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

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**Region Id:** 06

**Docid:** 9059307

**Bates:** 014659                      **To:** 014659

**Date:** 12/16/2008

**Pages:** 1

**Title:** [TRANSMITTAL OF THE TANK LIQUID CONSOLIDATION AND REMOVAL REPORT FOR MALONE SERVICE COMPANY SUPERFUND SITE]

**Doc Type:** ELECTRONIC RECORD  
CORRESPONDENCE

<u>Name</u>	<u>Organization</u>
<b>Author:</b> PUGA, ROBERTO	PROJECT NAVIGATOR LTD

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> ABSHIRE, CHARLES D	U.S. ENVIRONMENTAL PROTECTION AGENCY

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**Region Id:** 06

**Docid:** 860123

**Bates:** 014660                      **To:** 014660

**Date:** 12/22/2008

**Pages:** 1

**Title:** [EPA APPROVAL LETTER FOR MALONE SERVICE COMPANY FEASIBILITY STUDY DOCUMENT]

**Doc Type:** CORRESPONDENCE  
ELECTRONIC RECORD

<u>Name</u>	<u>Organization</u>
<b>Author:</b> ABSHIRE, CHARLES D	U.S. ENVIRONMENTAL PROTECTION AGENCY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> PUGA, ROBERTO	PROJECT NAVIGATOR LTD

---

**Region Id:** 06

**Docid:** 865252

**Bates:** 014661                      **To:** 014723

**Date:** 03/24/2009

**Pages:** 63

**Title:** [MALONE SERVICE CORPORATION INJECTION WELL WDW-138 2009 MECHANICAL INTEGRITY TEST AND BOTTOMHOLE PRESSURE SURVEY REPORT]

**Doc Type:** REPORT / STUDY  
ELECTRONIC RECORD

<u>Name</u>	<u>Organization</u>
<b>Author:</b> NONE,	SANDIA TECHNOLOGIES LLC

# ADMINISTRATIVE RECORD INDEX

10/01/2009

Region Id: 06

## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

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<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	NONE

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**Region Id:** 06

**Docid:** 864247

**Bates:** 014724                      **To:** 014728

**Date:** 04/14/2009

**Pages:** 5

**Title:** [MEMORANDUM: WELL LOG FOR MALONE WATER SUPPLY WELL (IN REFERENCE TO NO DEEP GROUND WATER MONITORING)]

**Doc Type:** ELECTRONIC RECORD  
INDEX

<u>Name</u>	<u>Organization</u>
<b>Author:</b> BASILE, BRENDA P	URS CORPORATION

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> PUGA, ROBERTO	URS CORPORATION

---

**Region Id:** 06

**Docid:** 864991

**Bates:** 014729                      **To:** 014730

**Date:** 04/17/2009

**Pages:** 2

**Title:** [MALONE COOPERATING PARTIES TO TEXAS HISTORIC COMMISSION - CONFIRMATION OF PLAN TO MOVE CEMETERY]

**Doc Type:** ELECTRONIC RECORD  
CORRESPONDENCE

<u>Name</u>	<u>Organization</u>
<b>Author:</b> JAWETZ, STEVEN	BEVERIDGE AND DIAMOND

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> MARTIN, WILLIAM	TEXAS HISTORICAL COMMISSION

---

# ADMINISTRATIVE RECORD INDEX

10/01/2009

Region Id: 06

## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

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**Region Id:** 06

**Docid:** 865366

**Bates:** 014731                      **To:** 014736

**Date:** 05/01/2009

**Pages:** 6

**Title:** [SITE STATUS SUMMARY APRIL 30, 2009 - MALONE SERVICE COMPANY SUPERFUND SITE]

**Doc Type:** FACTSHEET  
ELECTRONIC RECORD

<u>Name</u>	<u>Organization</u>
<b>Author:</b> ABSHIRE, DAVID C	U.S. ENVIRONMENTAL PROTECTION AGENCY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	NONE

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**Region Id:** 06

**Docid:** 874031

**Bates:** 014736.001                      **To:** 014736.001

**Date:** 05/01/2009

**Pages:** 1

**Title:** MALONE SERVICE PROPOSED PLAN - TCEQ SUPPORT LETTER

**Doc Type:** REPORT / STUDY  
ELECTRONIC RECORD

<u>Name</u>	<u>Organization</u>
<b>Author:</b> DUKE, FAY	TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> ABSHIRE, CHARLES D	U.S. ENVIRONMENTAL PROTECTION AGENCY

---

**Region Id:** 06

**Docid:** 865402

**Bates:** 014737                      **To:** 014737

**Date:** 05/01/2009

**Pages:** 1

**Title:** [TCEQ SUPPORT FOR THE PREFERRED REMEDY FOR THE MALONE SERVICE COMPANY SITE]

**Doc Type:** ELECTRONIC RECORD  
CORRESPONDENCE

<u>Name</u>	<u>Organization</u>
<b>Author:</b> DUKE, FAY	TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> ABSHIRE, DAVID C	U.S. ENVIRONMENTAL PROTECTION AGENCY

# ADMINISTRATIVE RECORD INDEX

10/01/2009

Region Id: 06

## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

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**Region Id:** 06

**Docid:** 866572

**Bates:** 014738                      **To:** 014741

**Date:** 05/01/2009

**Pages:** 4

**Title:** [FACT SHEET: EPA ANNOUNCES PROPOSED PLAN MALONE SERVICE COMPANY SUPERFUND SITE]

**Doc Type:** ELECTRONIC RECORD  
FACTSHEET

<u>Name</u>	<u>Organization</u>
<b>Author:</b> NONE,	U.S. ENVIRONMENTAL PROTECTION AGENCY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	NONE

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**Region Id:** 06

**Docid:** 865742

**Bates:** 014742                      **To:** 014770

**Date:** 05/11/2009

**Pages:** 29

**Title:** [PROPOSED PLAN - MALONE SERVICE COMPANY (SWAN LAKE) SUPERFUND SITE TEXAS CITY, GALVESTON COUNTY, TEXAS]

**Doc Type:** REPORT / STUDY  
ELECTRONIC RECORD

<u>Name</u>	<u>Organization</u>
<b>Author:</b> NONE,	U.S. ENVIRONMENTAL PROTECTION AGENCY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	NONE

# ADMINISTRATIVE RECORD INDEX

10/01/2009

Region Id: 06

## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

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**Region Id:** 06

**Docid:** 9094020

**Bates:** 014771                      **To:** 014822

**Date:** 05/12/2009

**Pages:** 52

**Title:** [PROPOSED PLAN ADMINISTRATIVE RECORD INDEX FOR THE MALONE SERVICE COMPANY SUPERFUND SITE]

**Doc Type:** INDEX

<u>Name</u>	<u>Organization</u>
<b>Author:</b> NONE,	U.S. ENVIRONMENTAL PROTECTION AGENCY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	NONE

---

**Region Id:** 06

**Docid:** 866569

**Bates:** 014823                      **To:** 014823

**Date:** 05/22/2009

**Pages:** 1

**Title:** [PUBLIC NOTICE: U.S. EPA REGION 6 PUBLIC NOTICE ANNOUNCES THE PROPOSED PLAN FOR REMEDIATION OF THE MALONE SERVICE COMPANY SUPERFUND SITE]

**Doc Type:** ELECTRONIC RECORD  
NOTICE

<u>Name</u>	<u>Organization</u>
<b>Author:</b> NONE,	U.S. ENVIRONMENTAL PROTECTION AGENCY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	NONE

---

**Region Id:** 06

**Docid:** 870381

**Bates:** 014824                      **To:** 014829

**Date:** 06/08/2009

**Pages:** 6

**Title:** [RESPONSE FROM FRANK DICK REGARDING PROPOSED PLAN]

**Doc Type:** CORRESPONDENCE

<u>Name</u>	<u>Organization</u>
<b>Author:</b> DICK, FRANK	NONE

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> ABSHIRE, DAVID C	U.S. ENVIRONMENTAL PROTECTION AGENCY



# ADMINISTRATIVE RECORD INDEX

10/01/2009

Region Id: 06

## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

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**Region Id:** 06

**Docid:** 874033

**Bates:** 014830                      **To:** 014850

**Date:** 06/09/2009

**Pages:** 21

**Title:** [PUBLIC MEETING TRANSCRIPT - MALONE SERVICE COMPANY SUPERFUND SITE  
PROPOSED PLAN PUBLIC MEETING]

**Doc Type:** PUBLIC MEETING TRANSCRIPT  
ELECTRONIC RECORD

<u>Name</u>	<u>Organization</u>
<b>Author:</b> ROCHELLE, JOHN G	ESQUIRE DEPOSITION SOLUTIONS

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	U.S. ENVIRONMENTAL PROTECTION AGENCY

---

**Region Id:** 06

**Docid:** 874032

**Bates:** 014851                      **To:** 014852

**Date:** 06/22/2009

**Pages:** 2

**Title:** [SCENIC GALVESTON - COMMENTS ON MALONE SERVICE PROPOSED PLAN]

**Doc Type:** ELECTRONIC RECORD  
REPORT / STUDY

<u>Name</u>	<u>Organization</u>
<b>Author:</b> MASON, LALISE	SCENIC GALVESTON INCORPORATED

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> ABSHIRE, CHARLES D	U.S. ENVIRONMENTAL PROTECTION AGENCY

---

# ADMINISTRATIVE RECORD INDEX

10/01/2009

Region Id: 06

## ADMINISTRATIVE RECORD

**Site Name:** MALONE SERVICE CO - SWAN LAKE PLANT  
**CERCLIS:** TXD980864789  
**OID:** 00  
**SSID:** GZ  
**Action:** RECORD OF DECISION

---

**Region Id:** 06

**Docid:** 9100519

**Bates:** 014853                      **To:** 014858

**Date:** 09/01/2009

**Pages:** 6

**Title:** SITE STATUS SUMMARY FOR MALONE SERVICE COMPANY

**Doc Type:** FACTSHEET

<u>Name</u>	<u>Organization</u>
<b>Author:</b> NONE,	U.S. ENVIRONMENTAL PROTECTION AGENCY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	NONE

---

**Region Id:** 06

**Docid:** 9109310

**Bates:** 014859                      **To:** 015100

**Date:** 09/30/2009

**Pages:** 243

**Title:** RECORD OF DECISION FOR MALONE SERVICE COMPANY SUPERFUND SITE

**Doc Type:** RECORD OF DECISION / AMENDMENT  
ELECTRONIC RECORD

<u>Name</u>	<u>Organization</u>
<b>Author:</b> ABSHIRE, CHARLES	U.S. ENVIRONMENTAL PROTECTION AGENCY

<u>Name</u>	<u>Organization</u>
<b>Addressee:</b> NONE,	NONE

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## **Appendix B – State of Texas Concurrence Letter**

Buddy Carter, Chairman  
Lynn P. Searcy, Commissioner  
Bryan W. Slaw, P.E., Commissioner  
Mark R. Vickery, P.G., Executive Director



## TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

*Protecting Texas by Reducing and Preventing Pollution*

September 29, 2009

Mr. Samuel Coleman, P.E., Director  
Superfund Division  
U.S. Environmental Protection Agency, Region 6  
1445 Ross Avenue  
Dallas, Texas 75202

Re: Record of Decision  
Malone Service Company (Swan Lake) Superfund Site  
Texas City, Galveston County, Texas

Dear Mr. Coleman:

The Texas Commission on Environmental Quality (TCEQ) received the final Superfund Record of Decision (ROD) for the above-referenced site on September 19, 2009. We have completed our review and concur that the response action described in the ROD is the most appropriate remedy for this site.

Sincerely,

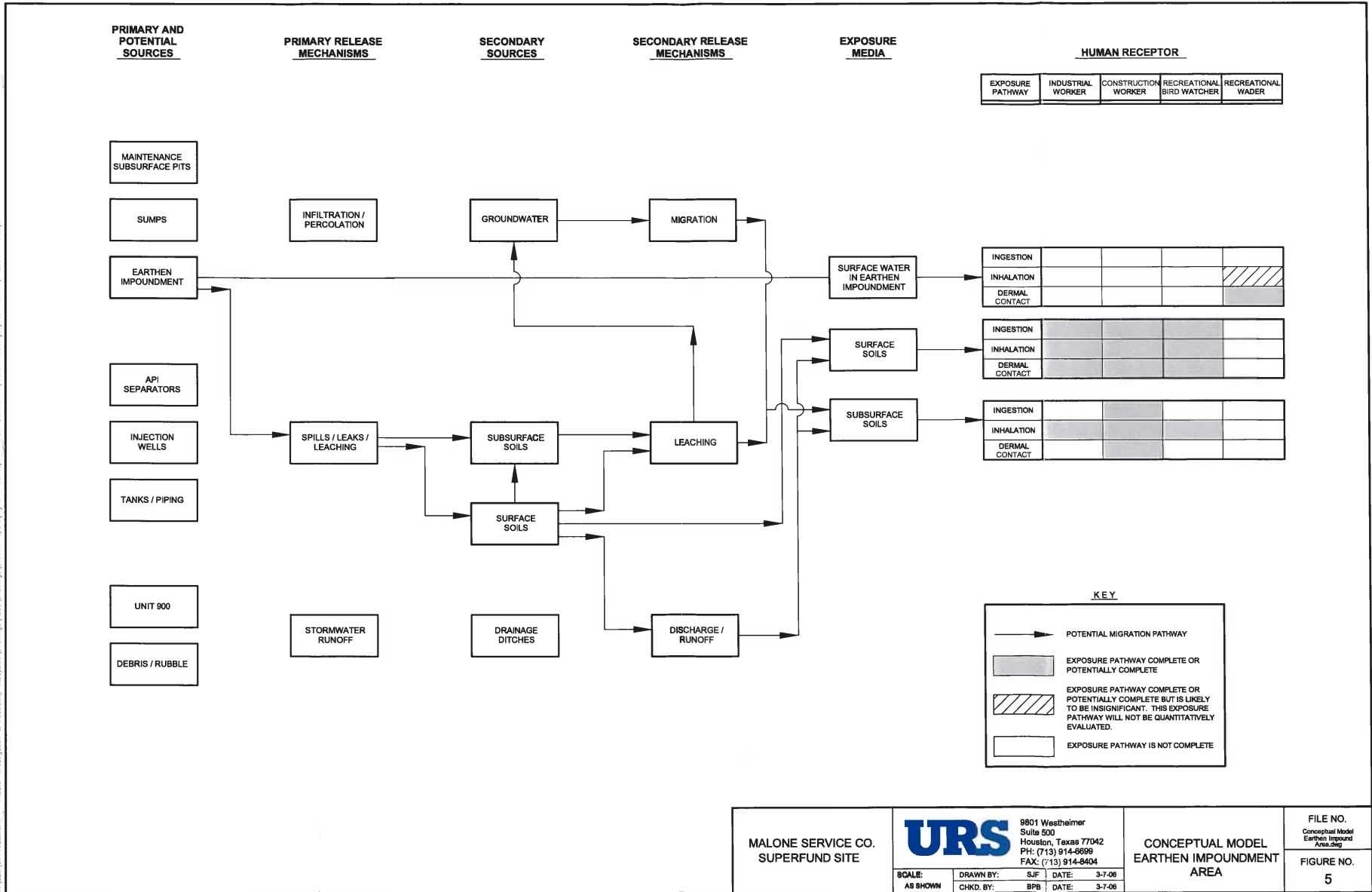
Mark R. Vickery, P.G.  
Executive Director

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# **Attachment 1 – Baseline Human Health Risk Assessment Figures**

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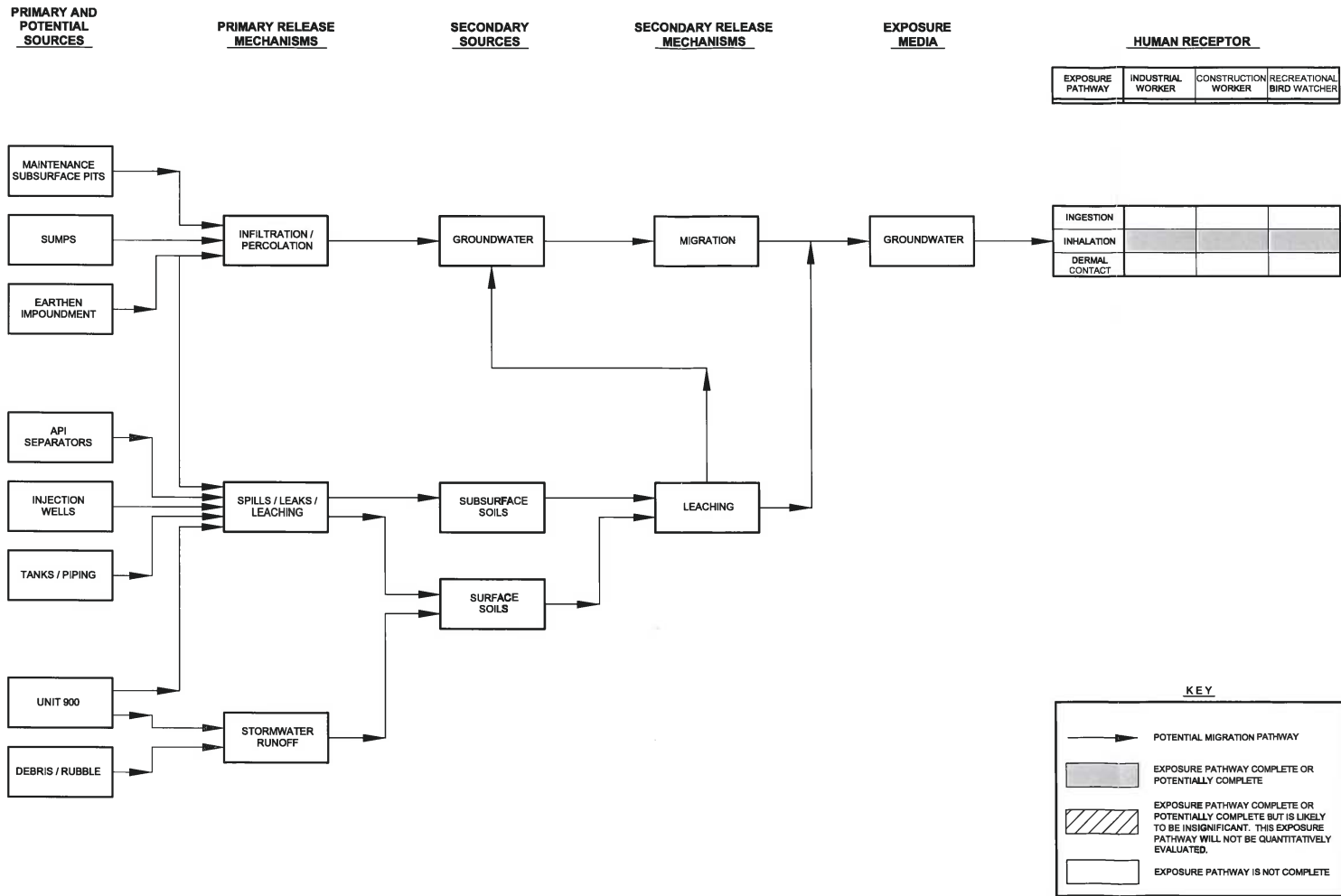
K:\EIA\811102\_Medical\_Investigation & Feasibility\_Study\_CD\Drawings\Area\Drawings\Bharka\_Report\Fig 5 - Conceptual Model - Earthen Impoundment Area.dwg, Jun 01, 2008, 5:20pm



<b>MALONE SERVICE CO.</b> SUPERFUND SITE	9801 Westheimer Suite 500 Houston, Texas 77042 PH: (713) 914-6699 FAX: (713) 914-8404	<b>CONCEPTUAL MODEL</b> EARTHEN IMPOUNDMENT AREA	FILE NO. Conceptual Model Earthen Impoundment Area.dwg
			FIGURE NO. 5
SCALE: AS SHOWN	DRAWN BY: SJF CHKD. BY: BPB	DATE: 3-7-08 DATE: 3-7-08	

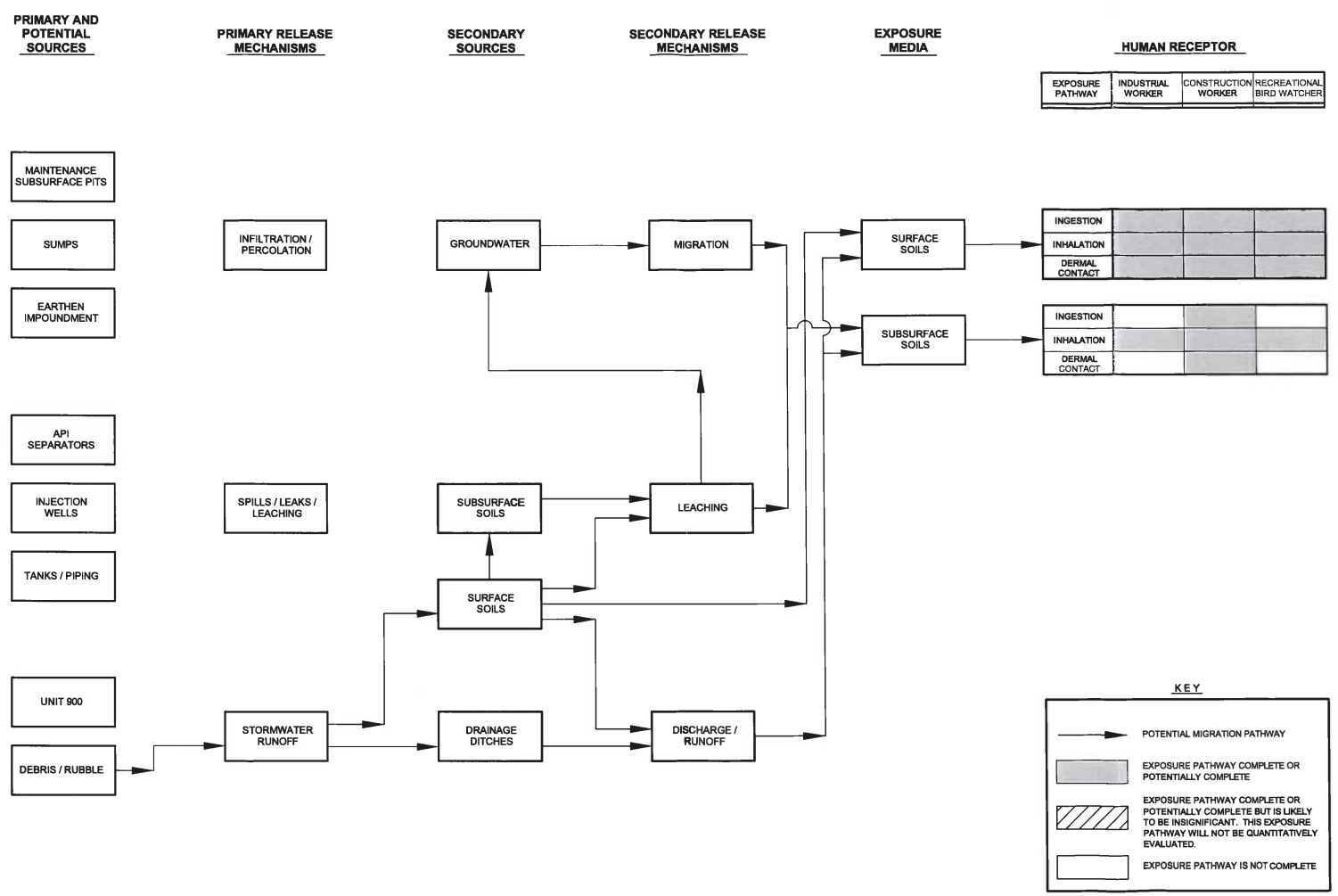


K:\ELM\011102\_Mal\emmedial Investigation & Feasibility Study\_03\Drawings\Acad\Drawings\Bldg\Bldg\Report\Fig\_7 - Conceptual Model - Groundwater.dwg, Jun 01, 2008 - 5:24pm



MALONE SERVICE CO. SUPERFUND SITE	<b>URS</b>		9801 Westheimer Suite 500 Houston, Texas 77042 PH: (713) 914-6699 FAX: (713) 914-9404	FILE NO. Conceptual Model Groundwater.dwg
	SCALE: AS SHOWN	DRAWN BY: SJM	DATE: 3-7-08	FIGURE NO. 7

K:\EIA\811102\_Med...\_emedia\_investigation & feasibility\_study\_civ\Drawings\Acad\Drawings\BHP\81102a\_Report\Fig 9 - Conceptual Model Laydown Area.dwg: 2008 - 12/21/08



