No. 08-40025

IN THE UNITED STATES COURT OF APPEALS
FOR THE FIFTH CIRCUIT

LYONDELL CHEMICAL CO.; ATLANTIC RICHFIELD COMPANY
Plaintiffs-Appellee-Cross Appellants
v.
EPEC POLYMERS INC.; EPEC CORPORATION; EL PASO TENNESSEE PIPELINE COMPANY
Third Party Plaintiffs-Appellees-Cross Appellants
v.
LUBRIZOL CORP.
Defendant-Cross-Defendant-Appellant-Cross Appellee
v.
EXXON MOBIL CORPORATION; PPG INDUSTRIES INC.;
Defendants-Appellees
TENNESSEE GAS PIPELINE COMPANY, formerly known as Tenneco Inc.
Defendants-Appellees-Cross Appellants
BAYER CROPSCIENCE INC., formerly known as Rhone Poulenc AG Company Inc.
Third Party Defendant-Appellee

****

UNITED STATES OF AMERICA
Plaintiff
v.
EPEC POLYMERS INC.
Defendant

****

On Appeal from the United States District Court
Eastern District of Texas (Beaumont Div.)
Nos. 1:03-CV-225
1:02-CV-3
1:01-CV-890

MUTUAL RELEASE AND SETTLEMENT AGREEMENT AS TO THE LUBRIZOL CORPORATION

1. DEFINITIONS

1.1. "Lyondell" means Lyondell Chemical Company, a Delaware corporation authorized to do business in Texas. Lyondell is the legal successor to ARCO Chemical Company, and currently is in Chapter 11 reorganization proceedings in the United States Bankruptcy Court for the Southern District of New York, Case No. 09-10023 (the "Bankruptcy Court.").

1.2. "ARCO" means Atlantic Richfield Company, a Delaware Corporation authorized to do business in Texas.

1.3. "El Paso Tennessee" means El Paso Tennessee Pipeline Company, a Delaware corporation authorized to do business in Texas.

1.4. "EPEC" means EPEC Corporation, a Delaware corporation authorized to do business in Texas.

1.5. "EPEC Polymers" means EPEC Polymers, Inc., a Delaware corporation authorized to do business in Texas.

1.6. "Tennessee Gas" means Tennessee Gas Pipeline Company, a Delaware corporation authorized to do business in Texas.

1.7. "Plaintiffs" means ARCO and Lyondell, named plaintiffs in this Litigation, and any and all current or former parents, subsidiaries, divisions, predecessors, affiliates, successors, assigns, directors, officers, agents, representatives, attorneys, insurers, and employees.

1.8. "Third-Party Plaintiffs" means El Paso Tennessee, EPEC, EPEC Polymers, and Tennessee Gas, named defendants and third-party plaintiffs in this Litigation, and any and all current or former parents, subsidiaries, divisions, predecessors, affiliates, successors, assigns, directors, officers, agents, representatives, attorneys, insurers, and employees.

1.9. "Settling Defendant" means The Lubrizol Corporation, a named defendant in this Litigation, and any and all current or former parents, subsidiaries, divisions, predecessors, affiliates, successors, assigns, directors, officers, agents, representatives, attorneys, insurers, and employees.

1.10. "Agreement" means this Mutual Release and Settlement Agreement.

1.11. "Litigation" means the above-captioned action, and all related and subsequent actions, claims, cross claims, third-party claims, including, without limitation, any and all appeals, including the appeal currently pending in the United States Court of Appeals for the Fifth Circuit.

1.12. "Party" individually means, and "Parties" collectively means, Plaintiffs, Third-Party Plaintiffs, and Settling Defendant.

1.13. "Claims" means any and all claims, debts, demands, liability, actions, cost recovery actions, contribution actions, and causes of actions of any kind whatsoever, whether at common law, in contract, or tort, or pursuant to statute, for any and all claims, losses, and damages, whether claimed or unclaimed, contingent or fixed, known or unknown, at law or in equity, that the Parties have or have had, (now or in the future) against each other in connection with the Litigation, or in connection with the facts alleged in the Litigation or based upon events, acts, omissions, or occurrences referred to by or in any way related to the Litigation, including but not limited to, any present or future response costs, remediation obligations or responsibilities under the current Amended Consent Decree as to ARCO and ARCO Chemical Company and the current Consent Decree as to EPEC Polymers; provided, however, that Claims for natural resource damages or toxic tort, and Claims pertaining to areas outside the scope of any current consent decree are expressly excluded from this definition.

1.14. "Plaintiffs' Attorney" means Don Maierson, of the firm of The Maierson Law Firm, 1914 North Memorial Way, Houston, Texas 77007.