MALONE SERVICE CO.  
SUPERFUND SITE

**URS**  
9801 Westheimer  
Suite 500  
Houston, Texas 77042  
PH: (713) 914-6699  
FAX: (713) 914-9404

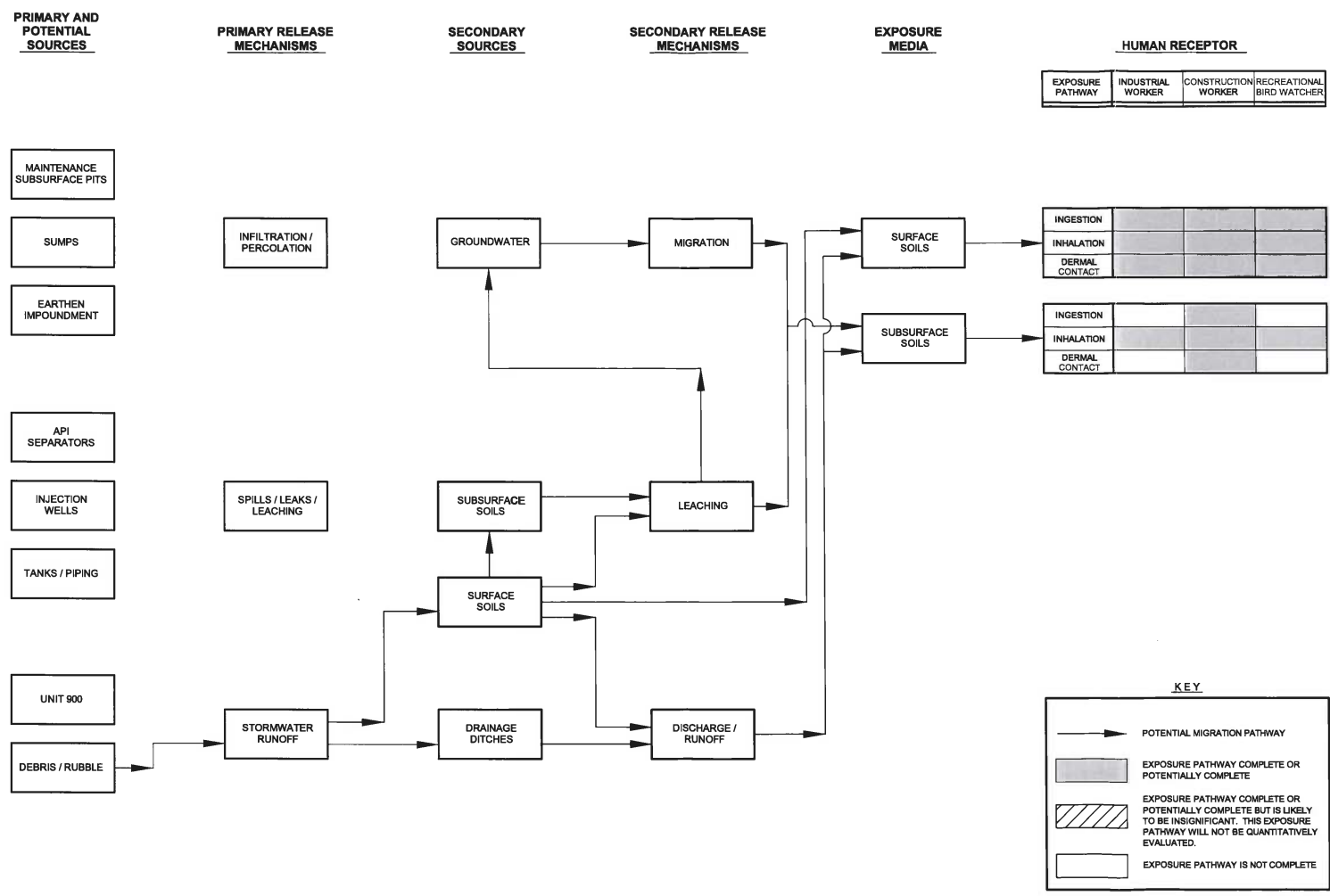
CONCEPTUAL MODEL  
LAYDOWN AREA

FILE NO.  
Conceptual Model  
Laydown Area.dwg

FIGURE NO.  
9

SCALE:	DRAWN BY:	SJF	DATE:	3-7-06
AS SHOWN	CHKD. BY:	BPB	DATE:	3-7-06

K:\ELM\811102.dwg - Remedial Investigation & Feasibility Study - 03\Drawings\Acad\Drawings\Bentley Report\Fig 11 - Conceptual Model Cemetery Area.dwg (print) Jun 01, 2006 10:52:20am



EXPOSURE PATHWAY	INDUSTRIAL WORKER	CONSTRUCTION WORKER	RECREATIONAL BIRD WATCHER
------------------	-------------------	---------------------	---------------------------

	INDUSTRIAL WORKER	CONSTRUCTION WORKER	RECREATIONAL BIRD WATCHER
INGESTION			
INHALATION			
DERMAL CONTACT			

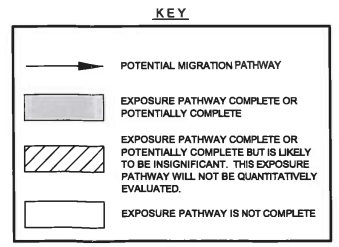
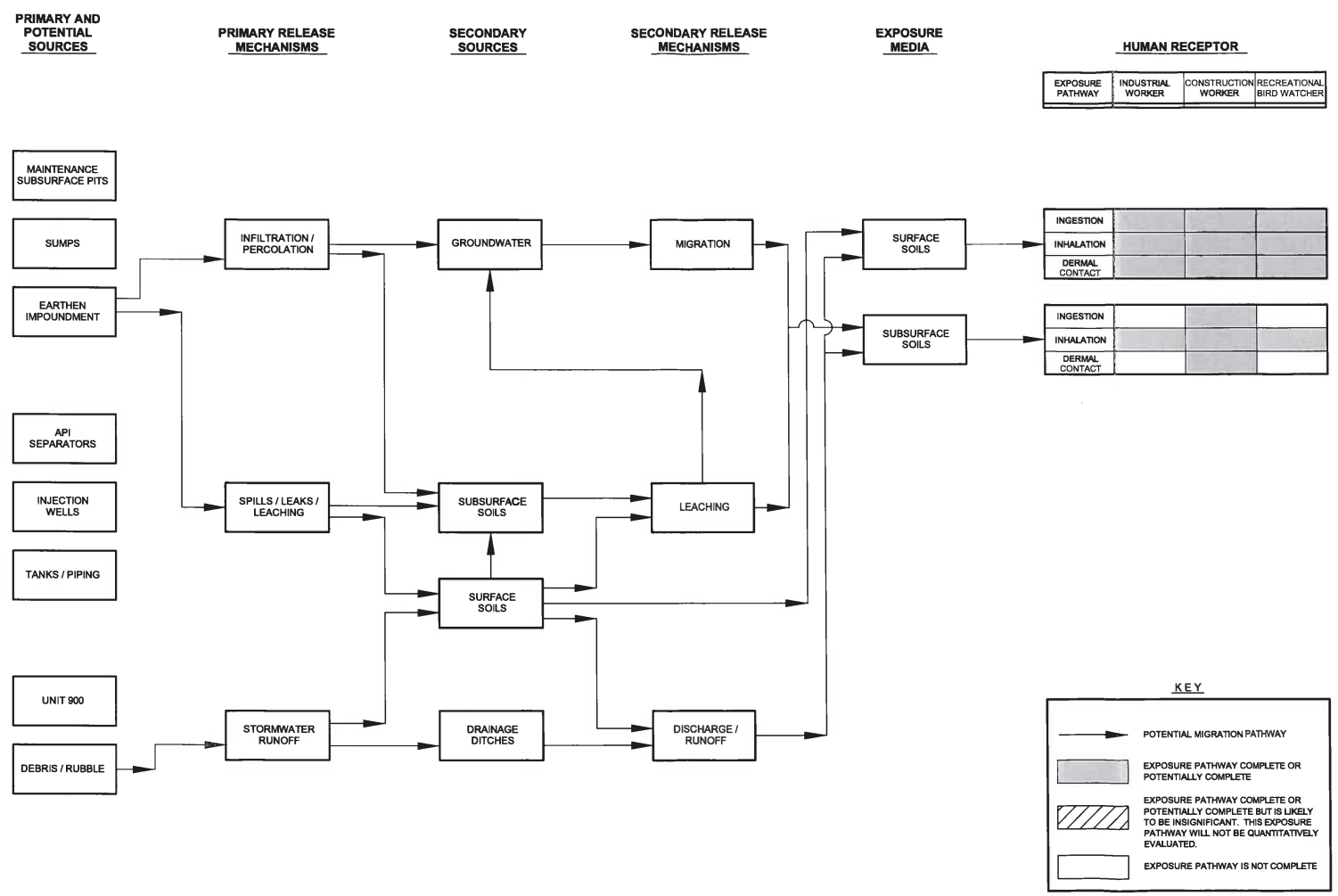
	INDUSTRIAL WORKER	CONSTRUCTION WORKER	RECREATIONAL BIRD WATCHER
INGESTION			
INHALATION			
DERMAL CONTACT			

**KEY**

- POTENTIAL MIGRATION PATHWAY
- EXPOSURE PATHWAY COMPLETE OR POTENTIALLY COMPLETE
- ▨ EXPOSURE PATHWAY COMPLETE OR POTENTIALLY COMPLETE BUT IS LIKELY TO BE INSIGNIFICANT. THIS EXPOSURE PATHWAY WILL NOT BE QUANTITATIVELY EVALUATED.
- EXPOSURE PATHWAY IS NOT COMPLETE

<b>MALONE SERVICE CO. SUPERFUND SITE</b>		9801 Westheimer Suite 500 Houston, Texas 77042 PH: (713) 914-8699 FAX: (713) 914-8404		FILE NO. Conceptual Model Cemetery Area.dwg
		SCALE: AS SHOWN	DRAWN BY: SJF CHKD. BY: BFB	DATE: 3-7-06 DATE: 3-7-06

K:\EIA\511102\_Mal...\_medial Investigation & Feasibility Study\_03\Drawings\Acad\Drawings\BHR04\_Report\Fig\_13 - Conceptual Model - Unused Area 1.dwg:dwg1 Jun 01, 2008 - 5:33pm



MALONE SERVICE CO.  
SUPERFUND SITE

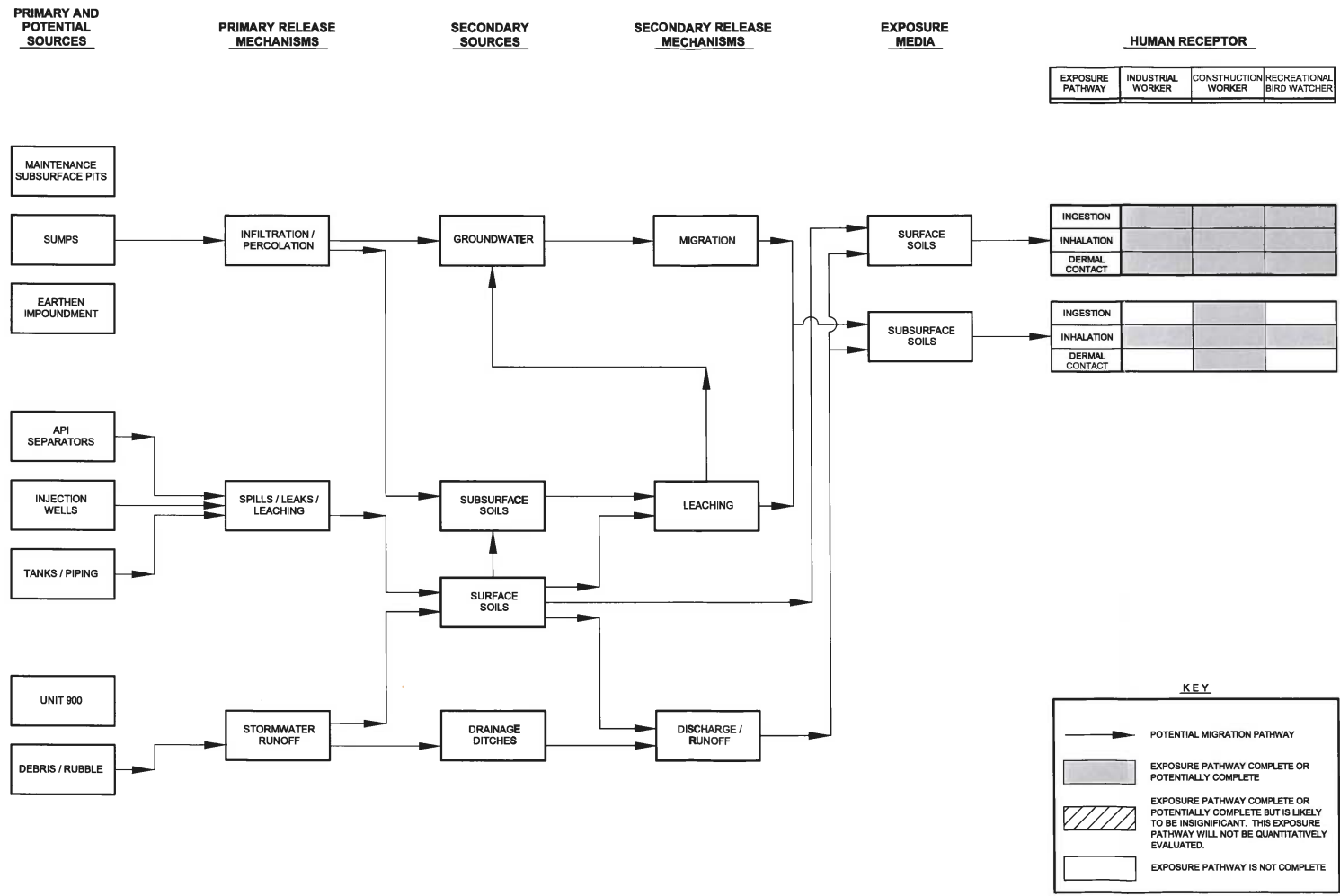
**URS**  
9801 Washelmer  
Suite 500  
Houston, Texas 77042  
PH: (713) 914-6699  
FAX: (713) 914-9404

SCALE: AS SHOWN  
DRAWN BY: SJF  
CHKD. BY: BPB  
DATE: 3-7-08

CONCEPTUAL MODEL  
UNUSED AREA 1 /  
EARTHEN IMPOUNDMENT  
SOIL

FILE NO.  
Conceptual Model  
Unused Area 1.dwg  
FIGURE NO.  
13

K:\1\111102\_1ack...\_medial\_investigation & Feasibility Study\_10\Drawings\Acad\Drawings\Exhibit Report\Fig 15 - Conceptual Model - Unused Area 2.dwg (by user) June 01, 2006 - 5:34pm



EXPOSURE PATHWAY	INDUSTRIAL WORKER	CONSTRUCTION WORKER	RECREATIONAL BIRD WATCHER
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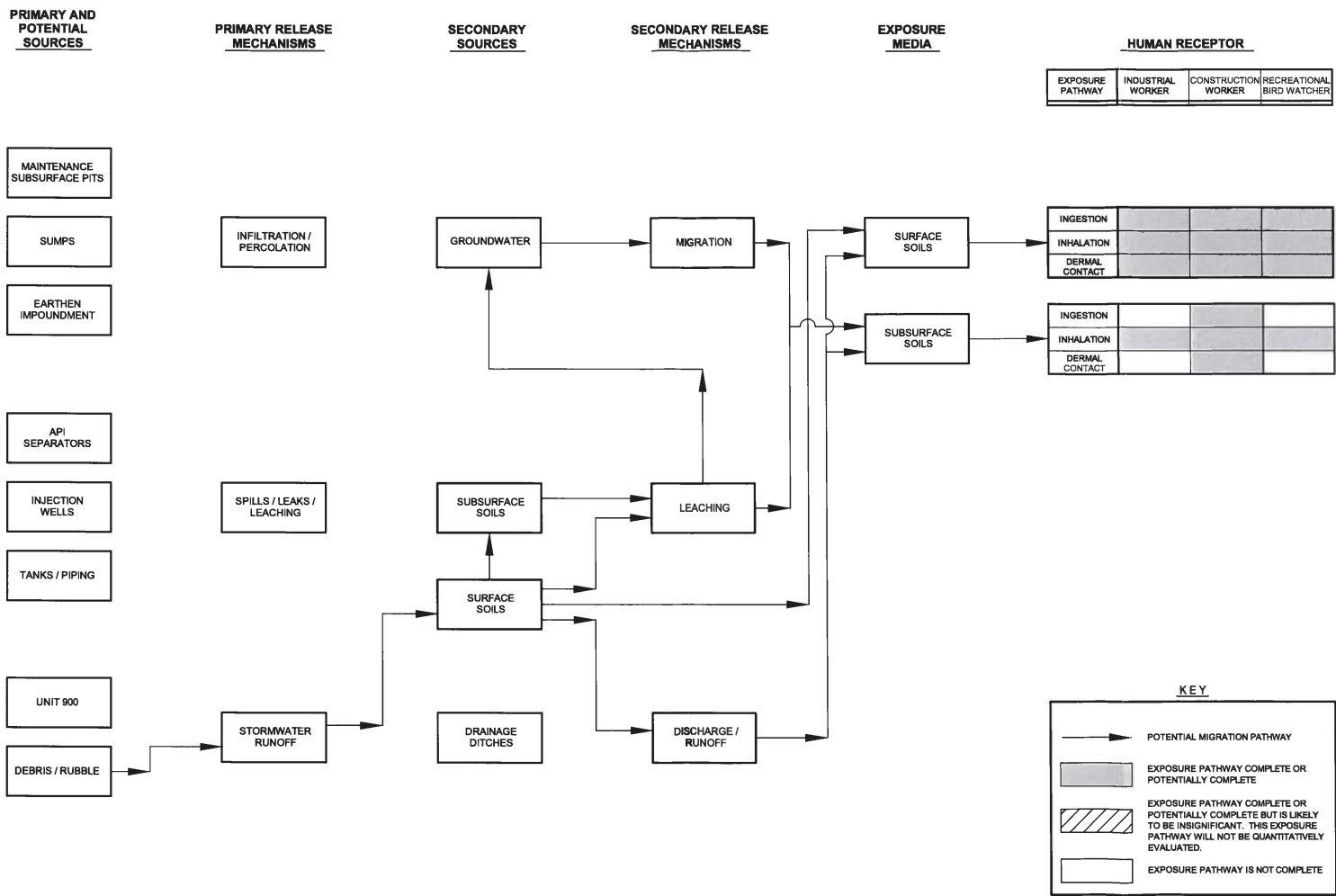
EXPOSURE PATHWAY	INDUSTRIAL WORKER	CONSTRUCTION WORKER	RECREATIONAL BIRD WATCHER
INGESTION			
INHALATION			
DERMAL CONTACT			
INGESTION			
INHALATION			
DERMAL CONTACT			

**KEY**

- POTENTIAL MIGRATION PATHWAY
- EXPOSURE PATHWAY COMPLETE OR POTENTIALLY COMPLETE
- ▨ EXPOSURE PATHWAY COMPLETE OR POTENTIALLY COMPLETE BUT IS LIKELY TO BE INSIGNIFICANT. THIS EXPOSURE PATHWAY WILL NOT BE QUANTITATIVELY EVALUATED.
- EXPOSURE PATHWAY IS NOT COMPLETE

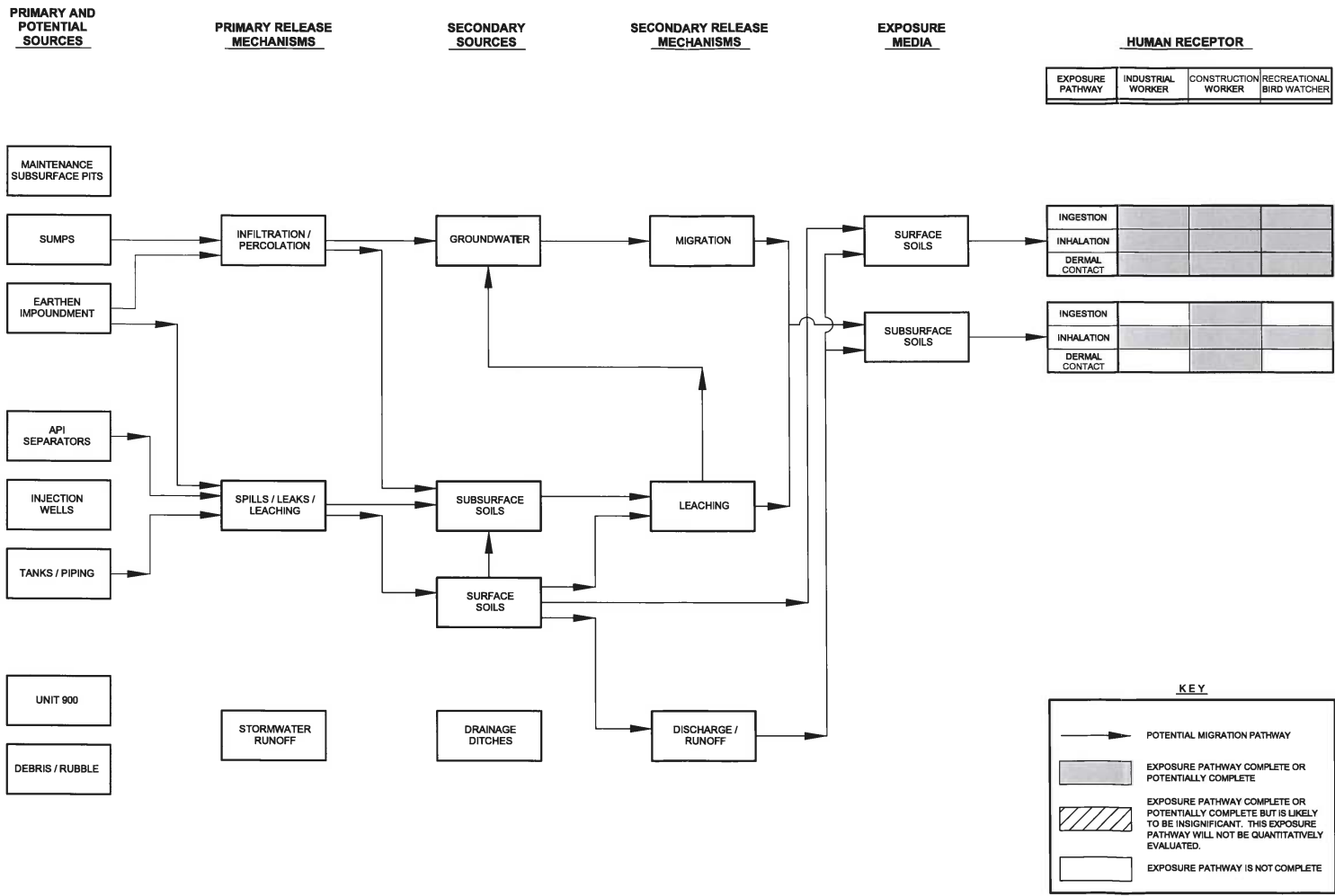
<b>MALONE SERVICE CO. SUPERFUND SITE</b>		9801 Westheimer Suite 500 Houston, Texas 77042 PH: (713) 914-6699 FAX: (713) 914-8404	FILE NO. Conceptual Model Unused Area 2.dwg
		SCALE: AS SHOWN	DRAWN BY: SJF CHKD. BY: BPB
			FIGURE NO. <b>15</b>

K:\EIA\511102\_Mal\emsa\Investigation & Feasibility Study\CD\Drawings\Area\Drawings\BIBB\Report\Fig 17 - Conceptual Model - Borrow Pit.dwg (pset1) Jun 01, 2006 - 5:55pm



MALONE SERVICE CO. SUPERFUND SITE	<b>URS</b>		9801 Westheimer Suite 500 Houston, Texas 77042 PH: (713) 914-6699 FAX: (713) 914-8404	FILE NO. Conceptual Model Borrow Pit.dwg
	SCALE: AS SHOWN	DRAWN BY: SJM	DATE: 3-7-06	FIGURE NO. 17

K:\EPA\311102\_001\medial\_investigation & feasibility\_study\_03\Drawings\Acro\Drawings\BHR06\_Report\Fig\_18 - Conceptual Model Office Lab Area.dwg (pilot) Jun 01, 2006 - 5:58pm



EXPOSURE PATHWAY	INDUSTRIAL WORKER	CONSTRUCTION WORKER	RECREATIONAL BIRD WATCHER
------------------	-------------------	---------------------	---------------------------

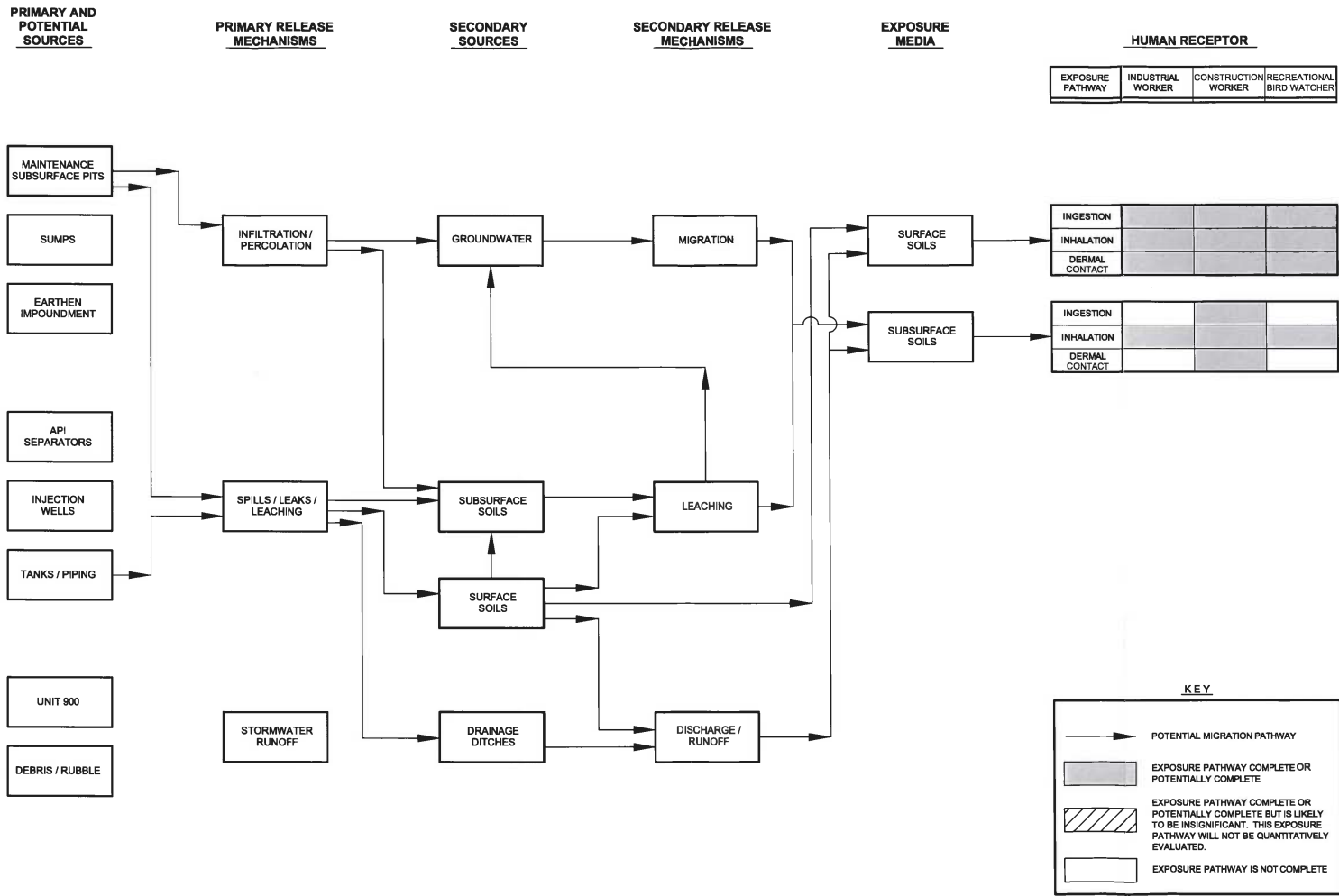
EXPOSURE PATHWAY	INDUSTRIAL WORKER	CONSTRUCTION WORKER	RECREATIONAL BIRD WATCHER
INGESTION			
INHALATION			
DERMAL CONTACT			

**KEY**

- POTENTIAL MIGRATION PATHWAY
- EXPOSURE PATHWAY COMPLETE OR POTENTIALLY COMPLETE
- ▨ EXPOSURE PATHWAY COMPLETE OR POTENTIALLY COMPLETE BUT IS LIKELY TO BE INSIGNIFICANT. THIS EXPOSURE PATHWAY WILL NOT BE QUANTITATIVELY EVALUATED.
- EXPOSURE PATHWAY IS NOT COMPLETE

<b>MALONE SERVICE CO. SUPERFUND SITE</b>		9801 Westheimer Suite 500 Houston, Texas 77042 PH: (713) 914-8699 FAX: (713) 914-8404	FILE NO. Conceptual Model Office-Lab Area.dwg
			FIGURE NO. 18
SCALE: AS SHOWN	DRAWN BY: SJF	DATE: 3-7-06	CONCEPTUAL MODEL OFFICE AND LAB AREA

K:\EDM\811102\_Mo...media\_investigation & feasibility\_study\03\Drawings\Area Drawings\BIBREK\_Report\Fig 20 - Conceptual Model - Maintenance Area Pits.dwg 01 Jun 01, 2006 - 5:48pm



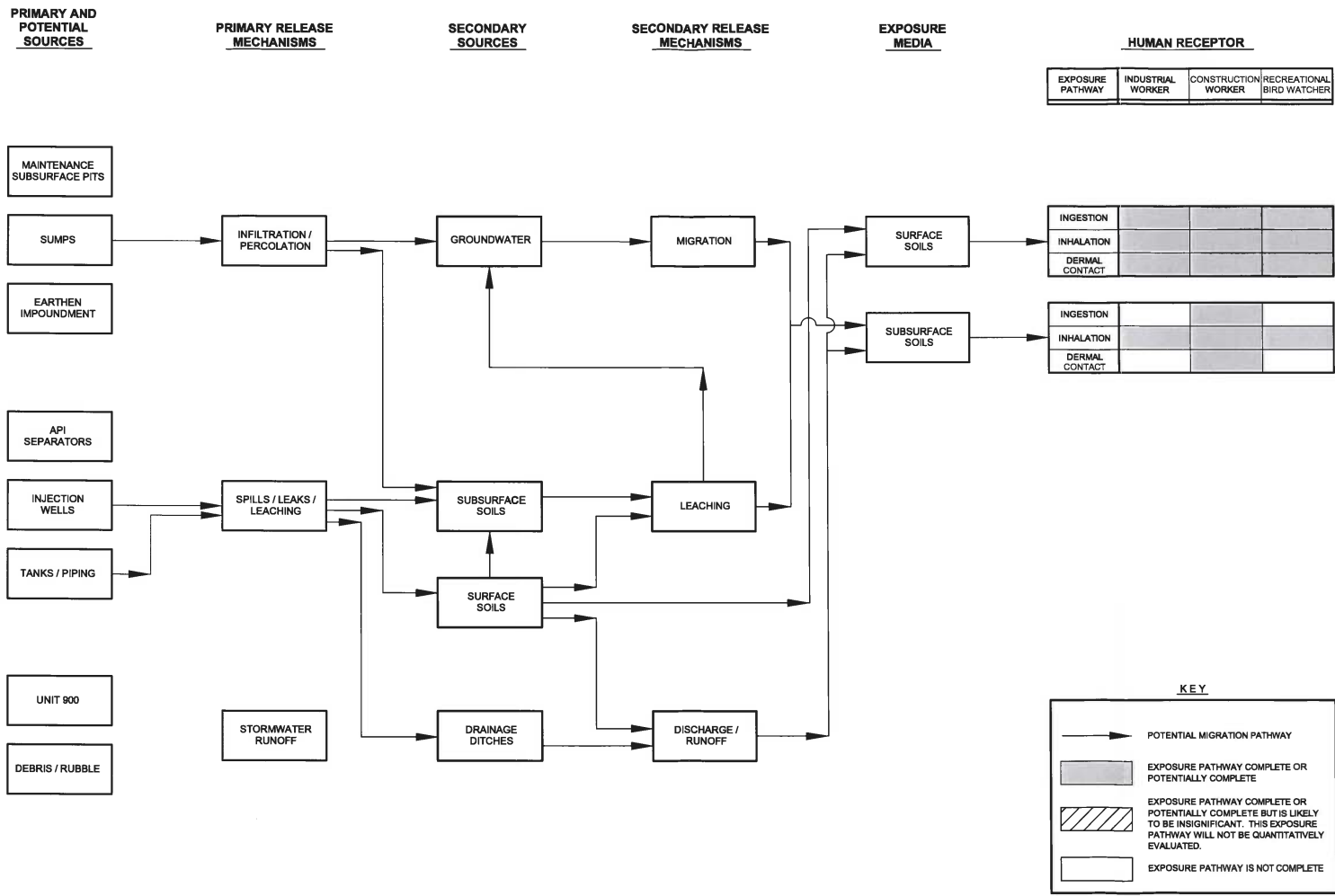
EXPOSURE PATHWAY	INDUSTRIAL WORKER	CONSTRUCTION WORKER	RECREATIONAL BIRD WATCHER
INGESTION			
INHALATION			
DERMAL CONTACT			

INGESTION			
INHALATION			
DERMAL CONTACT			

MALONE SERVICE CO. SUPERFUND SITE	<b>URS</b>		9801 Westheimer Suite 500 Houston, Texas 77042 PH: (713) 914-6699 FAX: (713) 914-8404		CONCEPTUAL MODEL MAINTENANCE AREA PITS	FILE NO. Conceptual Model Maintenance Area Pits.dwg
	SCALE: AS SHOWN	DRAWN BY: SJJ	DATE: 3-7-06	CHKD. BY: BPB		DATE: 3-7-06



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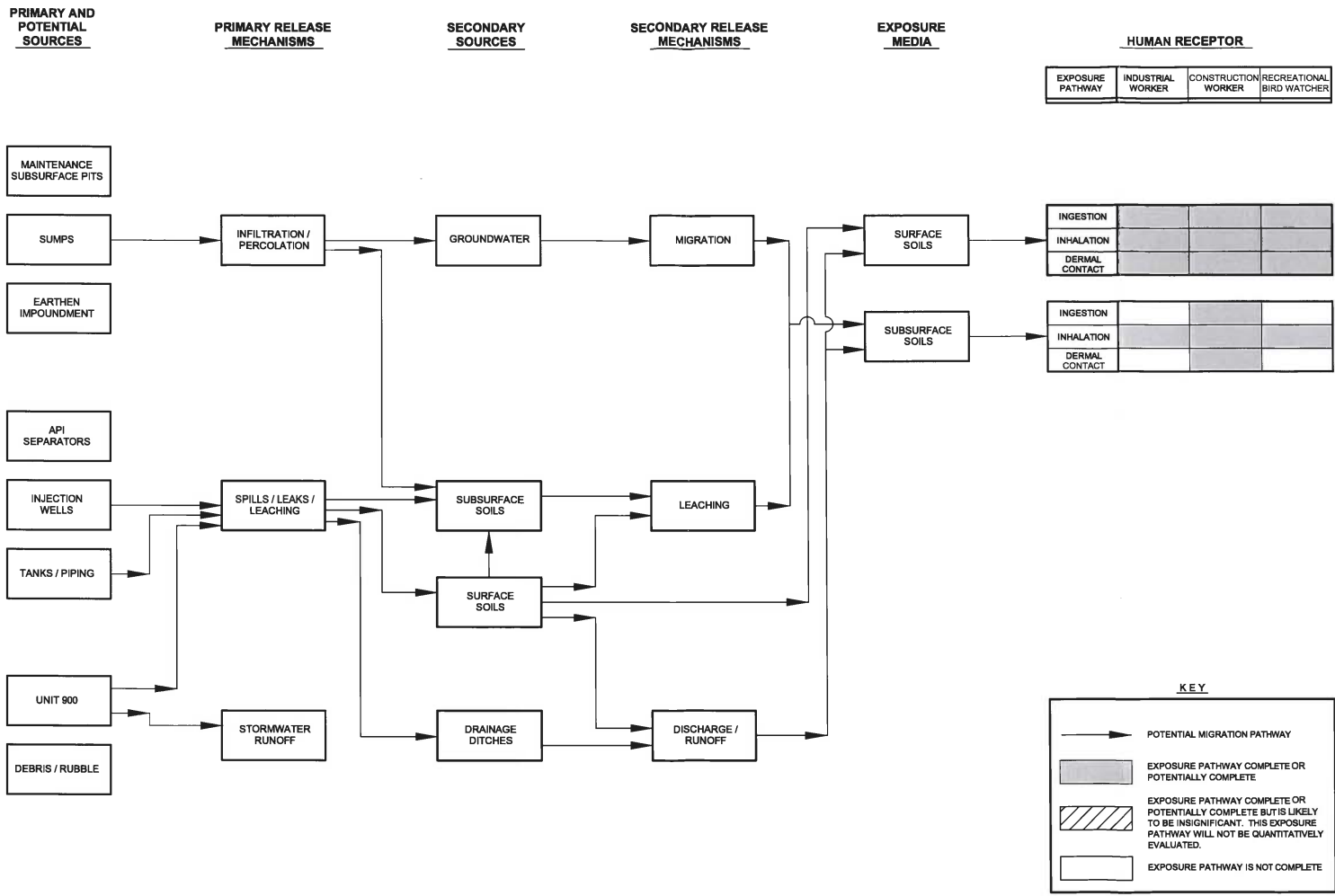


EXPOSURE PATHWAY	INDUSTRIAL WORKER	CONSTRUCTION WORKER	RECREATIONAL BIRD WATCHER
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EXPOSURE MEDIA	RECEPTOR	INDUSTRIAL WORKER	CONSTRUCTION WORKER	RECREATIONAL BIRD WATCHER
SURFACE SOILS	INGESTION			
	INHALATION			
	DERMAL CONTACT			
SUBSURFACE SOILS	INGESTION			
	INHALATION			
	DERMAL CONTACT			

<b>MALONE SERVICE CO.</b> SUPERFUND SITE	9801 Westheimer Suite 500 Houston, Texas 77042 PH: (713) 914-6699 FAX: (713) 914-8404	<b>CONCEPTUAL MODEL</b> MAINTENANCE AREA WAREHOUSE	FILE NO. Conceptual Model Maintenance Area Warehouse.dwg
			FIGURE NO. 21
SCALE: AS SHOWN	DRAWN BY: SJF	DATE: 3-7-06	
	CHKD. BY: BPB	DATE: 3-7-06	

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EXPOSURE PATHWAY	INDUSTRIAL WORKER	CONSTRUCTION WORKER	RECREATIONAL BIRD WATCHER
------------------	-------------------	---------------------	---------------------------

EXPOSURE PATHWAY	SURFACE SOILS		
	INDUSTRIAL WORKER	CONSTRUCTION WORKER	RECREATIONAL BIRD WATCHER
INGESTION	Grey	Grey	White
INHALATION	Grey	Grey	White
DERMAL CONTACT	Grey	Grey	White

EXPOSURE PATHWAY	SUBSURFACE SOILS		
	INDUSTRIAL WORKER	CONSTRUCTION WORKER	RECREATIONAL BIRD WATCHER
INGESTION	White	White	White
INHALATION	White	White	White
DERMAL CONTACT	White	White	White

<b>MALONE SERVICE CO.</b> SUPERFUND SITE		9801 Westheimer Suite 500 Houston, Texas 77042 PH: (713) 914-6699 FAX: (713) 914-8404		FILE NO. Conceptual Model Maintenance Area 900.dwg
		SCALE: AS SHOWN	DRAWN BY: BPB	DATE: 3-7-06
				FIGURE NO. 22

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**PRIMARY AND POTENTIAL SOURCES**

- MAINTENANCE SUBSURFACE PITS
- SUMPS
- EARTHEN IMPOUNDMENT
- API SEPARATORS
- INJECTION WELLS
- TANKS / PIPING
- UNIT 900
- DEBRIS / RUBBLE

**PRIMARY RELEASE MECHANISMS**

- INFILTRATION / PERCOLATION
- SPILLS / LEAKS / LEACHING

**SECONDARY SOURCES**

- GROUNDWATER
- SUBSURFACE SOILS
- SURFACE SOILS

**SECONDARY RELEASE MECHANISMS**

- MIGRATION
- LEACHING

**EXPOSURE MEDIA**

- SURFACE SOILS
- SUBSURFACE SOILS

**HUMAN RECEPTOR**

EXPOSURE PATHWAY	INDUSTRIAL WORKER	CONSTRUCTION WORKER	RECREATIONAL BIRD WATCHER
------------------	-------------------	---------------------	---------------------------

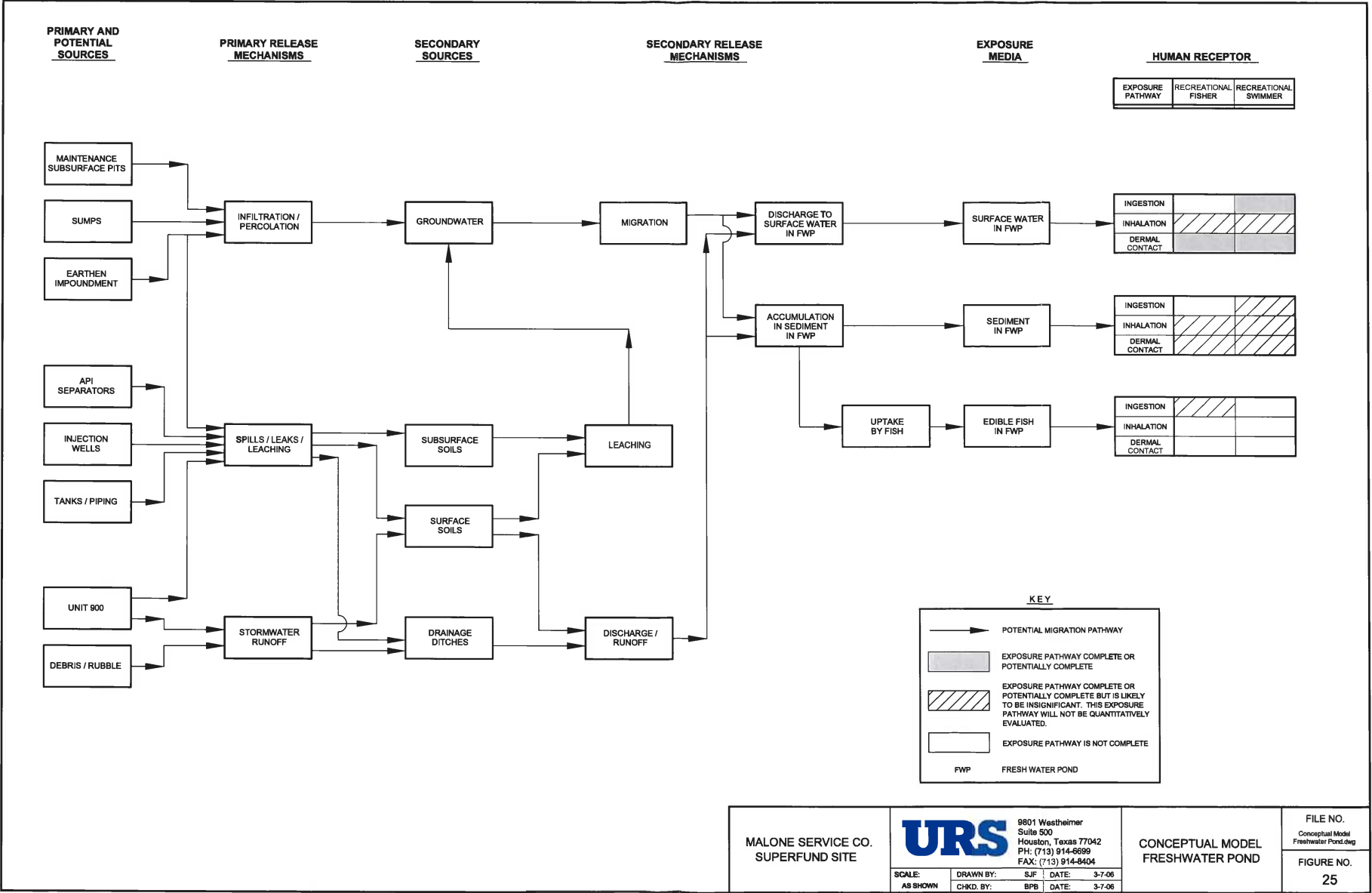
INGESTION			
INHALATION			
DERMAL CONTACT			
INGESTION			
INHALATION			
DERMAL CONTACT			

**KEY**

- POTENTIAL MIGRATION PATHWAY
- EXPOSURE PATHWAY COMPLETE OR POTENTIALLY COMPLETE
- EXPOSURE PATHWAY COMPLETE OR POTENTIALLY COMPLETE BUT IS LIKELY TO BE INSIGNIFICANT. THIS EXPOSURE PATHWAY WILL NOT BE QUANTITATIVELY EVALUATED.
- EXPOSURE PATHWAY IS NOT COMPLETE

<b>MALONE SERVICE CO. SUPERFUND SITE</b>			9801 Westheimer Suite 500 Houston, Texas 77042 PH: (713) 914-6699 FAX: (713) 914-8404	<b>CONCEPTUAL MODEL TANK 800 AREA</b>	FILE NO. Conceptual Model Tank 800 Area.dwg
	SCALE: AS SHOWN	DRAWN BY: SJF CHKD. BY: BPB	DATE: 3-7-06 DATE: 3-7-06	FIGURE NO. <b>23</b>	

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EXPOSURE PATHWAY	RECREATIONAL FISHER	RECREATIONAL SWIMMER
------------------	---------------------	----------------------

INGESTION		
INHALATION	///	///
DERMAL CONTACT	///	///

INGESTION	///	///
INHALATION	///	///
DERMAL CONTACT	///	///

INGESTION	///	
INHALATION		
DERMAL CONTACT		

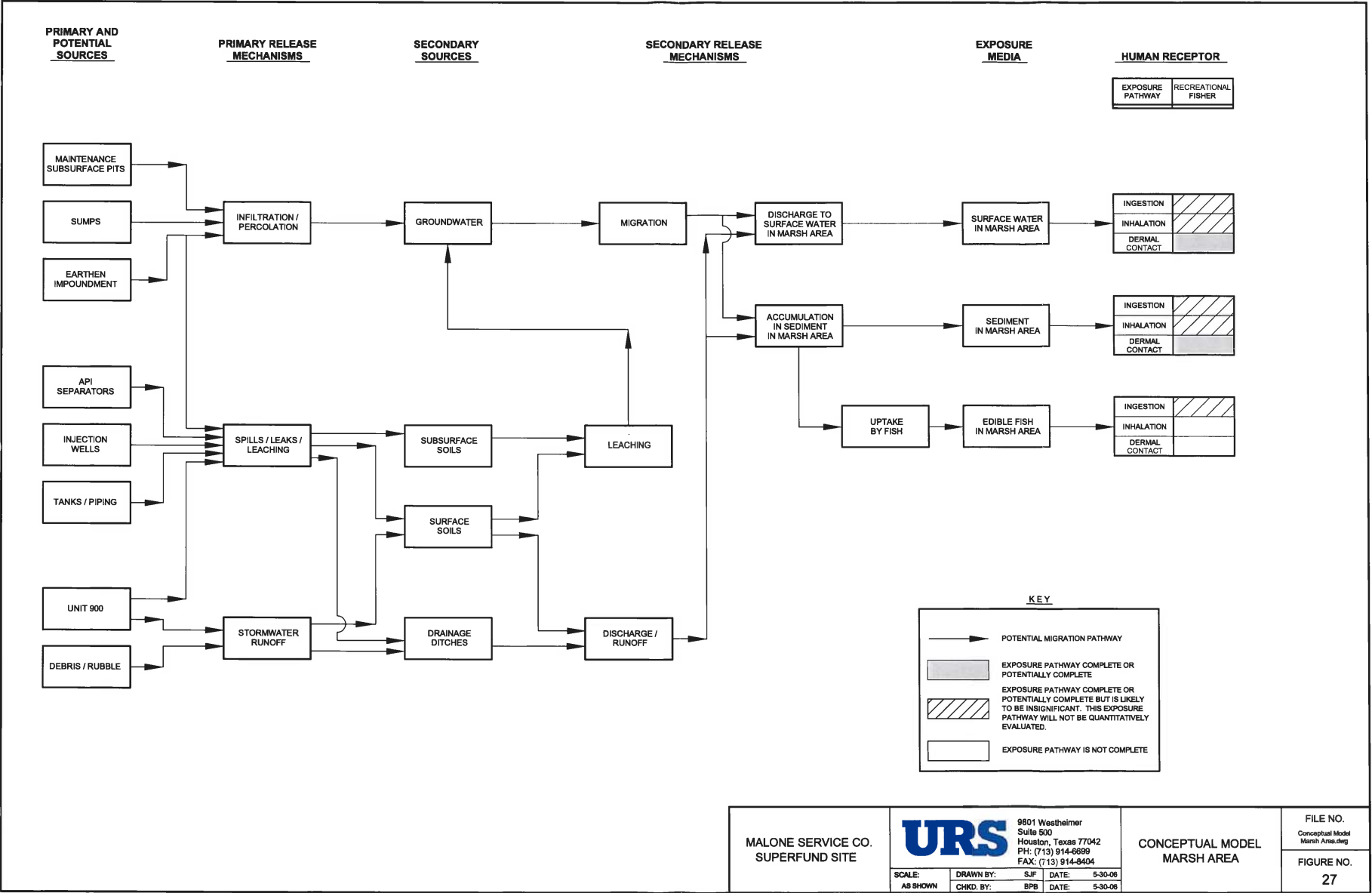
**KEY**

- POTENTIAL MIGRATION PATHWAY
- EXPOSURE PATHWAY COMPLETE OR POTENTIALLY COMPLETE
- ▨ EXPOSURE PATHWAY COMPLETE OR POTENTIALLY COMPLETE BUT IS LIKELY TO BE INSIGNIFICANT. THIS EXPOSURE PATHWAY WILL NOT BE QUANTITATIVELY EVALUATED.
- EXPOSURE PATHWAY IS NOT COMPLETE

FWP FRESH WATER POND

MALONE SERVICE CO. SUPERFUND SITE	<b>URS</b>		9801 Westheimer Suite 500 Houston, Texas 77042 PH: (713) 914-6699 FAX: (713) 914-9404	FILE NO. Conceptual Model Freshwater Pond.dwg
	SCALE: AS SHOWN	DRAWN BY: SJJ	DATE: 3-7-08	FIGURE NO. 25
	CHKD. BY: BPB	DATE: 3-7-08	CONCEPTUAL MODEL FRESHWATER POND	

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MALONE SERVICE CO.  
SUPERFUND SITE

**URS**  
9801 Washelmer  
Suite 500  
Houston, Texas 77042  
PH: (713) 914-6699  
FAX: (713) 914-9404

CONCEPTUAL MODEL  
MARSH AREA

FILE NO.  
Conceptual Model  
Marsh Area.dwg

FIGURE NO.  
27

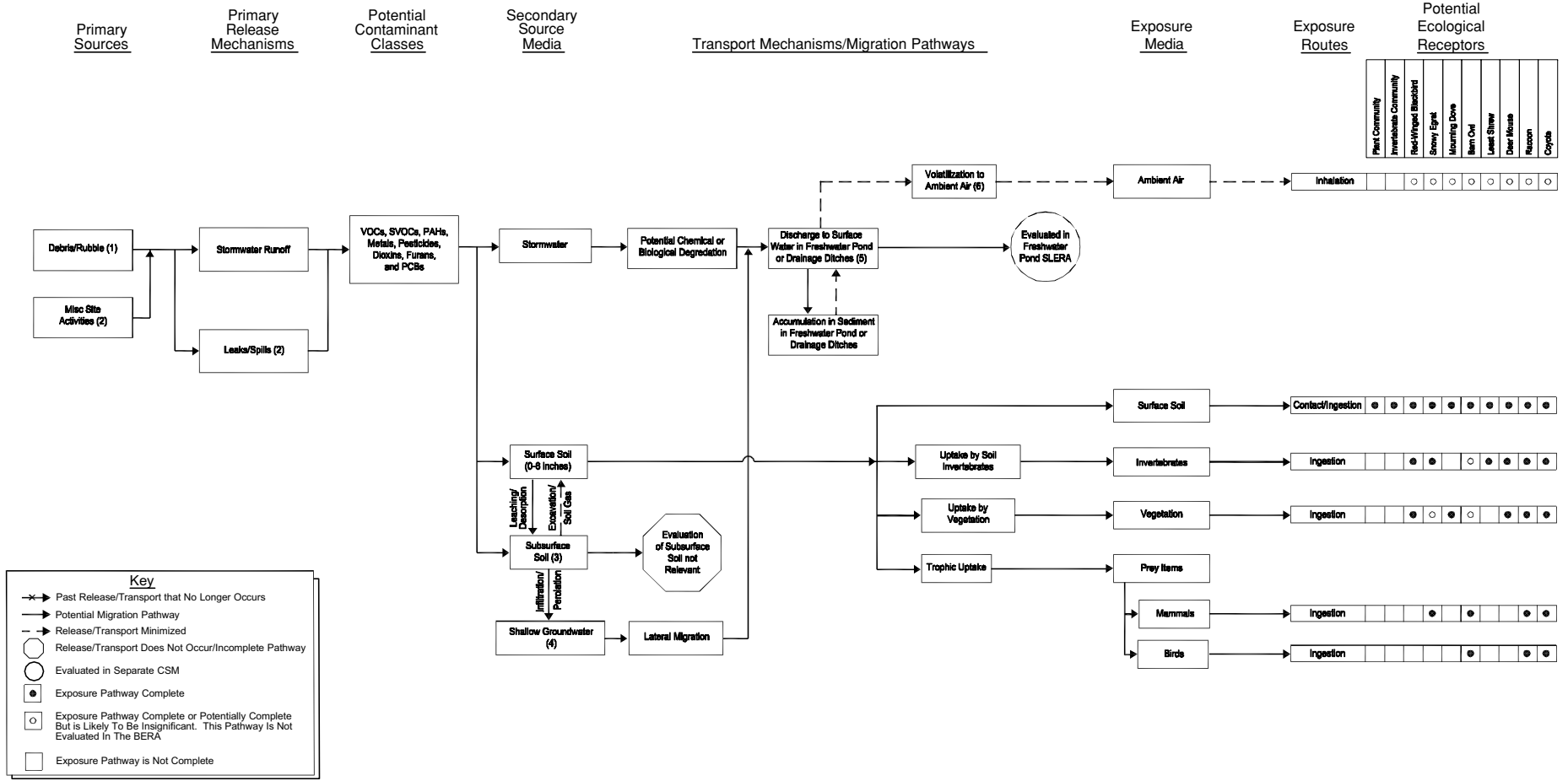
SCALE: AS SHOWN	DRAWN BY: SJM	DATE: 5-30-06
	CHKD. BY: BPB	DATE: 5-30-06

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# **Attachment 2 – Baseline Ecological Risk Assessment Figures**

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X:\LEWA\111122\_Malone\_Remedial Investigation & Feasibility Study.dwg\Drawings\Acad\Drawings\BERA\Fig 9 - Conceptual Site Model-Terrestrial.dwg Fig 15 Dec 19, 2006 - 10:55am

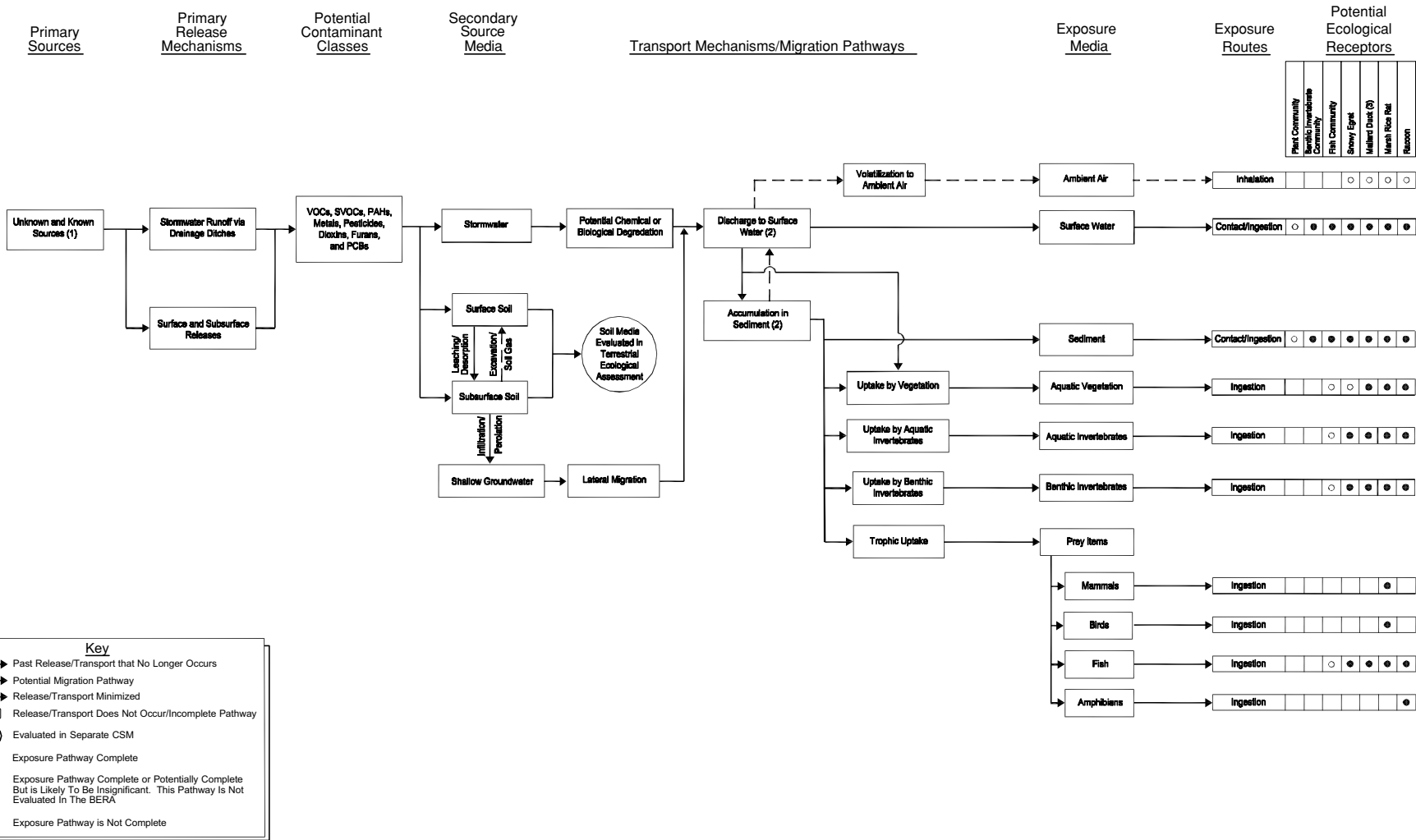


- NOTES:**
- The Laydown Area was used for storage of miscellaneous equipment, debris and concrete rubble. Several areas, such as the Borrow Pit, have no history of site activities.
  - Equipment may have contained waste materials.
  - Subsurface soil (below 6 inches) is not evaluated for ecological exposure.
  - Shallow groundwater is not available to ecological receptors.
  - Runoff is channeled to the Freshwater Pond or drainage ditches, where it is collected and disposed of.
  - Exposure of VOC via inhalation is not addressed in the ecological risk assessment, although pathway may be complete, it is likely insignificant.

MALONE SERVICE CO. SUPERFUND SITE		9801 Westheimer Suite 500 Houston, Texas 77042 PH: (713) 914-8699 FAX: (713) 914-8404		CONCEPTUAL SITE MODEL TERRESTRIAL	FILE NO. Conceptual Site Model Terrestrial.dwg
		SCALE: AS SHOWN	DRAWN BY: BPP		DAL BPP

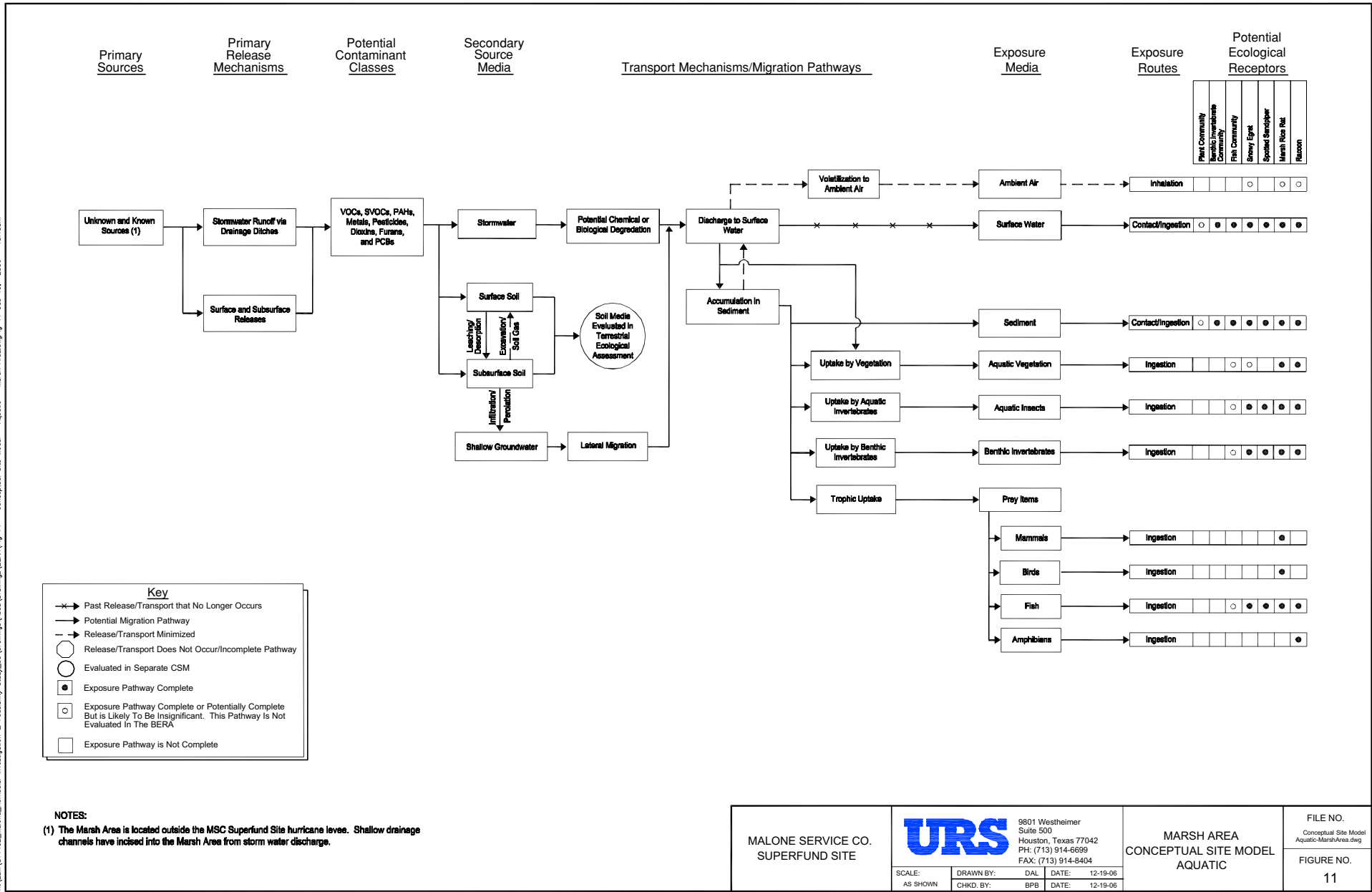


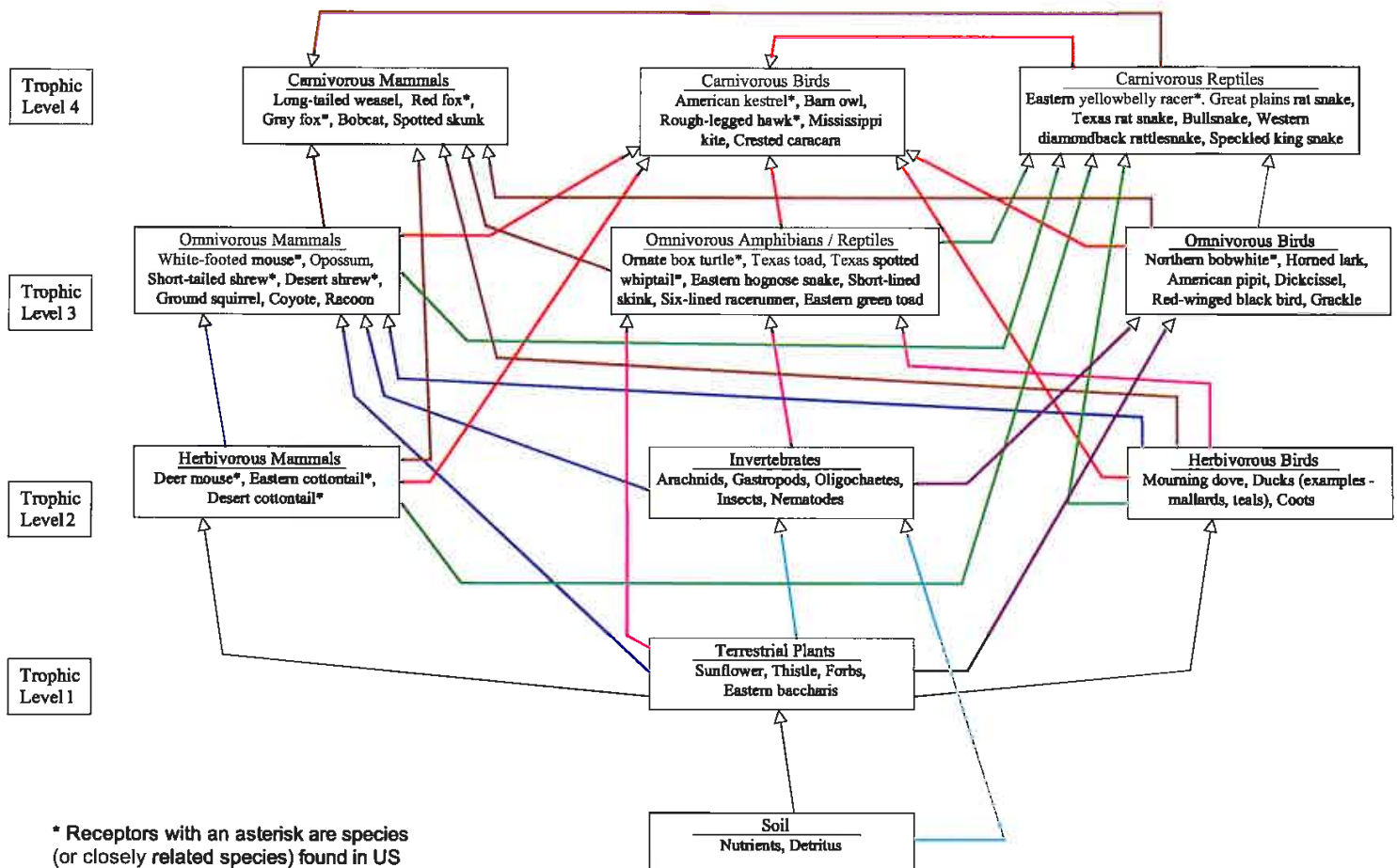
K:\ELM\811102\_Malone\_Bremetal\_Investigation & Feasibility\_Study\_03\Drawings\Acad\Drawings\BERA\Fig 10 - Conceptual Site Model - Aquatic - Freshwater Pond.dwg (9, 13 Dec 19, 2006 - 10:39am)



MALONE SERVICE CO. SUPERFUND SITE		9801 Westheimer Suite 500 Houston, Texas 77042 PH: (713) 914-6699 FAX: (713) 914-8404		<b>FRESHWATER POND AND DRAINAGE AREA CONCEPTUAL SITE MODEL AQUATIC</b>	FILE NO. Conceptual Site Model Aquatic-Freshwater Pond.dwg
		SCALE: AS SHOWN	DRAWN BY: BPB		DAL DATE: 12-19-06


K:\EM\011102\_Malone\_Remedial\_Investigation & Feasibility\_Study\03\Drawings\Acad\Drawings\BERA\Fig 11 - Conceptual Site Model - Aquatic - Marsh Area.dwg Fig 11 - Conceptual Site Model - Aquatic - Marsh Area.dwg 14 Dec 19, 2006 - 10:43am



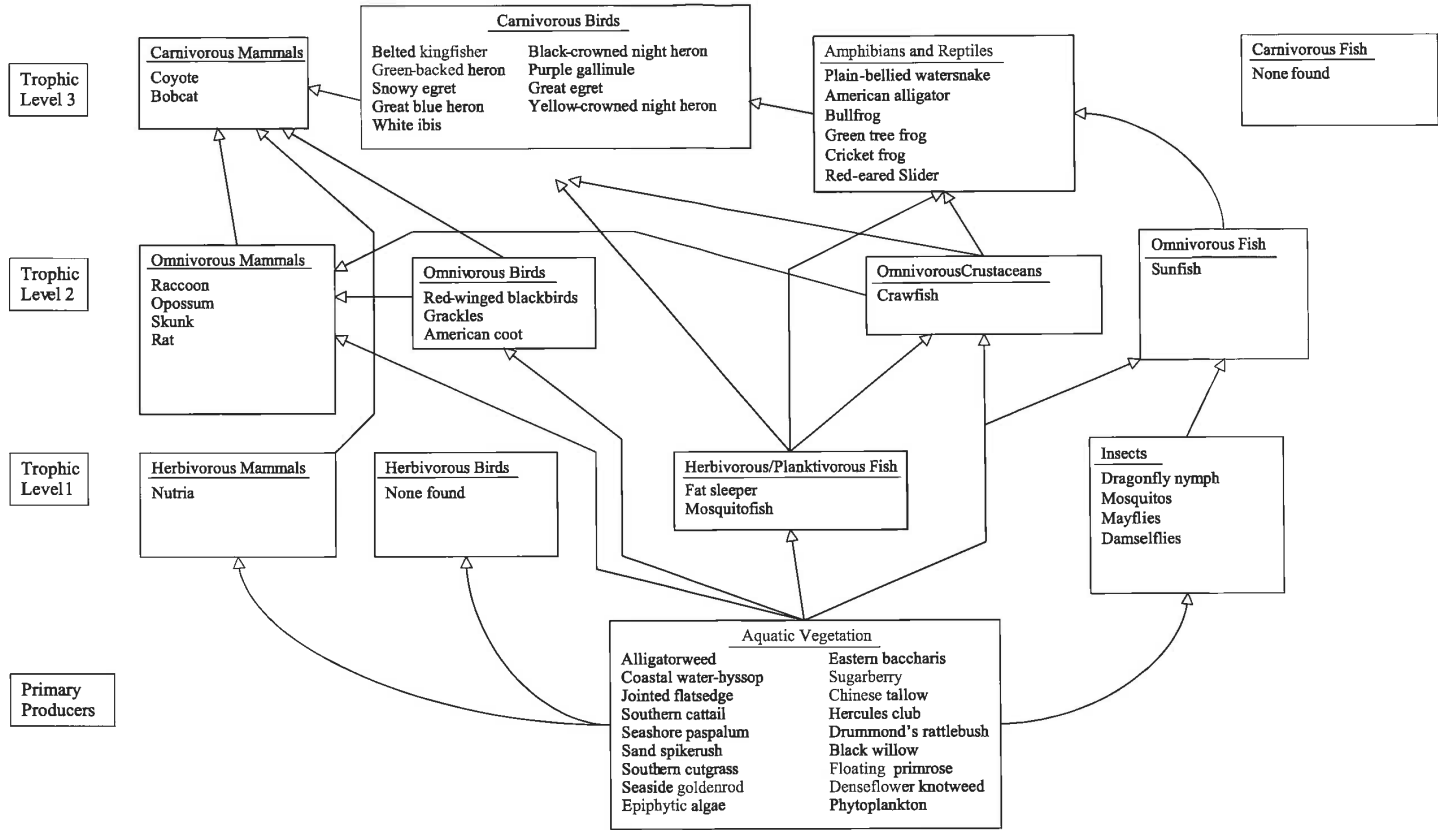


\* Receptors with an asterisk are species (or closely related species) found in US EPA's Wildlife Exposure Factors Handbook (1993).

Reference: Modified from Guidance For Conducting Ecological Risk Assessments at Remediation Sites in Texas, RG-263 (revised), December 2001, Figure 3-8.

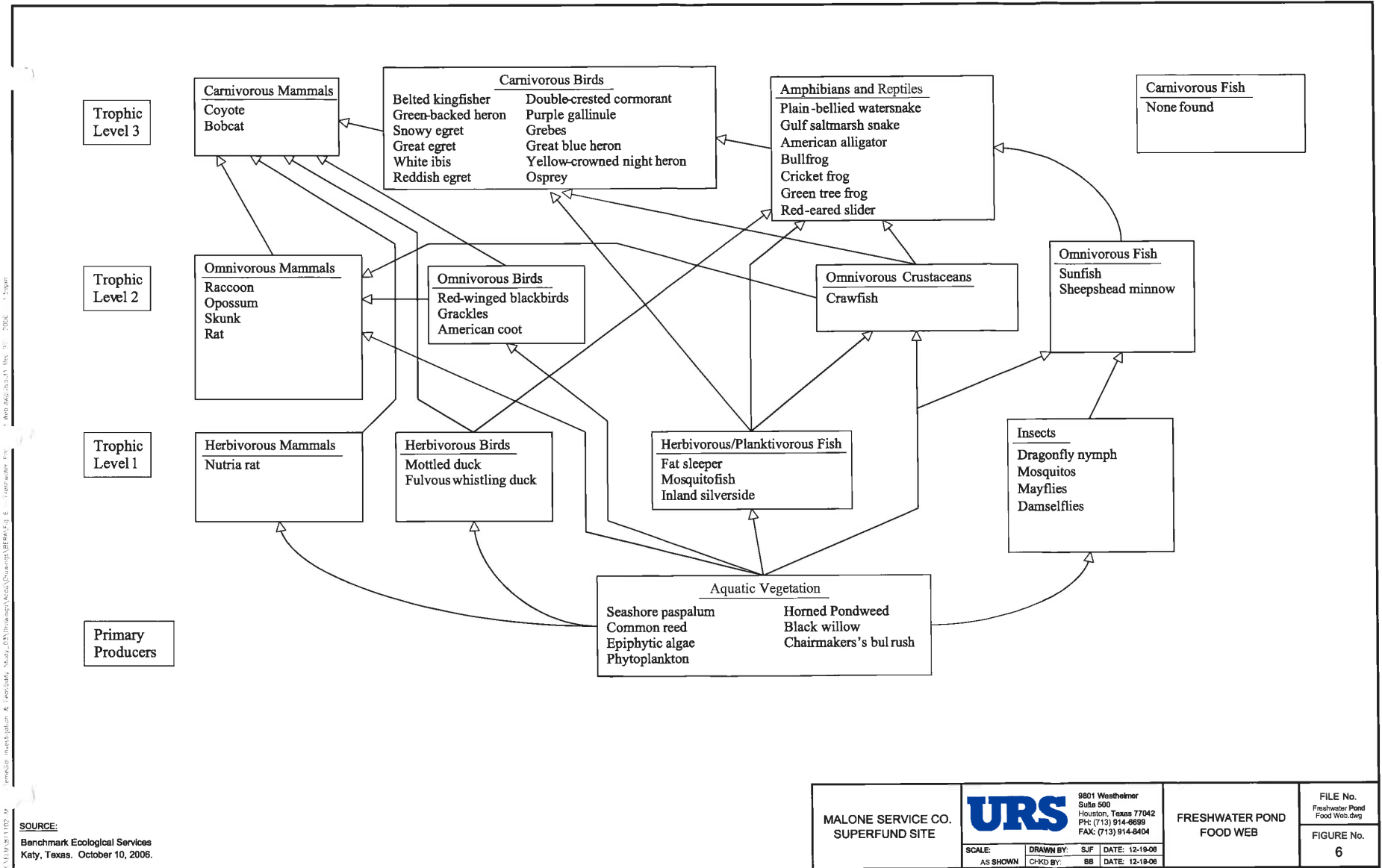
 8801 WESTHEIMER, SUITE 500 HOUSTON, TEXAS 77042 PH: (713) 814-6699 FAX: (713) 789-6404		Title: <b>TERRESTRIAL FOOD WEB</b>	
		Project: <b>MALONE SERVICE CO. SUPERFUND SITE</b>	
Scale: <b>As Shown</b>		Client: <b>MALONE COOPERATING PARTIES</b>	
Drawn by: <b>SJF</b>	Date: <b>12-21-08</b>	Project No.: <b>25008093</b>	File Name: <b>Terrestrial Food Web.dwg</b>
Chkd by: <b>BPB</b>	Date: <b>12-21-06</b>	Figure No.: <b>4</b>	

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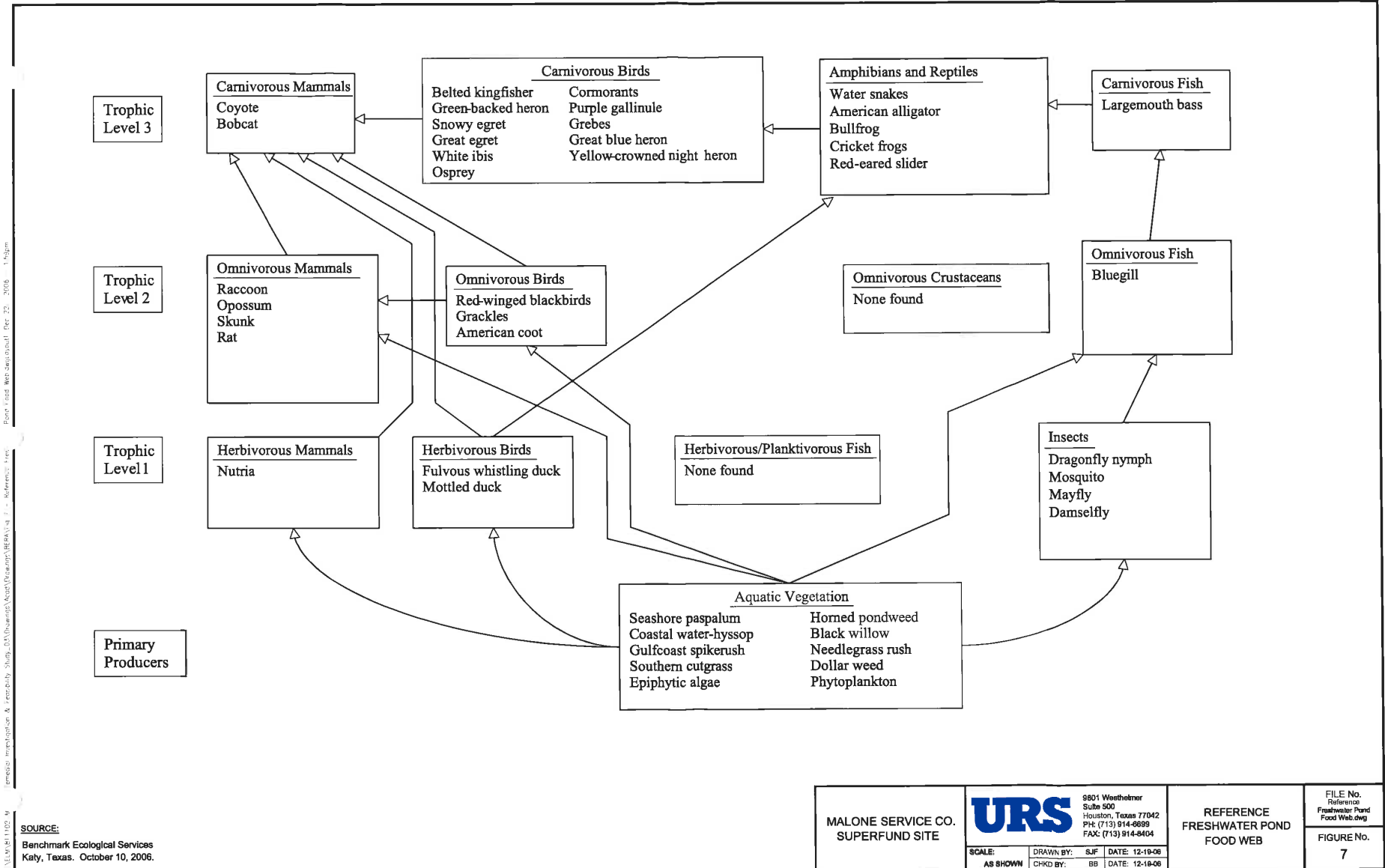
**SOURCE:**  
 Benchmark Ecological Services  
 Katy, Texas. October 10, 2006.

<b>MALONE SERVICE CO.</b> SUPERFUND SITE	 9801 Westheimer Suite 500 Houston, Texas 77042 PH: (713) 914-6699 FAX: (713) 914-6404	<b>DRAINAGE DITCHES</b> FOOD WEB	FILE No. Drainage Ditches Food Web.dwg
			FIGURE No. 5
SCALE: AS SHOWN	DRAWN BY: SJF CHKD BY: BB	DATE: 12-19-06 DATE: 12-19-06	



SOURCE: Benchmark Ecological Services, Katy, Texas, October 10, 2006.

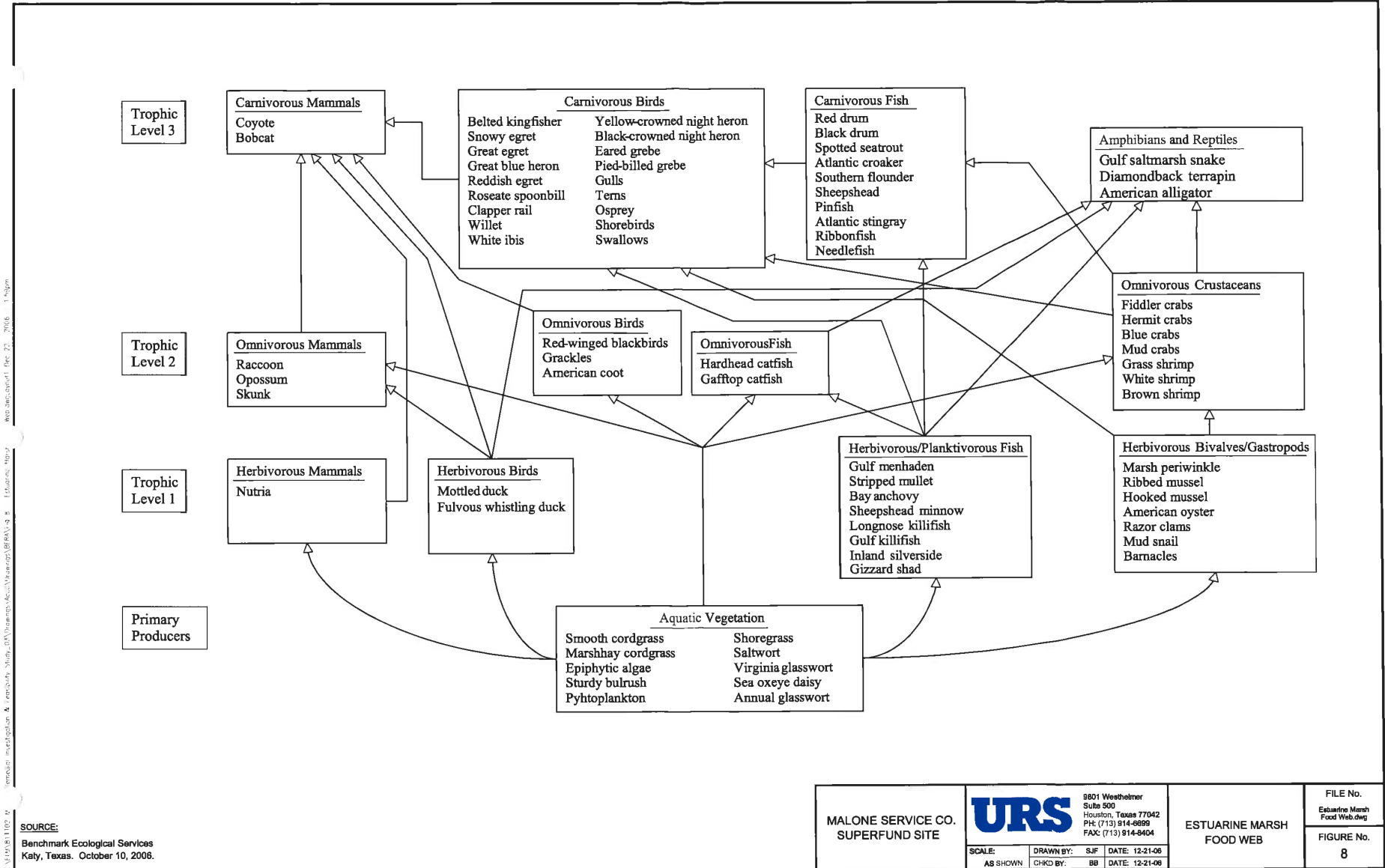
<b>MALONE SERVICE CO.</b> SUPERFUND SITE	9801 Westheimer Suite 500 Houston, Texas 77042 PH: (713) 914-6699 FAX: (713) 914-8404	<b>FRESHWATER POND</b> FOOD WEB	FILE No. Freshwater Pond Food Web.dwg
			FIGURE No. 6
SCALE: AS SHOWN	DRAWN BY: SJF CHKD BY: BB	DATE: 12-19-09 DATE: 12-19-09	



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 Project: 01102\_V  
 Date: 12-19-06  
 Author: SJF  
 Checker: BB

**SOURCE:**  
 Benchmark Ecological Services  
 Katy, Texas. October 10, 2006.

MALONE SERVICE CO. SUPERFUND SITE		9801 Westheimer Suite 500 Houston, Texas 77042 PH: (713) 914-6699 FAX: (713) 914-8404		<b>REFERENCE</b> <b>FRESHWATER POND</b> <b>FOOD WEB</b>	FILE No. Reference Freshwater Pond Food Web.dwg <b>FIGURE No.</b> 7
		SCALE: AS SHOWN	DRAWN BY: SJF		



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 remedi...  
 web...  
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**SOURCE:**  
 Benchmark Ecological Services  
 Katy, Texas. October 10, 2006.

<b>MALONE SERVICE CO.</b> SUPERFUND SITE		9801 Westheimer Suite 500 Houston, Texas 77042 PH: (713) 914-6899 FAX: (713) 914-8404	FILE No. Estuarine Marsh Food Web.dwg
		<b>ESTUARINE MARSH          FOOD WEB</b>	FIGURE No. 8
SCALE: AS SHOWN	DRAWN BY: CHKD BY: SJF BB	DATE: DATE: 12-21-06 12-21-06	

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**FINAL STATEMENT OF WORK FOR  
THE MALONE SERVICE COMPANY SUPERFUND SITE  
RD/RA CONSENT DECREE**

**TEXAS CITY, GALVESTON COUNTY, TEXAS**

APPENDIX B

Consent Decree re the Malone Service Company Superfund Site

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# **STATEMENT OF WORK FOR THE REMEDIAL DESIGN AND REMEDIAL ACTION AT THE MALONE SERVICE COMPANY SUPERFUND SITE**

## **I. INTRODUCTION**

This Statement of Work (“SOW”) outlines the work to be performed by Principal Settling Defendants at the Malone Service Company Superfund Site in Texas City, Galveston County, Texas (the “Site”). The work outlined is intended to fully implement the remedy for the entire Site which is considered one Operable Unit, as described in the Record of Decision (“ROD”) for the Site, dated September 30, 2009, and to achieve the Performance Standards set forth in the ROD, Consent Decree, and this SOW. The requirements of this SOW will be further detailed in work plans and other documents to be submitted by the Principal Settling Defendants for approval as set forth in this SOW. It is not the intent of this document to provide task specific engineering or geological guidance; rather it provides the framework for performance of the work. The definitions set forth in Section IV of the Consent Decree shall also apply to this SOW unless expressly provided otherwise herein.

Principal Settling Defendants are responsible for performing the Work to implement the selected remedy. The U.S. Environmental Protection Agency (“EPA”) shall conduct oversight of the Principal Settling Defendants’ activities throughout the performance of the Work. The Principal Settling Defendants shall assist EPA in conducting oversight activities.

The EPA review or approval of a task or deliverable shall not be construed as a guarantee as to the adequacy of such task or deliverable. If EPA modifies a deliverable pursuant to Section XI of the Consent Decree, such deliverable as modified shall be deemed approved by EPA for purposes of this SOW. A summary of the major deliverables that Principal Settling Defendants shall submit for the Work is attached herein.

## **II. OVERVIEW OF THE REMEDY**

The Remedial Action Objectives (“RAOs”) for sludge (including soils and surface water overlying the sludge) are to:

- Prevent the potential direct contact/inhalation of carcinogenic and non-carcinogenic Constituents of Concern (“COCs”) by human receptors above risk-based remediation levels;
- Prevent the release of carcinogenic and non-carcinogenic COCs from sludge to surface soils and sediments above risk-based remediation levels;
- Prevent the migration of carcinogenic and non-carcinogenic COCs from sludge to groundwater above risk-based remediation levels for inhalation from groundwater contaminants by human receptors;

- Prevent the release of COCs from sludge to surface soils and sediments above ecological risk-based remediation levels; and
- Prevent the release of COCs from sludge to surface water above ecological risk-based remediation levels.

The RAOs for soil are to:

- Prevent ingestion/direct contact/inhalation by human receptors of carcinogenic and non-carcinogenic COCs from surface soils above risk-based remediation levels;
- Prevent migration of COCs to groundwater from soils with subsequent emanation of vapors above risk-based remediation levels for the prevention of inhalation of contaminants by human receptors;
- Prevent ingestion by ecological receptors of COCs from surface soils above risk-based remediation levels;
- Prevent ingestion by avian and mammalian receptors of soil invertebrates, terrestrial plants, and/or other prey that have accumulated COCs from the soil above the ROD remediation levels; and
- Prevent inhalation by on-site nature conservancy workers of carcinogenic and non-carcinogenic COCs from subsurface soils above risk-based remediation levels.

The RAO for groundwater is to:

- Prevent migration of COCs beyond the Site boundary at concentrations exceeding Texas Class 3 Groundwater PCLs (Texas, 30 TAC, Chapter 350, Subchapter D) for commercial/industrial sites or, for metals, concentrations the higher of TCEQ Class 3 Groundwater PCLs or background levels.

### **III. REMEDY COMPONENTS**

The remedy includes prevention of human exposure to site contaminants by: 1) excavating the site sludge and subsurface soil contaminated with source material, solidifying it and consolidating it into a RCRA Subtitle “C” equivalent cell; 2) excavating the surface soil contaminated above the site remediation levels identified in the ROD, and consolidating the soils into the RCRA Subtitle “C” equivalent cell, with the excavation areas backfilled with clean soil; 3) monitoring of contaminated Class 3 groundwater to prevent offsite migration of contaminated groundwater above the Texas Commission on Environmental Quality (“TCEQ”) groundwater protective concentration levels (“PCLs”); and 4) implementing institutional controls to control exposure to any remaining soil contamination and prevent access to groundwater.

A. Components

The major components of the remedy are described in the Selected Remedy section of the attached Record of Decision (Section 2.12).

B. Treatment

The treatment technologies for the remedy are described in Section 2.12 of the Selected Remedy section of the attached Record of Decision.

C. Performance Standards

Principal Settling Defendants shall conduct remedial action as required until Principal Settling Defendants have demonstrated compliance with the Performance Standards, as that term is defined in the Consent Decree, and in accordance with the Construction Quality Assurance Plan (CQAP) required by this SOW.

D. Compliance Testing

Principal Settling Defendants shall perform compliance testing to ensure that all Performance Standards are met. The treated materials shall be tested in accordance with the CQAP developed pursuant to this SOW. If testing of the treated materials indicates the Performance Standards consistently cannot be achieved, EPA may reevaluate the effectiveness of the source control component. The Principal Settling Defendants may seek approval from EPA for other means to properly manage any such material that does not meet the Performance Standards.

After demonstration of compliance with Performance Standards, Principal Settling Defendants shall monitor the Site, including taking such actions as are necessary to maintain the RCRA cell, in accordance with the approved Operation and Maintenance Plan until hazardous substances remaining at the Site are below levels allowing for unlimited use and unrestricted exposure, as determined by EPA. Principal Settling Defendants also shall conduct groundwater monitoring not connected with the maintenance of the RCRA cell in accordance with the approved Groundwater Monitoring Work Plan; EPA may modify the minimum 30-year monitoring period for Site groundwater if monitoring data support that the plumes are stable or shrinking such that there is no potential for off-site migration of organic COCs beyond the Site boundary at concentrations exceeding Texas Class 3 Groundwater PCLs for commercial/industrial sites or, for metals, concentrations the higher of TCEQ Class 3 Groundwater PCLs or background levels.

#### E. Treatability Pilot Studies

A bench scale Treatability Study was conducted and a report submitted in February 2008. Principal Settling Defendants shall submit and, upon approval by EPA, implement a Treatability Pilot Study Work Plan to determine how Site-specific Performance Standards for solidification will be met, and the results shall be incorporated into the detailed design of the selected remedy. The EPA will evaluate the results of the treatability pilot study to determine whether the proposed treatment will attain the Performance Standards. Principal Settling Defendants shall submit the Treatability Pilot Study Final Report to EPA as soon as possible following completion of the study.

### IV. PLANNING AND DELIVERABLES

The specific scope of this work shall be documented by Principal Settling Defendants in a General Remedial Design (“RD”)/Remedial Action (“RA”) Work Plan. Due to the nature and scope of work associated with the project the Principal Settling Defendants will conduct the work in a phased approach. Initially, the General RD/RA Work Plan will be prepared and submitted with Component Plans as described below (e.g. Health and Safety Plan). These documents will provide requirements for each phase. The Principal Settling Defendants shall submit the Work Plans for Phase One activities within 30 days of EPA approval of the General RD/RA Work Plan and Component Plans. The specific work associated with each phase will be documented by Principal Settling Defendants in a series of deliverables over the life of the project according to the schedule attached hereto, and a schedule included in the General RD/RA Work Plan and updated in the Final Design and RA Work Plan for Phases Two through Four.

Principal Settling Defendants shall submit a technical memorandum documenting any need for additional data along with the proposed Data Quality Objectives (“DQOs”) whenever such requirements are identified. Principal Settling Defendants are responsible for fulfilling additional data and analysis needs identified by EPA during the RD/RA process that are consistent with the scope and objectives of the Consent Decree, including this SOW.

The project will be divided into four (4) distinct phases. Each phase, other than Phase One, will have a separate Final Design and RA Work Plan, as described below in Task III. Plans, specifications, submittals, and other deliverables shall be subject to EPA review and approval in accordance with Section XI of the Consent Decree. During the Project Planning, discussed below, the specific components of phases may be rearranged with EPA’s approval.

The major work elements anticipated for each phase are summarized below:

#### **Phase One**

- Pre-Design Investigations – Work Plan and Implementation
  - Slurry Wall Investigation
  - Sludge Pond Investigation

- RCRA Cell Investigation
- Building and Tank Investigation
- Additional Data Collection (if required)
- Cemetery Relocation - Work Plan and Implementation
- Treatability Pilot Study - Work Plan and Implementation

**Phase Two**

- Above Ground Tank and Building Demolition
- Design and Construction of Slurry Wall
- Design and Construction of Sludge Pond Berm Improvements

**Phase Three**

- Design and Construction of the RCRA Cell
- Sludge Treatment and Consolidation
- Soil Delineation, Excavation and Consolidation

**Phase Four**

- Site grading, drainage, and revegetation
- Confirmation of procedure used to abandon former injection well
- Well logging and proper abandonment of the two (2) on-site hazardous waste injection wells, and the proper plugging, logging and abandonment of the onsite water supply well
- Groundwater Monitoring Work Plan and Well Installation
- Institutional Controls

The Work will be implemented in the following sequence:

**TASK I - PROJECT PLANNING**

**A. Site Background**

Principal Settling Defendants shall gather and evaluate the existing information regarding the Site and shall conduct a visit to the Site with EPA to assist in planning the RD/RA. Before planning RD/RA activities, all existing Site data shall be thoroughly reviewed by Principal Settling Defendants. Specifically, this shall include the ROD, RI/FS, and other available data related to the Site. This information shall be utilized in determining if additional data is needed for RD/RA implementation. Final decisions on the necessary data and DQOs shall be made by EPA.

**B. Scoping Meeting**

Once Principal Settling Defendants have evaluated existing data, the specific project scope shall be planned and discussed with EPA in a Scoping Meeting. The Scoping Meeting shall occur within 45 days after EPA's issuance of an authorization to proceed under Paragraph 10 of

the Consent Decree. The Scoping Meeting will be held at or near to the site in order to incorporate a site walk-through with EPA.

**C. Schedule**

The project schedule will initially be presented in the schedule attached to this SOW and in the General RD/RA Work Plan as described below. Subsequently, the Final Design and RA Work Plan for each phase will revise and update the schedule for that phase. The Final Design for Phase Two shall also include the schedule for submittal of the Final Design for Phase Three, and the Final Design for Phase Three shall include the schedule for submittal of the Final Design for Phase Four. The initial milestones and the schedules for their submittal are:

<b>Milestone</b>	<b>Schedule</b>
Scoping Meeting	Within 45 days of Authorization to Proceed
General RD/RA Work Plan	Within 90 days of Scoping Meeting
Phase One Work Plans	Within 30 days of EPA Approval of General RD/RA Work Plan and Component Plans
Work Start	Within 30 days of EPA approval of Phase One Work Plans, or within 30 days of the Effective Date, whichever is later
Phase Two Basis of Design Meeting and the Phase Two Prefinal and Final Design	As specified in the EPA-approved Pre-Design Investigations Report

**TASK II –REMEDIAL DESIGN AND REMEDIAL ACTION PLAN**

The Remedial Designs shall provide the technical details for implementation of the Remedial Actions in accordance with currently accepted environmental protection technologies and standard professional engineering and construction practices. The designs shall include clear and comprehensive design plans and specifications for implementation of the Remedial Actions.

The Remedial Actions shall be performed by Principal Settling Defendants to implement the response actions selected in the ROD.

**A. General Remedial Design and Remedial Action Work Plan**

Principal Settling Defendants shall submit a General RD/RA Work Plan and its Component Plans to EPA within 90 days after the Scoping Meeting. The associated components may be separate submittals and are listed in Section IV, Task II.B, below.

The General RD/RA Work Plan and associated components must be reviewed and approved by EPA, and the Health and Safety Plan reviewed and commented on by EPA, prior to the initiation



of field activities. Upon approval of the General RD/RA Work Plan and its associated Component Plans, Principal Settling Defendants shall implement the General RD/RA Work Plan in accordance with the project schedule contained therein and in this SOW. Plans, specifications, submittals, and other deliverables shall be subject to EPA review and approval in accordance with Section XI of the Consent Decree. Review and/or approval of draft design submittals only allow Principal Settling Defendants to proceed to finalizing the design submittals. It does not imply acceptance of later design submittals that have not been reviewed, nor that the remedy, when constructed, will meet Performance Standards.

The General RD/RA Work Plan shall provide an overall plan of action for completing the RA activities. One objective of the General RD/RA Work Plan is to provide for the safe and efficient completion of the RA. The General RD/RA Work Plan shall include a comprehensive description of the work to be performed.

Specifically, the General RD/RA Work Plan shall present the following;

1. A statement of the problem(s) and potential problem(s) posed by the Site and the objectives of the RD/RA.
2. A background summary setting forth the following:
  - a. A brief description of the Site including the geographic location and the physiographic, hydrologic, geologic, demographic, ecological and natural resource features;
  - b. A brief synopsis of the history of the Site including a summary of past disposal practices and a description of previous responses that have been conducted by local, State, Federal, or private parties;
  - c. A summary of the existing data including physical and chemical characteristics of the contaminants identified and their distribution among the environmental media at the Site.
3. A list and detailed description of the tasks to be performed, information needed for each task, information to be produced during and at the conclusion of each task, and a description of the work products that shall be submitted to EPA. This description shall include the deliverables set forth herein.
4. An overall schedule for the activities and deliverables required by the Consent Decree and this SOW and the procedure to be used for any schedule modifications.

**B. General RD/RA Work Plan – Component Plans**

The General RD/RA Work Plan shall be submitted with Component Plans including:

1. Health and Safety Plan
2. Air Monitoring Plan
3. Hurricane and Flooding Contingency Plan
4. Storm Water Management Plan
5. Spill Control and Countermeasures Plan
6. Sampling and Analysis Plan
7. Quality Assurance Project Plan
8. Project Management Plan
9. Data Management Plan
10. Permitting Plan (if required)
11. Construction Management Plan
12. Construction Quality Assurance Plan
13. Community Relations Plan (by EPA)

The Component Plans shall be used throughout the project, but phase-specific addenda may be made in each phase's Work Plans or RA Work Plan. Additional descriptions for these plans are provided below.

#### 1 - Health and Safety Plan

A Health and Safety Plan shall be prepared in conformance with Principal Settling Defendants' health and safety program and in compliance with OSHA regulations and protocols. The Health and Safety Plan shall include a health and safety risk analysis, a description of monitoring and personal protective equipment, medical monitoring, and provisions for site control. The EPA will not approve Principal Settling Defendants' Health and Safety Plan, but rather EPA will review it to ensure that all necessary elements are included, and that the plan provides for the protection of human health and the environment.

This plan shall include a Contingency Plan for the Site. The Contingency Plan is to be written for the onsite construction workers and the local affected population. It shall include the following items:

1. Name of person who will be responsible in the event of an emergency incident.
2. Plan for initial site safety indoctrination and training for all employees, name of the person who will give the training and the topics to be covered.
3. Plan and date for meeting with the local community, including local, state and federal agencies involved in the cleanup, as well as the local emergency squads and the local hospitals.
4. A list of the first aid and medical facilities, including location of first aid kits, names of personnel trained in first aid, a clearly marked map with the route to the nearest medical facility, all necessary emergency phone numbers conspicuously posted at the job site (i.e., fire, rescue, local hazardous material teams, National Emergency Response Team, etc.).
5. Plans for protection of public and visitors to the job site.

## 2 – Air Monitoring Plan

The Air Monitoring Plan shall incorporate the following requirements:

1. Air monitoring shall be conducted both on Site and at the perimeter of the Site. The chemical constituents that were identified during the Risk Assessment shall serve as a basis of the sampling for and measurement of pollutants in the atmosphere. Principal Settling Defendants shall clearly identify which chemicals will be monitored and the detection and notification levels required in Paragraph 4 below. Air monitoring shall include personnel monitoring, on-site area monitoring, and perimeter monitoring.
2. Personnel monitoring shall be conducted according to OSHA and NIOSH regulations and guidance.
3. Onsite area monitoring shall consist of continuous real-time monitoring performed immediately adjacent to any waste excavation areas, treatment areas, and any other applicable areas where work is occurring. Measurements shall be taken in the breathing zones of personnel and immediately upwind and downwind of the work areas. Equipment shall include the following, at a minimum: organic vapor meter, explosion meter, particulate monitoring equipment, and onsite windsock.
4. Perimeter monitoring shall consist of monitoring airborne contaminants at the perimeter of the Site to determine whether harmful concentrations of toxic constituents are migrating off-site. The EPA approved methods shall be used for sampling and analysis of air at the Site perimeter. The results of the perimeter air monitoring and the on-site meteorological station shall be used to assess the potential for off-site exposure to toxic materials. The air monitoring program shall include provisions for notifying any off-site potentially affected parties, including local, state, and federal agencies, in the event that unacceptable concentrations of airborne toxic constituents are migrating off-site. Principal Settling Defendants shall report detection of unacceptable levels of airborne contaminants to EPA in accordance with Section X of the Consent Decree.

## 3 – Hurricane and Flooding Contingency Plan

The Principal Settling Defendants shall prepare a Hurricane and Flooding Contingency Plan (HFCP) to describe the potential issues associated with a hurricane or flooding at the Site and define in detail the efforts and work required at the Site to properly prepare for and implement response actions. Included in the HFCP shall be;

1. Descriptions of potential concerns resulting from a hurricane or severe flooding
2. Notification requirements
3. Equipment and material requirements associated with a response action

4. A work plan for protection of the remedy and any work in progress and prevention of migration of hazardous substances
5. A description of activities associated with re-entry to the Site and resuming remedial efforts

#### 4 – Storm Water Management Plan

The existing Storm Water Management Plan for the Site will be updated in view of the planned work and submitted to EPA for review and approval. Principal Settling Defendants shall implement the Storm Water Management Plan following EPA approval, in accordance with the schedule in the approved plan.

#### 5 – Spill Control and Countermeasures Plan

The Principal Settling Defendants shall prepare a Spill Control and Countermeasures Plan which shall include the following:

1. Contingency measures for potential spills and discharges from materials handling and/or transportation.
2. A description of the methods, means, and facilities required to prevent contamination of soil, water, atmosphere, and uncontaminated structures, equipment, or material by spills or discharges.
3. A description of the equipment and personnel necessary to perform emergency measures required to contain any spillage and to remove spilled materials and soils or liquids that become contaminated due to spillage. This collected spill material must be properly disposed of.
4. A description of the equipment and personnel to perform decontamination measures that may be required for previously uncontaminated structures, equipment, or material

#### 6 - Sampling and Analysis Plan

As part of the Work Plan, Principal Settling Defendants shall prepare a Sampling and Analysis Plan (“SAP”) to ensure that sample collection and analytical activities are conducted in accordance with technically acceptable protocols and that the data generated will meet the established DQOs. The SAP shall include a Field Sampling and Analysis Plan.

The SAP shall define in detail the sampling and data-gathering methods that shall be used on the project. It shall include sampling objectives, sample location (horizontal and vertical) and frequency, sampling equipment and procedures, and sample handling and analysis. The SAP shall be written so that a field sampling team unfamiliar with the Site would be able to gather the samples and field information required.

## 7 - Quality Assurance Project Plan (“QAPP”)

The QAPP shall describe the project objectives and organization, functional activities, and quality assurance and quality control (“QA/QC”) protocols that shall be used to achieve the desired DQOs. The DQOs shall, at a minimum, reflect use of analytical methods for obtaining data of sufficient quality to meet National Contingency Plan requirements as identified at 40 C.F.R. § 300.435(b). In addition, the QAPP shall address personnel qualifications, sampling procedures, sample custody, analytical procedures, and data reduction, validation, and reporting. These procedures must be consistent with the Region 6 Environmental Investigation Standard Operating Procedures and Quality Assurance Manual and the guidance specified in Section VIII of the Consent Decree.

Principal Settling Defendants shall demonstrate in advance and to EPA's satisfaction that each laboratory it may use is qualified to conduct the proposed work and meets the requirements specified in Section VIII of the Consent Decree. The EPA may require that Principal Settling Defendants submit detailed information to demonstrate that the laboratory is qualified to conduct the work, including information on personnel qualifications, equipment and material specification, and laboratory analyses of performance samples (blank and/or spike samples). In addition, EPA may require submittal of data packages equivalent to those generated by the EPA Contract Laboratory Program (“CLP”).

## 8 - Project Management Plan

Principal Settling Defendants shall submit a project management plan that outlines the strategy for delivering the project. The plan shall address the management approach for implementing the Remedial Action, including procurement methods and contracting strategy, phasing alternatives, and contractor and equipment availability concerns, if any. The plan is expected to include provisions for monthly reports to EPA in accordance with the CD and meetings and presentations to EPA at the conclusion of each major phase of the RD/RA

## 9 - Data Management Plan

The data management plan shall address the requirements for project management systems, including tracking, sorting, and retrieving the data along with an identification of the software to be used, minimum data requirements, data format and backup data management. The plan shall address both data management and document control for all activities conducted during the RD/RA.

## 10 - Permitting Plan (if determined by EPA to be applicable for the Site)

All activities must be performed in accordance with the requirements of all applicable federal and state laws and regulations. Any off-site disposal shall be in compliance with

the policies stated in the Procedure for Planning and Implementing Off-site Response Actions (Federal Register, Volume 50, Number 214, November, 1985, pages 45933 - 45937) and the National Contingency Plan, Section 300.440. The plan shall identify the off-site disposal permits that are anticipated, the time required to process the permit applications, and a schedule for submittal of the permit applications.

#### 11 - Construction Management Plan

A Construction Management Plan shall be developed to indicate how the construction activities are to be implemented and coordinated with EPA during the RA. Principal Settling Defendants shall designate a person to be a Remedial Action Coordinator and its representative on-site during all phases of the Remedial Action and identify this person in the Plan. This Plan shall also identify other key project management personnel and lines of authority, and provide descriptions of the duties of the key personnel along with an organizational chart. In addition, a plan for the administration of construction changes and EPA review and approval of those changes shall be included.

#### 12 - Construction Quality Assurance Plan ("CQAP")

Principal Settling Defendants shall develop and implement a Construction Quality Assurance Plan to ensure, with a reasonable degree of certainty, that the completed Remedial Action meets or exceeds all design criteria, plans and specifications, and Performance Standards. The Construction Quality Assurance Plan will include Performance Standards as set forth in the Record of Decision and as developed and approved by EPA during the remedial work, and the methods which shall be used to verify that the Performance Standards have been met.

At a minimum, the Construction Quality Assurance Plan shall include the following elements:

1. A description of the quality control organization, including a chart showing lines of authority and identifying the members of the Independent Quality Assurance Team ("IQAT"), and acknowledgment that the IQAT will implement the control system for all aspects of the work specified and shall provide all reports to both the Principal Settling Defendants' Project Coordinator and EPA. The IQAT members shall be representatives from testing and inspection organizations and/or the Supervising Contractor and shall be responsible for the QA/QC of the Remedial Action. The members of the IQAT shall have a good professional and ethical reputation, previous experience in the type of QA/QC activities to be implemented and demonstrated capability to perform the required activities. They shall also be independent of the construction contractor.

2. The name, qualifications, duties, authorities, and responsibilities of each person assigned a QC function.
3. Description of the observations and control testing that will be used to monitor the construction and/or installation of the components of the Remedial Action. This includes information which certifies that personnel and laboratories performing the tests are qualified and the equipment and procedures to be used comply with applicable standards. Any laboratories to be used shall be specified. Acceptance/Rejection criteria and plans for implementing corrective measures shall be addressed.
4. A schedule for managing submittals, testing, inspections, and any other QA function (including those of contractors, subcontractors, fabricators, suppliers, purchasing agents, etc.) that involve assuring quality workmanship, verifying compliance with the plans and specifications, or any other QC objectives. Inspections shall verify compliance with all environmental requirements and include, but not be limited to, air quality and emissions monitoring records and waste disposal records, etc.
5. Reporting procedures and reporting format for QA/QC activities including such items as daily summary reports, schedule of data submissions, inspection data sheets, problem identification and corrective measures reports, evaluation reports, acceptance reports, and final documentation.
6. A list of definable features of the work to be performed. A definable feature of work is a task which is separate and distinct from other tasks and has separate control requirements.
7. The CQAP shall provide a mechanism to ensure that both short-term and long-term Performance Standards for the Remedial Action are met. Guidance used in developing the Sampling and Analysis Plan during the Remedial Design phase shall be used. The CQAP shall include:
  - 1) The CQAP shall provide guidance for all construction-related fieldwork by defining in detail the sampling and data gathering methods to be used. The CQAP, in conjunction with the Sampling and Analysis Plan, shall be written so that a field sampling team unfamiliar with the Site would be able to gather the samples and field information required.
  - 2) The CQAP shall describe the quality assurance and quality control protocols which will be followed in demonstrating compliance with Performance Standards.

- 3) Specification of those tasks to be performed by Principal Settling Defendants to demonstrate compliance with the Performance Standards and a schedule for the performance of these tasks.

### 13 - Community Relations Plan (by EPA)

At EPA's request, Principal Settling Defendants will assist EPA in preparing and disseminating information to the public regarding the RD/RA work to be performed. EPA will prepare any necessary Community Relations plan. This plan shall include a description of the community relations activities to be conducted during the RD/RA.

## **TASK III - REMEDIAL DESIGN AND REMEDIAL ACTION PHASES**

Following submittal and EPA approval of the General RD/RA Work Plan and its Component Plans, the remedial design and remedial action work will be initiated. The specific work tasks expected to be completed in each phase are shown below, but may change based on site-specific conditions as agreed by EPA and the Principal Settling Defendants. Principal Settling Defendants shall submit schedule and any other proposed changes to EPA for approval. Prior to implementation of Phase One there will be a Scope Meeting with EPA and Work Plans. Prior to implementation of Phases Two, Three, and Four, there will be a Basis of Design meeting with EPA, a Prefinal Design, a Final Design, and a Remedial Action Work Plan, all as set forth below.

### **A - Procedures for Phases**

#### **Phase One**

The Principal Settling Defendants shall prepare Phase One Work Plans for EPA approval and shall implement Phase One Work Plans that include the component work plans listed in Task III.C.1, below. The Scoping Meeting will include a discussion of the following:

- Description of the data gap(s), if any,
- the design element(s) the data will support,
- sampling and analytical requirements, and
- a description of how the data will be evaluated to support future design efforts.

Figures showing locations for investigations and a detailed schedule will be provided in each Phase One Work Plan. A cost estimate will not be required for Phase One. Once approved by EPA, and after the Effective Date, Principal Settling Defendants shall implement the Phase One Work Plans in accordance with the approved schedules in the Work Plans.



## **Phases Two, Three, and Four**

Phases Two, Three, and Four shall include the work described below.

### **1 - Basis of Design Meeting**

For each phase, Principal Settling Defendants shall have a Basis of Design (BOD) meeting with EPA. During the BOD meeting the Principal Settling Defendants shall present to EPA the Basis of Design for that phase, which shall include the concepts supporting the technical aspects of the design or investigation. Principal Settling Defendants shall submit to EPA at the meeting an outline of the required drawings, including preliminary sketches and layouts, describing conceptual aspects of the design, unit processes, investigation rationale, etc. In addition, an outline of the required specifications, including Performance Standards, shall be submitted. Construction drawings shall reflect organization and clarity, and the scope of the technical specifications shall be outlined in a manner reflecting the final specifications. Written approval by EPA of the Basis of Design submittal for a phase is required before proceeding with further design work for that phase, unless otherwise specifically authorized by EPA.

### **2 - Prefinal Design and Final Design**

The Remedial Design for each phase shall provide the technical details for implementation of the Remedial Action in accordance with currently accepted environmental protection technologies and standard professional engineering and construction practices. The design for each phase shall include clear and comprehensive design plans and specifications.

Principal Settling Defendants shall submit the Prefinal Design for each phase when the design work is approximately 90 percent complete, in accordance with the design management schedule in the approved General RD/RA Work Plan (or any subsequent schedule revisions approved by EPA in the Pre-Design Investigations Report, the Phase Two RD, and the Phase Three RD). Principal Settling Defendants shall address comments generated from the BOD meeting and show any modification of the design as a result of incorporation of the comments.

After EPA review and comment on the Prefinal Design, the Final Design shall be submitted along with a memorandum indicating how EPA's comments on the Prefinal Design were incorporated into the Final Design. All Final Design documents shall be certified by a Professional Engineer registered in the State of Texas. Written approval by EPA of the Final Design is required before initiating the RA, unless otherwise specifically authorized by EPA.

The following items shall be submitted with or as part of the Prefinal Design and Final Design for each phase:

a. Design Analyses

The selected design shall be presented along with an analysis supporting the design approach. Design calculations shall be included.

b. Plans and Specifications

A complete set of construction drawings and specifications shall be submitted which describe the selected design.

c. Construction Schedule

A draft construction schedule for construction and implementation of the relevant work that identifies timing for initiation and completion of all critical path tasks shall be prepared as part of the Prefinal Design. The schedule shall specifically identify target dates for completion of the subject tasks and major milestones. The submission of the Final Design of each phase shall include the final RA Work Plan for that phase, and the final RA Work Plan shall contain the final construction schedule for that phase for EPA approval. The Final Designs of Phases Two and Three shall also include final schedules for the Basis of Design meeting and submittal, the Prefinal Design, and the Final Design of Phases Three and Four, respectively.

d. Cost Estimate

A construction cost estimate with an expected accuracy of +15 percent to -10 percent shall be submitted.

### **3 - Remedial Action Work Plans**

As part of the submittal of the Prefinal Design for Phases Two, Three and Four, Principal Settling Defendants shall submit a draft Remedial Action (“RA”) Work Plan for that phase. Principal Settling Defendants shall submit the final RA Work Plans for each phase as part of the submission of the Final Designs for Phases Two, Three, and Four. Each RA Work Plan will provide a detailed plan of action for completing the RA activities under each phase and shall be submitted to EPA for review and approval. The objective of the Work Plan is to provide for the safe and efficient completion of the RA. The RA Work Plan shall be developed to be used with the General RD/RA Component Plans, and may include addenda to the Component Plans as needed. The RA Work Plan shall include a comprehensive description of the work to be performed and the work products to be submitted to EPA for that phase, and the Final Construction schedule for completion of each major activity and submission of each deliverable in that phase.

Upon EPA approval of the Final Design and the RA Work Plan for each phase, Principal Settling Defendants shall implement the Final Design and the RA Work Plan in accordance with the schedule in the RA Work Plan for each phase. Significant field changes to the RA as set forth in the RA Work Plan and Final Design shall not be undertaken without the approval of EPA. The RA shall be documented in enough detail to produce as-built construction drawings after the RA is complete. Deliverables shall be submitted to EPA for review and approval in accordance with Section XI of the Consent Decree. Review and/or approval of submittals does not imply acceptance of later submittals that have not been reviewed, nor that the remedy, when constructed, will meet Performance Standards.

### **B - Preconstruction Conference**

Following EPA approval each of the Phase Two, Three, and Four RA Work Plans, a Preconstruction Conference shall be held before initiation of construction. This conference shall include Principal Settling Defendants, Supervising Contractor, and federal, state and local government agencies and shall:

1. Define the roles, relationships, and responsibilities of all parties;
2. Review methods for documenting and reporting inspection data;
3. Review methods for distributing and storing documents and reports;
4. Review work area security and safety protocols;
5. Review the Construction Schedule;
6. Conduct a site reconnaissance to verify that the design criteria and the plans specifications are understood and to review material and equipment storage locations.

The Preconstruction Conference must be documented, including names of people in attendance, issues discussed, clarifications made, special instructions issued, etc.

### **C – Phase Descriptions**

#### **1 – Phase One**

Phase One is expected to include the following components of the Work:

- Pre-Design Investigations in relation to:
  - Slurry Wall Construction
  - Sludge Pond Improvements
  - RCRA Cell Construction

- Building and Tank Demolition
- Additional Data Collection (if required)
- Cemetery Relocation - Work Plan and Implementation
- Treatability Pilot Study - Work Plan and Implementation

Principal Settling Defendants shall submit three separate Phase One Work Plans: the Design Investigation Work Plan; the Cemetery Relocation Work Plan; and the Treatability Pilot Study Work Plan. Upon approval by EPA of the Phase One Work Plans, Principal Settling Defendants shall implement the Phase One Work Plans in accordance with the approved schedules in the Plans. Additional detail on the Cemetery Relocation Work Plan, Design Investigations Work Plan, and Treatability Pilot Study Work Plan is provided below.

#### Cemetery Relocation Work Plan

The Principal Settling Defendants will develop and implement a Cemetery Relocation Work Plan to provide for the following work in accordance with all Federal and State and local laws. The work is anticipated to involve three steps:

1. Investigation of the existing cemetery
2. Development and approval of a plan containing the details of the relocation
3. Relocation of the cemetery

In addition, Principal Settling Defendants shall pursue any judicial approvals needed to implement the above work.

#### Pre-Design Investigation Work Plan

As part of Phase One Work, Principal Settling Defendants shall prepare a design investigations work plan for EPA review and approval. The purpose of the design investigations is to provide data necessary to complete the Remedial Designs for Phases Two, Three, and Four. It is anticipated that design investigations will be required for design of the slurry wall, berm improvements at the sludge pit, building and tank demolition, additional data collection to fully delineate areas requiring remediation as described in Section 2.9.3 of the ROD, and the RCRA Cell.

Data gathered during the project planning phase shall be compiled, summarized, and submitted along with an analysis of the impact of the results on design activities. Principal Settling Defendants shall submit a Pre-Design Investigations Report summarizing this information from the pre-design investigations in accordance with the schedule in the Pre-Design Investigation Work Plan.

## Treatability Pilot Study Work Plan

Principal Settling Defendants shall prepare a Treatability Pilot Study Work Plan for EPA review and approval. The purpose of the Treatability Pilot Study is to determine which particular solidification /stabilization technology or vendor of this technology is capable of meeting the Site-specific Performance Standards. As provided for in the Record of Decision, the Treatability Pilot Study Work Plan shall describe the technology to be tested, test objectives, experimental procedures, treatability conditions to be tested, measurements of performance, analytical methods, data management and analysis, health and safety, and residual waste management. The DQOs for the treatability pilot study shall be documented as well. The Treatability Pilot Study Work Plan shall also describe pilot plant installation and start-up, pilot plant operation and maintenance procedures, and operating conditions to be tested. If testing is to be performed off-site, permitting requirements shall be addressed. A schedule for performing the treatability study shall be included with specific dates for the tasks, including, but not limited to, the procurement of contractors and the completion of sample collection, performance, sample analysis, and report preparation. The Treatability Pilot Study sampling and analysis procedures will be presented in the SAP, or in an addendum to the SAP.

The Work Plan shall describe in detail the treatment process and how the proposed vendor or technology will meet the Performance Standards for the Site. Review and approval by EPA shall mean only that EPA considers the proposed technology, vendor, and study approach appropriate for the remedy selected for the Site. The Treatability Pilot Study Work Plan shall also address how Principal Settling Defendants propose to meet all discharge requirements for any and all treated material, air, water, and expected effluents. Any and all permitting requirements shall also be addressed.

Following completion of the Treatability Pilot Study, Principal Settling Defendants shall submit a report on the performance of the technology to EPA for review and approval. The EPA will evaluate the results of the treatability study for completeness and appropriateness based on site conditions

The study results shall indicate clearly the performance of each technology or vendor with regard to Unconfined Compressive Strength (UCS), elimination of free liquids, volume increases, time to achieve maximum UCS, bearing strength of treated material, and other relevant parameters, compared with applicable Performance Standards established for the Site. The report shall evaluate the treatment technology's effectiveness, implementability, cost, and actual results as compared with predicted results. The report shall also evaluate full-scale application of the technology, including a sensitivity analysis identifying the key parameters affecting full-scale operation, and propose any additional solidification evaluation criteria for EPA approval, including the methods by which the proposed treatment will attain the Performance Standards. The preliminary study results shall be submitted to EPA immediately upon completion of the study. Consistent with relevant EPA regulations, EPA may modify the UCS standard based on the results of the treatability pilot study to best achieve RAOs.

Should the results indicate that the proposed technology will meet the Performance Standards, EPA will instruct Principal Settling Defendants to include the Treatability Pilot Study Final Report in the Phase Three Prefinal and Final Design and the study results and operating conditions shall be used in the detailed design of the selected remedy. The EPA approval of the Treatability Pilot Study Final Report shall mean only that EPA finds the study methodology acceptable. The EPA approval of the study, results, or the Treatability Pilot Study Final Report shall not imply or be construed to mean that EPA is warranting the performance of this or any vendor or technology. Should the Treatability Pilot Study not be approved by EPA, additional treatability studies may be required to fully evaluate the available treatment systems.

## **2 -- Phase Two**

Phase Two is expected to include the design and construction of the following components of the Work:

- Above Ground Tank and Building Demolition
- Slurry Wall
- Sludge Pond Berm Improvements

Upon approval by EPA of the Phase Two Final Design and RA Work Plan, Principal Settling Defendants shall implement the Phase Two Final Design and RA Work Plan according to the schedule in the Plan.

## **3 – Phase Three**

Phase Three is expected to include the design and construction of at least the following components of the Work:

- RCRA Cell
- Sludge Treatment and Consolidation
- Soil Excavation and Consolidation

Upon approval by EPA of the Phase Three Final Design and RA Work Plan, Principal Settling Defendants shall implement the Phase Three Final Design and RA Work Plan according to the schedule in the Plan.

Phase Three will include the Final Design and RA Work Plan for the RCRA Cell for disposition of treated materials and contaminated soils and debris. Design elements shall include the sub-grade design, specifications for the cell liner and drainage, treated material or contaminated soil placement and grading designs, the RCRA Cell cover design, drainage, and final grading designs.

Phase Three will also include the final Remedial Design for the solidification of Site sludges and the excavation and consolidation of contaminated Site soils, and the RA Work Plan to implement the design.

#### **4 – Phase Four**

Phase Four shall include the design and construction of the following components of the Work:

- Site grading, drainage, and revegetation
- Confirmation of procedure used to abandon former injection well
- Well logging and proper abandonment of the two (2) on-site restricted hazardous waste injection wells and the on-site water supply well
- Groundwater Monitoring Work Plan and Well Installation
- Institutional Controls

The Groundwater Monitoring Work Plan will provide for monitoring of Site groundwater to document if natural attenuation is degrading COC plumes and to detect any migration of COCs beyond the Site boundary at concentrations exceeding Texas Class 3 Groundwater PCLs (Texas, 30 TAC, Chapter 350, Subchapter D) for commercial/industrial sites or, for metals, concentrations the higher of TCEQ Class 3 Groundwater PCLs or background levels. The plan will include any additional investigations to justify monitoring well locations. The Plan will be submitted for EPA approval, and upon EPA approval, Principal Settling Defendants shall implement the Groundwater Monitoring Work Plan according to the schedule therein.

Upon approval by EPA of the Phase Four Final Design and RA Work Plan, Principal Settling Defendants shall implement the Phase Four Final Design and RA Work Plan according to the schedule in the Plan.

#### **TASK IV – CONSTRUCTION COMPLETION**

Following completion of all construction activities associated with each of Phases Two, Three, and Four, the Principal Settling Defendants shall notify EPA and complete the following work.

##### **A. Prefinal Construction Inspection**

Upon preliminary completion of a particular phase, Principal Settling Defendants shall notify EPA for the purpose of conducting a Prefinal Construction Inspection. Participants should include the Project Coordinators, Supervising Contractor, Construction Contractor, Natural Resource Trustees, and other federal, state, and local agencies with a jurisdictional interest. The Prefinal Inspection shall consist of a walk-through inspection of the entire project Site. The objective of the inspection is to determine whether the construction of the phase is complete and consistent with the Consent Decree. Any outstanding construction items

discovered during the inspection shall be identified and noted on a punch list. Additionally, treatment equipment, if any, shall be operationally tested by Principal Settling Defendants. Principal Settling Defendants shall certify that the equipment has performed to effectively meet the purpose and intent of the specifications. Retesting shall be completed where deficiencies are revealed. A Prefinal Construction Inspection Report shall be submitted by Principal Settling Defendants which outlines the outstanding construction items, actions required to resolve the items, completion date for the items, and an anticipated date for the Final Inspection for that phase.

#### B. Final Construction Inspection

Upon completion of all outstanding construction items associated with a phase, Principal Settling Defendants shall notify EPA for the purpose of conducting a Final Construction Inspection. The Final Construction Inspection shall consist of a walk-through inspection of the entire project Site. The Prefinal Construction Inspection Report shall be used as a check list with the Final Construction Inspection focusing on the outstanding construction items identified in the Prefinal Construction Inspection. All tests that were originally unsatisfactory shall be conducted again. Confirmation shall be made during the Final Construction Inspection that all outstanding items have been resolved. Any outstanding construction items discovered during the inspection still requiring correction shall be identified and noted on a punch list. If any items are still unresolved, the inspection shall be considered to be a Prefinal Construction Inspection requiring another Prefinal Construction Inspection Report and subsequent Final Construction Inspection.

#### C. Final Construction Report

Final Construction Reports will be prepared for each of Phases Two, Three, and Four. Within 75 days following the conclusion of the Final Construction Inspection for each phase, Principal Settling Defendants shall submit a draft Final Construction Report. The EPA will review the draft report and will provide comments to Principal Settling Defendants. The Final Construction Report shall include the following:

1. Brief description of how outstanding items noted in the Prefinal Inspection were resolved;
2. Explanation of modifications made during the RA to the original RD and RA Work Plans and why these changes were made;
3. As-built drawings.
4. Synopsis of the construction work defined in the SOW and certification that the construction work has been completed.



#### D. Remedial Action Report

As provided in Section XIV of the Consent Decree, within 90 days after Principal Settling Defendants conclude that the Remedial Action (for all phases) has been fully performed and the Performance Standards have been attained, Principal Settling Defendants shall so certify to the United States and shall schedule and conduct a pre-certification inspection to be attended by EPA and Principal Settling Defendants. If after the pre-certification inspection Principal Settling Defendants still believe that the Remedial Action has been fully performed and the Performance Standards have been attained, Principal Settling Defendants shall submit a Remedial Action Report to EPA in accordance with Section XIV of the Consent Decree. The RA Report shall include the following:

1. A copy of the Final Construction Reports for each phase;
2. Synopsis of the work defined in this SOW and a demonstration in accordance with the Construction Quality Assurance Plan that Performance Standards have been achieved;
3. Certification that the Remedial Action has been completed in full satisfaction of the requirements of the Consent Decree; and
4. A description of how Principal Settling Defendants will implement any remaining part of the EPA approved Operation and Maintenance Plan.

After EPA review, Principal Settling Defendants shall address any comments and submit a revised report. As provided in Section XIV of the Consent Decree, the Remedial Action shall not be considered complete until EPA approves the RA Report.

#### **TASK V – OPERATION, MAINTENANCE, AND MONITORING**

Operation, Maintenance, and Monitoring (“O&M”) shall be performed in accordance with the approved Operation and Maintenance Plan.

As part of the submission of the Prefinal Design for Phase Four, Principal Settling Defendants shall submit an Operation and Maintenance Plan for review. The Operation and Maintenance Plan must be reviewed and approved by EPA prior to initiation of Operation and Maintenance activities. If necessary, the Operation and Maintenance Plan shall be modified to incorporate any design modifications implemented during the Remedial Actions of Phases Three and Four. The Operation and Maintenance Plan shall include all necessary O&M information for the operating personnel.

Upon approval of the Operation and Maintenance Plan, Principal Settling Defendants shall implement the Operation and Maintenance Plan in accordance with the schedule contained therein. This plan shall describe inspections, procedures, training, and evaluation activities that

shall be carried out by Principal Settling Defendants. The plan shall address the following elements:

1. Description of normal operation and maintenance;
  - a. Description of tasks required for remedy inspections;
  - b. Description of tasks required for remedy maintenance;
  - c. Description of tasks required for remedy monitoring; and
  - d. Schedule showing the required frequency for each O&M task.
2. Description of potential O&M problems;
  - a. Description and analysis of potential O&M problems;
  - b. Sources of information regarding problems; and
  - c. Common remedies or anticipated corrective actions.
3. Description of routine monitoring and laboratory testing;
  - a. Description of monitoring tasks;
  - b. Description of required laboratory tests and their interpretation;
  - c. Required QA/QC; and
  - d. Schedule of monitoring frequency and date, if appropriate, when monitoring may cease.
4. Safety Plan;
  - a. Description of precautions to be taken and required health and safety equipment, etc., for site personnel protection; and
  - b. Safety tasks required in the event of systems failure.
5. Description of equipment;
  - a. Equipment identification and technical specifications governing the monitoring systems;
  - b. Installation of monitoring components;
  - c. Maintenance of site equipment; and
  - d. Replacement schedule for equipment and installation components.
6. Records and reporting;
  - a. O&M logs;

- b. Laboratory records;
- c. Records of O&M cost;
- d. Mechanism for reporting emergencies;
- e. Personnel and Maintenance Records; and
- f. Reports to State/Federal Agencies

## REFERENCES

The following list, although not comprehensive, comprises many of the regulations and guidance documents that apply to the RD/RA process. Settling Defendants shall review these guidances and shall use the information provided therein in performing the RD/RA and preparing all deliverables under this SOW.

1. "National Oil and Hazardous Substances Pollution Contingency Plan, Final Rule", Federal Register 40 CFR Part 300, March 8, 1990.
2. "Superfund Remedial Design and Remedial Action Guidance," U.S. EPA, Office of Emergency and Remedial Response, June 1986, OSWER Directive No. 9355.O-4A.
3. "Interim Final Guidance on Oversight of Remedial Designs and Remedial Actions Performed by Potentially Responsible Parties," U.S. EPA, Office of Emergency and Remedial Response, February 14, 1990, OSWER Directive No. 9355.5-01.
4. "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Interim Final," U.S. EPA, Office of Emergency and Remedial Response, October 1988, OSWER Directive No. 355.3-01.
5. "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.
6. "EPA NEIC Policies and Procedures Manual," EPA-330/9-78-001-R, May 1978, revised November 1984.
7. "Data Quality Objectives for Remedial Response Activities," U.S. EPA, Office of Emergency and Remedial Response and Office of Waste Programs Enforcement, EPA/540/G-87/003, March 1987, OSWER Directive No. 9335.0-7B.
8. "Guidelines and Specifications for Preparing Quality Assurance Project Plans," U.S. EPA, Office of Research and Development, Cincinnati, OH, QAMS-004/80, December 29, 1980.
9. "Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans," U.S. EPA, Office of Emergency and Remedial Response, QAMS-005/80, December 1980.
10. "Users Guide to the EPA Contract Laboratory Program," U.S. EPA, Sample Management Office, August 1982.
11. "Environmental Compliance Branch Standard Operating Procedures and Quality

- Assurance Manual," U.S. EPA Region IV, Environmental Services Division, February 1, 1991, (revised periodically).
12. "USEPA Contract Laboratory Program Statement of Work for Organics Analysis," U.S. EPA, Office of Emergency and Remedial Response, February 1988.
  13. "USEPA Contract Laboratory Program Statement of Work for Inorganics Analysis," U.S. EPA, Office of Emergency and Remedial Response, July 1988.
  14. "Quality in the Constructed Project: A Guideline for Owners, Designers, and Constructors, Volume 1, Preliminary Edition for Trial Use and Comment," American Society of Civil Engineers, May 1988.
  15. "Interim Guidance on Compliance with Applicable or Relevant and Appropriate Requirements," U.S. EPA, Office of Emergency and Remedial Response, July 9, 1987, OSWER Directive No. 9234.0-05.
  16. "CERCLA Compliance with Other Laws Manual," Two Volumes, U.S. EPA, Office of Emergency and Remedial Response, August 1988 (Draft), OSWER Directive No. 9234.1-01 and -02.
  17. "Guidance on Remedial Actions for Contaminated Groundwater at Superfund Sites," U.S. EPA, Office of Emergency and Remedial Response, (Draft), OSWER Directive No. 9283.1-2.
  18. "Guide for Conducting Treatability Studies Under CERCLA," U.S. EPA, Office of Emergency and Remedial Response, Pre-publication Version.
  19. "Health and Safety Requirements of Employees Employed in Field Activities," U.S. EPA, Office of Emergency and Remedial Response, July 12, 1981, EPA Order No. 1440.2.
  20. "Standard Operating Safety Guides," U.S. EPA, Office of Emergency and Remedial Response, November 1984.
  21. "Standards for General Industry," 29 CFR Part 1910, Occupational Health and Safety Administration.
  22. "Standards for the Construction Industry," 29 CFR 1926, Occupational Health and Safety Administration.
  23. "NIOSH Manual of Analytical Methods," 2d edition. Volumes I - VII, or the 3rd edition, Volumes I and II, National Institute of Occupational Safety and Health.
  24. "Occupational Safety and Health Guidance Manual for Hazardous Waste Site

Activities," National Institute of Occupational Safety and Health/Occupational Health and Safety Administration/United States Coast Guard/ Environmental Protection Agency, October 1985.

25. "TLVs - Threshold Limit Values and Biological Exposure Indices for 1987 - 88," American Conference of Governmental Industrial Hygienists.
26. "American National Standards Practices for Respiratory Protection," American National Standards Institute Z88.2-1980, March 11, 1981.
27. "Quality in the Constructed Project - Volume 1," American Society of Civil Engineers, 1990.

## Summary of Major Deliverables/Schedule

Scoping Meeting – Within 45 Days of Authorization to Proceed

General RD/RA Work Plan – Within 90 Days of Scoping Meeting

Phase One Work Plans – Within 30 days of EPA approval of General RD/RA Work Plan

Work Start of Phase One – Within 30 days of EPA approval of Phase One Work Plans, or within 30 days of the Effective Date, whichever is later

Phase One Deliverables – As specified in the Phase One Work Plans

Phase Two Basis of Design Meeting, Phase Two Prefinal and Final Design, and Phase Two RA Work Plan – As specified in the EPA approved Pre-Design Investigations Report

Phase Two Deliverables – As specified in the Phase Two RA Work Plan

Phase Three Basis of Design, Phase Three Prefinal and Final Design, and Phase Three RA Work Plan – As specified in the EPA approved Phase Two Final Design

Phase Three Deliverables – As specified in the Phase Three RA Work Plan

Phase Four Basis of Design, Phase Four Prefinal and Final Design, and Phase Four RA Work Plan – As specified in the EPA approved Phase Three Final Design

Phase Four Deliverables – As specified in the Phase Four RA Work Plan

Operation and Maintenance Plan – to be submitted with the Final Design of Phase Four

APPENDIX C

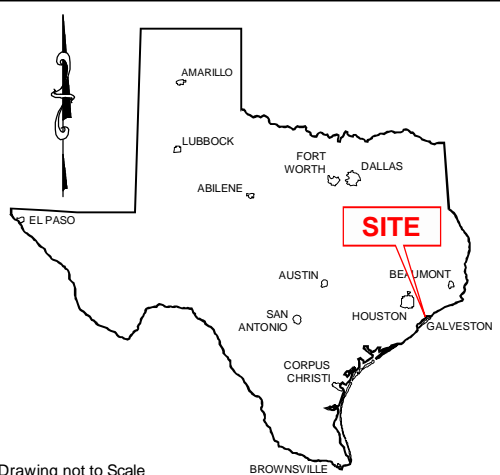
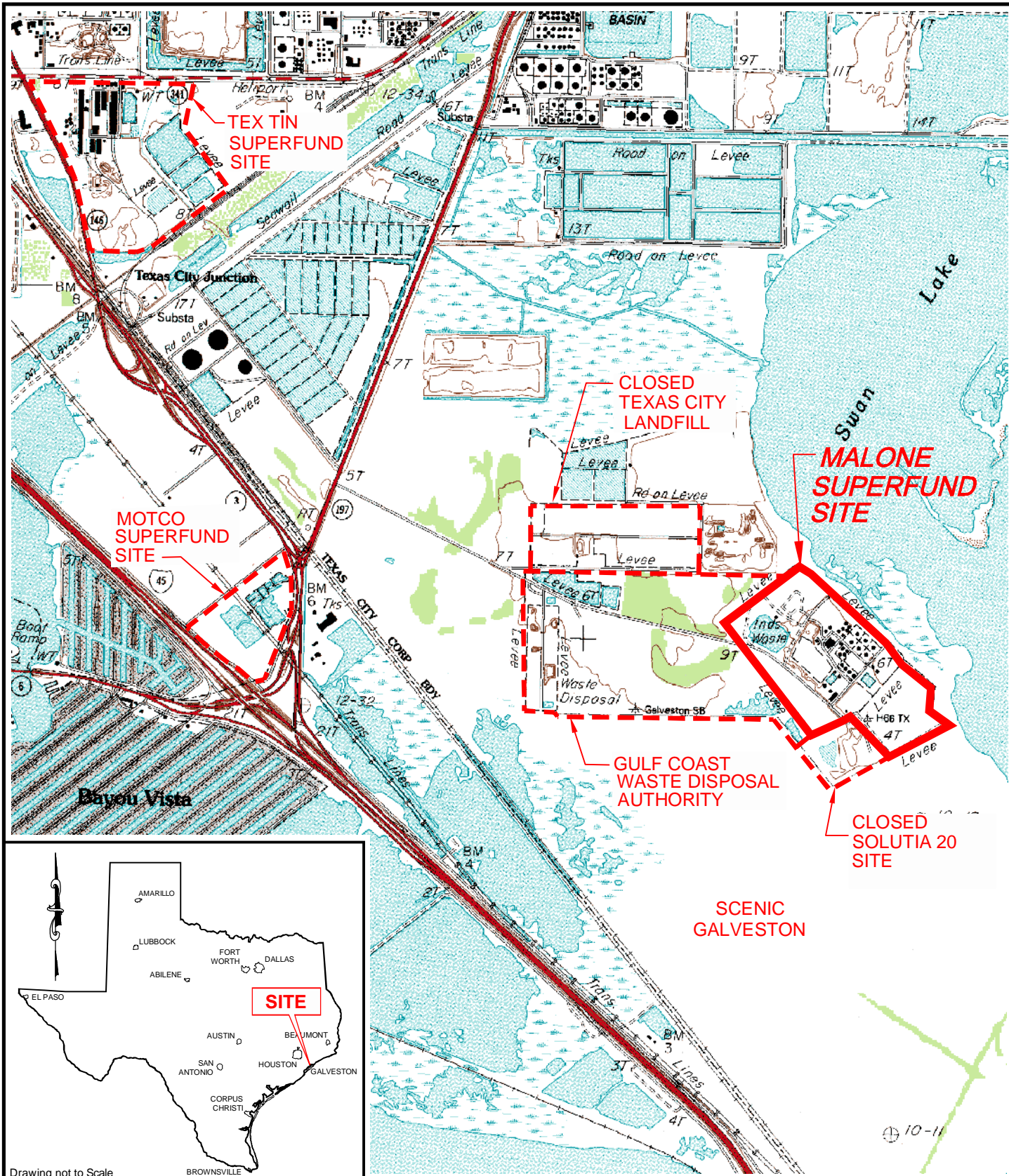
SITE MAPS

Figures 1 and 2

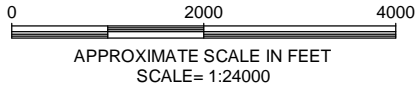
Appendix C to the Consent Decree re the Malone Service Company Superfund Site



K:\ELM\811102\_Malone Remedial Investigation & Feasibility Study\_03 Drawings\Acad Drawings\FS Final\Fig 1 - Site Location Map.dwg Fig 1 Jun 04, 2008 - 10:47am



Drawing not to Scale



Source:  
U.S.G.S. 7.5-minute series topographic map.  
Virginia Point, Texas Quadrangle, 1994.



Title: **FIGURE NO. 1  
SITE LOCATION MAP**

Project: **MALONE SERVICE CO.  
SUPERFUND SITE**

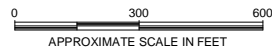
**TEXAS CITY,  
GALVESTON COUNTY,  
TEXAS**

K:\EIA\11102\_Malone\_Remedial\_Investigation\_&\_Feasibility\_Study\_03\Drawings\Acad\Drawings\Final\Fig 2 - Site Features Map.dwg\Layout1 Jun 04, 2008 - 10:48am



**SOURCE:**  
 AERIAL PHOTO FROM 2003-2004 H-GAC AND GDC DIGITAL ORTHOPHOTO COVERAGE AREA.  
 NAD 83, TEXAS STATE PLANE, SOUTH CENTRAL ZONE COORDINATE SYSTEM.

**LEGEND:**  
 — Site Boundary



MALONE SERVICE CO.  
 SUPERFUND SITE



**FIGURE NO. 2**  
**SITE FEATURES MAP**  
 TEXAS CITY, GALVESTON COUNTY, TEXAS

## APPENDIX D

Consent Decree re the Malone Service Company Superfund Site

<b>PRINCIPAL SETTLING DEFENDANTS</b>
Alcoa Inc.
Atlantic Richfield Company, BP America Production Company, BP Amoco Chemical Company, BP Products North America Inc., and Welchem, Inc.
Baker Hughes Inc., Baker Petrolite Corporation, and Baker Hughes Oilfield Operations, Inc.
BASF Corporation
Champion Technologies, Inc. (f/k/a Champion Chemicals, Inc.)
Chevron U.S.A. Inc.
Dixie Chemical Company, Inc.
Exxon Mobil Corporation, Mobil Oil Exploration & Producing Southeast Inc., Mobil Exploration and Producing North America Inc., Mobil Producing Texas & New Mexico Inc., Mobil Research and Development Corporation, Mobil Business Resources Corporation, The Superior Oil Company, Mobil Oil Corporation (now known as ExxonMobil Oil Corporation), Mobil Exploration and Producing Services Inc., Mobil Corporation, Exxon Technology Holding Corp., Reliance Electric Company, Exxon Biomedical Sciences, Inc. (now known as ExxonMobil Biomedical Sciences, Inc.), Exxon Research and Engineering Company (now known as ExxonMobil Research and Engineering Company), Exxon Pipeline Company (now known as ExxonMobil Pipeline Company), Exxon Coal USA, Inc. (now known as ExxonMobil Coal USA Inc.), Exxon Production Research Company (now known as ExxonMobil Upstream Research Company), Exxon Chemical Services Americas Inc. (now known as ExxonMobil Chemical Services Americas Inc.), and Friendswood Development Company (now known as Exxon Land Development, Inc.)
FMC Corporation
Groendyke Transport, Inc.
Halliburton Energy Services, Inc. and DII Industries, Inc.
Marathon Oil Company
Mission Petroleum Carriers, Inc.
Nalco Company
Occidental Chemical Corporation as a successor to Diamond Shamrock Chemicals Company
Perma-Fix Environmental Services, Inc.

Pharmacia Corporation (f/k/a Monsanto Company)
Quality Carriers, Inc. as successor to Chemical Leaman Tank Lines, Inc., Montgomery Tank Lines, Inc., and United Express
Quality Distribution, Inc
Rohm and Haas Company, Rohm and Haas Texas Incorporated, Rohm and Haas Chemicals LLC, and Morton International, LLC
Texaco, Inc.
Texas Instruments Incorporated
The Dow Chemical Company
The Goodyear Tire & Rubber Company
Trimac Transportation, Inc., Ameri-Liquid Transport, Inc., DSI Transports, Inc. (now known as Trimac Transportation South Inc.), Liquid Transporters Inc. (now known as Trimac Transportation East Inc.), Robertson Tank Lines (now known as Trimac Transportation Group Inc.), Ryder Bulk Transportation Services (now known as Triplus Inc.), and Trimac Bulk Transportation, Inc. (now known as Triplus Inc.)
Union Carbide Corporation
Union Pacific Railroad Co.

**APPENDIX E**  
**TRUST AGREEMENT**

Malone Service Company Superfund Site

This Trust Agreement (this “Agreement”) is entered into as of this \_\_\_\_ day of \_\_\_\_\_, 20\_\_ by and between the Principal Settling Defendants whose names and states of incorporation are set forth in Appendix A to this Trust Agreement (the “Grantors”), and \_\_\_\_\_, a [insert “corporation,” “banking organization,” “association,” etc.] organized and existing under the laws of the State of [\_\_\_\_\_] (the “Trustee”).

**Whereas**, the United States Environmental Protection Agency (“EPA”), an agency of the United States government, and the Grantors have entered into a Consent Decree, United States of America v. \_\_\_\_\_, United States District Court for the Southern District of Texas, Civil Action No. \_\_\_\_\_, with respect to the Malone Service Company Superfund Site (hereinafter the “Consent Decree”);

**Whereas**, the Consent Decree provides, in Article XIII, that the Grantors shall provide assurance that funds will be available as and when needed for performance of the Work required by the Consent Decree;

**Whereas**, in order to provide such financial assurance, Grantors have agreed to establish and fund the trust created by this Agreement; and

**Whereas**, the Grantors, acting through their duly authorized officers or representatives, have selected the Trustee to be the trustee under this Agreement, and the Trustee has agreed to act as trustee hereunder.

**Now, therefore**, the Grantors and the Trustee agree as follows:

***Section 1. Definitions. As used in this Agreement:***

(a) The term “Beneficiary” shall have the meaning assigned thereto in Section 3 of this Agreement.

(b) The term “Business Day” means any day, other than a Saturday or a Sunday, that banks are open for business in the State of Texas, USA.

(c) The term “Claim Certificate” shall have the meaning assigned thereto in Section 4(a) of this Agreement.

(d) The term “Fund” shall have the meaning assigned thereto in Section 3 of this Agreement.

(e) The term “Grantors” shall have the meaning assigned thereto in the first paragraph of this Agreement.

(f) The term “Objection Notice” shall have the meaning assigned thereto in Section 4(b) of this Agreement.

(g) The term “Consent Decree” shall have the meaning assigned thereto in the second paragraph of this Agreement.

(h) The term “Site” shall have the meaning assigned thereto in the Consent Decree.

(i) The term “Trust” shall have the meaning assigned thereto in Section 3 of this Agreement.

(j) The term “Trustee” shall mean the trustee identified in the first paragraph of this Agreement, along with any successor trustee appointed pursuant to the terms of this Agreement.

(k) The term “Work” shall have the meaning assigned thereto in the Consent Decree.

**Section 2. Identification of Facilities and Costs.** This Agreement pertains to costs for Work required pursuant to the Consent Decree at the Site.

**Section 3. Establishment of Trust Fund.**

(a) The Grantors and the Trustee hereby establish a trust (the “Trust”), for the benefit of EPA (the “Beneficiary”), to assure that funds are available to pay for performance of the Work in the event that Grantors fail to conduct or complete the Work required by, and in accordance with the terms of, the Consent Decree. The Grantors and the Trustee intend that no third party shall have access to monies or other property in the Trust except as expressly provided herein.

(b) The Trust is established initially as consisting of funds in the amount of twelve million U.S. Dollars (\$12,000,000). This initial payment shall be deposited into the Trust within 90 days from the Effective Date of the Consent Decree.

Within one year and 150 days from the Effective Date, a payment of twelve million U.S. Dollars (\$12,000,000) shall be deposited into the Trust.

Within two years and 150 days from the Effective Date, a payment of sixteen million U.S. Dollars (\$16,000,000) shall be deposited into the Trust.

Within three years and 90 days from the Effective Date, a payment of sixteen million four hundred thousand U.S. Dollars (\$16,400,000) shall be deposited into the Trust.

The timing or the amount of all payments other than the first two may be modified pursuant to Paragraph 50 of the Consent Decree (Modification of Amount and/or Form of Performance Guarantee). The Trustee shall be notified in writing by Grantors' Representative(s) of any such modification of timing or payment amounts. Such funds, along with any other monies and/or other property hereafter deposited into the Trust, and together with all earnings and profits thereon, are referred to herein collectively as the "Fund." If any payment pursuant to Section 4 reduces the balance of the Trust below \$1,500,000 at any time within three years and 90 days from the Effective Date, then no later than thirty (30) days after such payment the Grantors shall deposit into the Trust additional funds sufficient to bring the Fund balance up to at least \$3,000,000. The amount of any such deposit made to replenish the Trust may be deducted from the next annual payment due pursuant to this Section 3(b).

(c) The Fund shall be held by the Trustee, IN TRUST, as hereinafter provided. The Trustee shall not be responsible nor shall it undertake any responsibility for the amount or adequacy of, nor any duty to collect from the Grantors, any payments necessary to discharge any liabilities of the Grantors owed to the United States.

[PERFORMING SETTling DEFENDANTS SHALL SELECT ONE OF THE FOLLOWING TWO SUBPARAGRAPHS]

[(d) When the Trust is initially established, it shall include a segregated subaccount that shall be limited to funds paid by the Cashout Settling Defendants to resolve claims under CERCLA against the Cashout Settling Defendants relating to the Site and that is intended by the Principal and Cashout Settling Defendants to be treated as a Qualified Settlement Fund for federal and state tax purposes in accordance with the requirements of 26 C.F.R. Section 1.468B. Such segregated subaccount shall be subject at all times to the continuing jurisdiction of the United States District Court for the Southern District of Texas, and the Trustee shall comply with all tax filing, payment, and reporting requirements applicable to a Qualified Settlement Fund.]

OR

[(d) When the Trust is initially established, it shall include a subaccount that shall be limited to funds paid by the Cashout Settling Defendants to resolve claims under CERCLA against the Cashout Settling Defendants relating to the Site but that shall not be established as a Qualified Settlement Fund and shall not be under continuing court jurisdiction. The Trustee shall expend the amounts in this subaccount (and the earnings thereon) before expending amounts contributed to the Trust by any other Grantors (and the earnings thereon).]

**Section 4. Payment for Work Required Under the Consent Decree.** The Trustee shall make payments from the Fund in accordance with the following procedures.

(a) From time to time, the Grantors and/or their authorized Representative(s) may request that the Trustee make payment from the Fund for Work performed under the Consent Decree by delivering to the Trustee and EPA a written invoice and certificate (together, a "Claim Certificate") signed by the Grantors' Representative(s) and certifying:

(i) that the invoice is for Work performed at the Site in accordance with the Consent Decree;

(ii) a description of the Work that has been performed, the amount of the claim, and the identity of the payee(s); and

(iii) that the Grantors have sent a copy of such Claim Certificate to EPA, both to the EPA attorney and the EPA RPM at their respective addresses shown in this Agreement, including the date on which such copy was sent and, in the case of electronic delivery, the date on which such copy was received by EPA as evidenced by a e-mail, facsimile, or other similar delivery methods, or in the case of regular mail, Grantors will provide Trustee with proof of service upon EPA by overnight delivery, certified mail, or other similar delivery methods, within a reasonable time after service is complete.

(iv) the Claim Certificate shall designate the entity to which the requested payment from the Fund is to be made.

(b) EPA may object to any payment requested in a Claim Certificate submitted by the Grantors (or their authorized Representative(s)), in whole or in part, by delivering to the Trustee a written notice (an "Objection Notice") within fifteen (15) days after the date of EPA's receipt of the Claim Certificate as shown on the relevant return receipt. An Objection Notice sent by EPA shall state (i) whether EPA objects to all or only part of the payment requested in the relevant Claim Certificate; (ii) the basis for such objection, (iii) that EPA has sent a copy of such Objection Notice to the Grantors and the date on which such copy was sent; and (iv) the portion of the payment requested in the Claim Certificate, if any, which is not objected to by EPA, which undisputed portion the Trustee shall proceed to distribute in accordance with Section 4(d) below. EPA may object to a request for payment contained in a Claim Certificate only on



the grounds that the requested payment is either (x) not for the costs of Work under the Consent Decree or (y) otherwise inconsistent with the terms and conditions of the Consent Decree.

(c) If the Trustee receives a Claim Certificate and does not receive an Objection Notice from EPA within the time period specified in Section 4(b) above, the Trustee shall, after the expiration of such time period, promptly make the payment from the Fund requested in such Claim Certificate.

(d) If the Trustee receives a Claim Certificate and also receives an Objection Notice from EPA within the time period specified in Section 4(b) above, but which Objection Notice objects to only a portion of the requested payment, the Trustee shall, after the expiration of such time period, promptly make payment from the Fund of the uncontested amount as requested in the Claim Certificate. The Trustee shall not make any payment from the Fund for the portion of the requested payment to which EPA has objected in its Objection Notice.

(e) If the Trustee receives a Claim Certificate and also receives an Objection Notice from EPA within the time period specified in Section 4(b) above, which Objection Notice objects to all of the requested payment, the Trustee shall not make any payment from the Fund for amounts requested in such Claim Certificate.

(f) Any disputes among the Grantors and EPA with respect to an Objection Notice shall be resolved pursuant to Section XX (Dispute Resolution) of the Consent Decree.

(g) If, at any time during the term of this Agreement, EPA implements a “Work Takeover” pursuant to the terms of the Consent Decree and intends to direct payment of monies from the Fund to pay for performance of Work during the period of such Work Takeover, the timing and amounts of the payments established by Section 3(b) above shall be superseded, and consistent with the requirements of Paragraph 49 (Funding for Work Takeover) of the Consent Decree, the Grantors shall immediately upon written demand of EPA deposit into the Trust in immediately available funds and without setoff, counterclaim, or condition of any kind, a cash amount up to but not exceeding the estimated cost of the remaining Work to be performed, as determined by EPA. EPA shall notify the Trustee in writing of EPA’s commencement of such Work Takeover. Upon receiving such written notice from EPA, the disbursement procedures set forth in Sections 4(a)-(e) above shall immediately be suspended, and the Trustee shall thereafter make payments from the Fund only to such person or persons as the EPA may direct in writing from time to time for the sole purpose of providing payment for performance of Work required by the Consent Decree. Further, after receiving such written notice from EPA, the Trustee shall not make any disbursements from the Fund at the request of the Grantors, including their Representatives(s), or of any other person except at the express written direction of EPA. If EPA ceases such a Work Takeover in accordance with the terms of the Consent Decree, EPA shall so notify the Trustee in writing and, upon the Trustee’s receipt of such notice, the disbursement procedures specified in Sections 4(a)-(e) above shall be reinstated.

(h) While this Agreement is in effect, disbursements from the Fund are governed exclusively by the express terms of this Agreement.

**Section 5. Trust Management.** The Trustee shall invest and reinvest the principal and income of the Fund and keep the Fund invested as a single fund, without distinction between principal and income, in accordance with directions which the Grantors may communicate in writing to the Trustee from time to time, except that:

(a) securities, notes, and other obligations of any person or entity shall not be acquired or held by the Trustee with monies comprising the Fund, unless they are securities, notes, or other obligations of the U.S. government or any U.S. state government or as otherwise permitted in writing by the EPA;

(b) the Trustee is authorized to invest the Fund in time or demand deposits of the Trustee, to the extent such deposits are insured by an agency of the U.S. or any U.S. state government; and

(c) the Trustee is authorized to hold cash awaiting investment or distribution uninvested for a reasonable time and without liability for the payment of interest thereon.

**Section 6. Commingling and Investment.**

(a) The Trustee is expressly authorized in its discretion to transfer from time to time any or all of the assets of the Fund to any common, commingled, or collective trust fund created by the Trustee in which the Fund is eligible to participate, subject to all of the provisions hereof and thereof, to be commingled with the assets of other trusts participating therein.

(b) The Trustee is authorized to purchase shares in any investment company registered under the Investment Company Act of 1940, 15 U.S.C. 80a-1 et seq., including one which may be created, managed, underwritten, or to which investment advice is rendered or the shares of which are sold by the Trustee. The Trustee may vote such shares in its discretion.

**Section 7. Express Powers of Trustee.** Without in any way limiting the powers and discretion conferred upon the Trustee by the other provisions of this Agreement or by law, the Trustee is expressly authorized and empowered:

(a) to make, execute, acknowledge, and deliver any and all documents of transfer and conveyance and any and all other instruments that may be necessary or appropriate to carry out the powers herein granted;

(b) to register any securities held in the Fund in its own name or in the name of a nominee and to hold any security in bearer form or in book entry, or to combine certificates representing such securities with certificates of the same issue held by the Trustee in other fiduciary capacities, or to deposit or arrange for the deposit of such securities in a qualified central depository even though, when so deposited, such securities may be merged and held in bulk in the name of the nominee of such depository with other securities deposited therein by another person, or to deposit or arrange for the deposit of any securities issued by the U.S. government or any U.S. state government, or any agency or instrumentality thereof, with a Federal Reserve bank, but the books and records of the Trustee shall at all times show that all such securities are part of the Fund; and

(c) to deposit any cash in the Fund in interest-bearing accounts maintained or savings certificates issued by the Trustee, in its separate corporate capacity, or in any other banking institution affiliated with the Trustee, to the extent insured by an agency of the U.S. government.

**Section 8. Taxes and Expenses.** All taxes of any kind that may be assessed or levied against or in respect of the Fund shall be paid from the Fund. All other expenses and charges incurred by the Trustee in connection with the administration of this Trust, including fees for legal services rendered to the Trustee, the compensation of the Trustee, and all other proper charges and disbursements of the Trustee, shall be paid by the Grantors. If the Grantors do not pay such expenses or charges directly within the time period agreed to by the Grantors and the Trustee, the Trustee, on written notice to the EPA attorney and the EPA RPM at their respective addresses shown in this Agreement, may seek payment from the Fund.

**Section 9. Annual Valuation.** The Trustee shall annually, no more than thirty (30) days after the anniversary date of establishment of the Fund, furnish to the Grantors' Representative(s) and to the Beneficiary a statement confirming the value of the Trust. Any securities in the Fund shall be valued at market value as of no more than 60 days prior to the anniversary date of establishment of the Fund. The annual valuation shall include an accounting of any fees or expenses levied against the Fund. The Trustee shall also provide such information concerning the Fund and this Trust as EPA may request from time to time.

**Section 10. Advice of Counsel.** The Trustee may from time to time consult with counsel with respect to any question arising as to the construction of this Agreement or any action to be taken hereunder; provided, however, that any counsel retained by the Trustee for such purposes may not, during the period of its representation of the Trustee, serve as counsel to the Grantors under this Agreement.

**Section 11. Trustee Compensation.** The Trustee shall be entitled to reasonable compensation for its services as agreed upon in writing with the Grantors and as notified in writing to the Beneficiary.

**Section 12. Trustee and Successor Trustee.** The Trustee and any replacement Trustee must be approved in writing by EPA and must not be affiliated with any of the Grantors. The Trustee may resign or the Grantors may replace the Trustee, but such resignation or replacement shall not be effective until the Grantors have appointed a successor trustee approved in writing by EPA and this successor accepts such appointment. The successor trustee shall have the same powers and duties as those conferred upon the Trustee hereunder. Upon the successor trustee's acceptance of the appointment, the Trustee shall assign, transfer, and pay over to the successor trustee the funds and properties then constituting the Fund. If for any reason the Grantors cannot or do not act in the event of the resignation of the Trustee, the Trustee may apply to EPA or a court of competent jurisdiction for the appointment of a successor trustee or for instructions. The successor trustee shall specify the date on which it assumes administration of the Fund and the Trust in a writing sent to the Grantors, the Beneficiary, and the present Trustee by certified mail no less than 10 days before such change becomes effective. Any expenses incurred by the Trustee as a result of any of the acts contemplated by this Section shall be paid as provided in Section 8.

**Section 13. Instructions to the Trustee.** All orders, requests, and instructions to the Trustee by the Grantors shall be in writing and signed by any of the persons designated in the attached Appendix B (the "Grantors Representative(s)") or such other designees as the Grantors may designate by amendment to Appendix B. All instructions to the Trustee shall be in writing, signed by such persons as are empowered to act on behalf of the entity giving such instructions. Such instruction may include, but not be limited to, instructions to direct the Trustee in any manner regarding the preparation and filing of Tax Returns, if any, by the Trustee. The Trustee shall be fully protected in acting without inquiry on such written instructions given in accordance with the terms of this Agreement. The Trustee shall have no duty to act in the absence of such written instructions, except as expressly provided for herein.

**Section 14. Amendment of Agreement.** This Agreement may be amended only by an instrument in writing executed by the Grantors or the Grantors' Representative(s) and the Trustee, and with the prior written consent of EPA.

**Section 15. Irrevocability and Termination.** This Trust shall be irrevocable and shall continue until terminated upon the earlier to occur of (a) receipt by the Trustee from Grantors or EPA of EPA's notice of completion of Work pursuant to the Consent Decree and (b) the complete exhaustion of the Fund comprising the Trust as certified in writing by the Trustee to EPA and the Grantors. Upon termination of the Trust pursuant to Section 15(a), all remaining trust property (if any), less final trust administration expenses, shall be delivered to the Grantors.

**Section 16. Immunity and Indemnification.** The Trustee shall not incur personal liability of any nature in connection with any act or omission, made in good faith, in the administration of this Trust, or in carrying out any directions by the Grantors or the EPA issued in accordance with this Agreement. The Trustee shall be indemnified and saved harmless by the Grantors from and against any personal liability to which the Trustee may be subjected by reason of any act or conduct made by the Trustee in good faith in its official capacity, including all

expenses reasonably incurred in its defense in the event the Grantors fail to provide such defense. If the Grantors fail to fulfill their obligations as set forth in this Section, the Fund shall indemnify and save harmless the Trustee as provided hereinabove.

**Section 17. Choice of Law.** In any proceeding in a state court, this Agreement shall be administered, construed, and enforced according to the laws of the State of Texas.

**Section 18. Interpretation.** As used in this Agreement, words in the singular include the plural and words in the plural include the singular. The descriptive headings for each Section of this Agreement shall not affect the interpretation or the legal efficacy of this Agreement.

**Section 19. Notices.** All notices and other communications given under this agreement shall be in writing and shall be addressed to the parties as follows or to such other address as the parties shall by written notice designate:

(a) If to the Grantors, to Steven M. Jawetz, Common Counsel for Malone  
Cooperating P & Diamond, P.C., 1350 I Street, NW, Suite 700, Washington,  
DC 20005, or

(b) If to the Trustee, to \_\_\_\_\_, tel #  
\_\_\_\_\_, fax # \_\_\_\_\_.

(c) If to EPA, to David Abshire, Remedial Project Manager, Arkansas/Texas  
Branch, Superfund Division, Mail Region 6, 1445 Ross Avenue, Suite  
1200, Dallas, TX 75202-2733, or **and** Anne Foster, Assistant Regional  
Counsel, Avenue, Suite 1200, Dallas TX  
75202, or

**Section 20. Method of Execution.** This Trust Agreement shall be executed in multiple counterparts, each of which shall be deemed an original, but all of which shall constitute one and the same instrument.

[Appendix A to Trust Agreement — List of Grantors — to be attached. See first paragraph.]

[Appendix B to Trust Agreement — Grantors Representative(s) — to be attached. See Sect. 13.]

[Remainder of page left blank intentionally.]

**APPENDIX F**

Consent Decree re the Malone Service Company Superfund Site

<b>MAJOR CASHOUT SETTLING DEFENDANTS</b>
Braskem America, Inc., f/k/a Braskem PP Americas Inc., f/k/a Sunoco Chemicals, Inc., f/k/a Aristech Chemical Corporation
General Dynamics Corporation
Mitsubishi Corporation, to the extent liable at the Site for the liability of Aristech Chemical Corporation or the former USS Chemicals Division of United States Steel Corporation
Sunoco, Inc., to the extent liable at the Site for the liability of Aristech Chemical Corporation or the former USS Chemicals Division of United States Steel Corporation, or for the liability of Mitsubishi Corporation for liability of Aristech Chemical Corporation or the former USS Chemicals Division of United States Steel Corporation
United States Steel Corporation, Tenn-USS Chemicals Co., USS Chemicals 30463, and USS Chemicals Novamont Division

**APPENDIX G**

Consent Decree re the Malone Service Company Superfund Site

<b>DE MINIMIS CASHOUT SETTLING DEFENDANTS</b>
Akzo Nobel Inc., as successor to Akzona, Akzo Chemie America, and Armak Company
Akzo Nobel Chemicals Inc. (f/k/a Akzo Chemicals Inc.), as successor to Texas Alkyls, Inc.
Akzo Nobel Paints LLC (f/k/a The Glidden Company), as successor to The Grow Group Inc., Devoe & Reynolds Co. Inc., and Napko Corp.
Ametek, Inc.
Aviall Services, Inc. and Aviall, Inc.
AZZ Group, LP, Automatic Processing, Inc., Aztec Manufacturing Partnership Ltd., Aztec Industries Inc., and International Galvanizers Partnership Ltd.
Beazer East, Inc. (f/k/a Koppers Company, Inc.)
Brilliant National Services, Inc., Brenntag, Inc., and Brenntag Southwest, Inc. (f/k/a Delta Distributors, Inc.)
Cargill, Incorporated
CenterPoint Energy, Inc., Houston Lighting & Power Company, Houston Industries Incorporated, Reliant Energy, Incorporated, Texas Genco Holdings, Inc., Texas Genco, LP, CenterPoint Energy, Inc., CenterPoint Energy Houston Electric, LLC, NRG Texas Power LLC, and NRG Energy, Inc.
Channel Shipyard Co., Inc.
Chatleff Controls, Inc. and Henderson Controls, Inc.
Chemical Exchange Industries, Inc. and Texmark Chemicals, Inc.
Coastal Transport Co., Inc.
Commercial Metals Company and CMC Steel Fabricators, Inc. d/b/a CMC Safety Railway Services
Crown Holdings, Inc., Crown Cork and Seal Company, Inc., Continental Can Company, and Crown Beverage Packaging, Inc.
Eastman Chemical Company, McWhorter Chemical, McWhorter, Incorporated, and McWhorter Technologies, Incorporated
Elk Corporation (a/k/a Elk Corporation of America), Elk Corporation of America (f/k/a DVA Corporation and Elk Roofing Products, Inc.), Elk Premium Building Products, Inc., and Elk Technology Group, Inc.
EPCO, Inc., Enterprise Products Company, Enterprise Transportation Co., Enterprise Petrochemical Co., and Can-Go Corp.
Fin-Tech Inc.
Flint Group Incorporated (f/k/a Flint Ink Corporation)
Furniture Brands International, Inc. and Broyhill Furniture Industries, Inc.
General Electric Company, Betz Laboratories, GE Carboloy, GE Silicone Carbide Products, and UNC Aerostructures (Weatherford Aerospace, Inc.)
Gergiel LLC d/b/a Houston Lead Co.
Giles Webster, Inc. and Giles Volkswagen, Inc. d/b/a Giles Volkswagen, Giles Volvo, Giles Volkswagen-Volvo
Griffin Corporation of Valdosta
Gulf Grinding Co. Inc. (d/b/a Gulf Precision Industries)

Heartland Cement Company
Hercules Incorporated
Honeywell International Inc.
Huntsman Corp., Rexene Chemical Co., Rexene Co., Rexene Polyolefins, El Paso Products Co., Texaco Chemical Co., and Jefferson Chemical Co.
Illinois Tool Works, Inc. and Childers Products Co.
International Paint LLC, as successor to International Paint Inc.
International Paper Company, Champion International, and St. Regis Paper Company
Iron Mountain Information Management, Inc. and Iron Mountain Pacific Records Mgmt., Inc.
Kaspar Electroplating, Inc.
Kinder Morgan Liquids Terminals, LLC, Unitank Terminal Services, Kinder Morgan Texas Pipeline L.P., and Kinder Morgan Liquids Terminals, LLC
Kinder Morgan Texas Pipeline LLC, United Texas Transmission Company, and Kinder Morgan Texas Pipeline L.P.
Kraft Foods Group, Inc. (f/k/a Kraft Foods Global, Inc.), as successor in interest to Dart & Kraft, Inc. and Maxwell House Coffee Co.
Lincoln Property Company
Lockheed Martin Corp. and Lockheed Missiles & Space Co.
Lonza Inc.
Loveland Products, Inc., as successor in interest to Transbas, Inc., and Agrium Inc., Agrium U.S. Inc., AGU US Holdings Inc., and United Agri Products Inc.
Lufkin Path Forward, Inc. (f/k/a Cybershield, Inc., Cybershield of Texas, Inc., Cybershield International, Inc., and Lufkin Path Forward International, Inc.), and Chromium Corporation
Matheson Tri-Gas, Inc. and Matheson Gas Products, Inc.
National Oilwell Varco, LP, AMF Tuboscope Inc., Best Industries Inc., Hydra-Rig Inc., Varco/Best Flow Products, Varco, LP, and National Oilwell Varco, LP
Nunez Construction Co., Inc. and Piling, Inc.
P Chem, Inc., a/k/a P Chem Inc., and Chemical Manufacturing Exchange, Inc.
PACCAR Inc.
Pfizer Inc., Pharmacia & Upjohn Co. LLC, and Upjohn Company LLC
Phoenix Oil, Inc.
Pilot Chemical and Pilot Industries of Texas, Inc.
PPG Industries, Inc.
Praxair, Inc., Fusion, Inc., and the former Linde Division of Union Carbide Corp.
PVI Industries
Reagent Chemical & Research, Inc.
Reichhold, Inc. (f/k/a Reichhold Chemicals, Inc.)
Rexam Beverage Can Company (f/k/a American National Can Company, f/k/a National Can Corporation) and Rexam PLC
Shell Oil Company, Pennzoil-Quaker State Company d.b.a. SOPUS Products, and Shell Chemical LP (collectively the Royal Dutch Shell group), and Marathon Morco Co., Marathon Morco Co./Penreco Morco Co., Pennzoil Co., Pennzoil Sulphur Co., Penreco, Penreco Morco, Shell Chemical Co., Shell Development Co., Shell Oil Co., Shell Pipeline (Hope Houston Pipeline)
Service Transport Company



SolvChem, Inc. (f/k/a Solvents & Chemicals, Inc.)
Southwest Galvanizing Inc.
Syngenta Crop Protection, LLC, Syngenta, AstraZeneca, Velsicol, and Sandoz
Syntech Chemicals, Inc.
Texas Commission on Environmental Quality
The Sherwin-Williams Company
Trinity Industries, Inc. and Platzer Shipyard, Inc.
Valero Energy Corporation, Diamond Shamrock Refining and Marketing Company (n/k/a Valero Retail Holdings, Inc.), Sigmor Corporation, TPI Petroleum, Inc. (f/k/a Total Petroleum, Inc.), and Ultramar Inc.
Valley Solvent Company Inc. d/b/a Valley Solvent and Chemicals
VAM USA, LLC, successor to VAM PTS Co.
Womble Company, Inc.