2. CONSIDERATION. In consideration of the mutual releases set forth herein, and the payment of certain sums as provided herein, and all other rights, responsibilities and obligations contained in this Agreement, the Parties, intending to be legally bound, hereby agree as follows:

2.1. All Parties will fully and timely execute this Mutual Release and Settlement Agreement.

2.2. As the full and sole consideration given for the agreements, promises, covenants, representations, assignments, and warranties given, granted and undertaken by Plaintiffs and Third-Party Plaintiffs pursuant to this Agreement, and in full satisfaction of any and all Claims against it, Settling Defendant will pay Plaintiffs and Third-Party Plaintiffs, the total sum of Eight Million Six Hundred Thousand and no/100 Dollars ($8,600,000.00). However, no payment shall be made under this Agreement unless this Agreement and the settlement is first approved by the Bankruptcy Court. Payment shall be made within thirty (30) days after Lubrizol receives written notice of the Bankruptcy Court's approval of this Agreement and the settlement; provided however, that Settling Defendant shall not be required to make any such payments until the applicable time period for an appeal of the Bankruptcy Court's approval of this Agreement and the settlement has run. If the Bankruptcy's Court approval of this Agreement and settlement is appealed, Settling Party shall make its payments within thirty (30) days after the Bankruptcy Court's order is affirmed. If the Bankruptcy Court's order is reversed, Settling Defendant shall have no obligation to make any payments under this Agreement and settlement. Subject to the above, payment shall be made to the following payees at bank accounts identified by their counsel as follows:

To Third Party Plaintiffs:	$3,440,000
To Lyondell:	$2,580,000
To ARCO:	$1,290,000
To the Plaintiffs' Attorney:	$1,290,000

2.2. A. In lieu of and in full satisfaction of the consideration set forth in Section 2.2 above, Plaintiffs and Third-Party Plaintiffs may exercise this OPTION. Within 10 days from the date of execution hereof, Plaintiffs and Third-Party Plaintiffs may jointly (and only jointly) elect the option, in their sole discretion, of receiving a total of $7,850,000, payable as set forth in Section 2.2 above; plus, Settling Defendant would also pay its full adjudicated share of 100% of all future costs[1] handled in the ordinary course of the future cleanup, as may be reasonably incurred by Plaintiffs and Third-Party Plaintiffs and determined per the Amended Findings of Fact and

[1] "Future" costs shall be those incurred after October 31, 2008.

Conclusions of Law [Dkt. No. 1334 of the United States District Court that decided the Litigation (the "District Court")]. The election of this option may be perfected by written notice of acceptance among counsel. Acceptance of this option is subject to Bankruptcy Court approval and the provisions regarding the prerequisites to Settling Defendant's payments in Section 2.2, above, are adopted herein. If this option is elected, counsel for Plaintiffs and Third Party Plaintiffs shall promptly advise Settling Defendant of the breakdown of the total payment of $7,850,000, which shall be the total of the lump sum payments. Plaintiffs and Third Party Plaintiffs shall advise Settling Defendant of the amounts and details of future costs, and payments by Settling Defendant shall be made, pursuant to the District Court's Order and Amended Findings of Fact and Conclusions of Law concerning supplemental cost claims for remedial costs [Dkt. Nos. 1294 and 1334].

2.3. If the Bankruptcy Court does not approve the settlement or if it does approve the settlement but that order is reversed, this settlement shall terminate unless otherwise agreed in writing by all Parties, and the pending appeal of the Litigation shall be restarted or reinstated if it has been stayed or dismissed. In no event shall the existence of this Agreement, until it is finalized and approved by the Bankruptcy Court and any appeal resolved in favor of the approval order, and until payments have been made and the dismissal obligations of Section 6.1 have become obligatory, prejudice or otherwise affect the appellate status of the Litigation and the Parties' rights to pursue their points of appeal and to otherwise pursue their full Litigation rights, including finalization and execution of the judgments. Moreover, if final resolution of the Bankruptcy Court approval process (including objection and any appeal) is not obtained within four (4) months from the date on which all Parties have signed this agreement, any Party may seek to reschedule argument in, or restart or reinstate the appeal now pending in the United States Court of Appeals for the Fifth Circuit, should that argument or appeal have been rescheduled, stayed or dismissed. In such event, no Party may oppose the efforts to reschedule, restart or reinstate the appeal based on the settlement or anything contained in this Agreement.

2.4. Subject to the ongoing future costs payment obligations under Section 2.2A (should that option be elected), and to final approval by the Bankruptcy Court under Section 2.2 above, the Parties, individually and collectively, hereby release, acquit, and forever discharge each other from any and all Claims.

2.5. The Parties shall pay their own respective costs and attorneys' fees, and individually and collectively, hereby release, acquit, and forever discharge each other from any and all claims that they have or may have against each other for payment of attorney's fees, court costs, interest or other expenses associated with, relating to, or arising out of the Litigation.

2.6 Lyondell agrees that is responsible for all costs and fees associated with obtaining the approval of Bankruptcy Court for this Agreement and settlement, including, but not limited to, the costs and fees associated with drafting and filing of any motions but Lyondell is not responsible for any costs incurred by other Parties with respect to obtaining Bankruptcy Court approval. All Parties agree to cooperate in the filing and will join in the motion urging approval by the Bankruptcy Court. Lyondell agrees that it will immediately notify Settling Defendant if any appeal is taken from any order of the Bankruptcy Court approving this Agreement and settlement.

3. GENERAL PROVISIONS

3.1. This Agreement represents a compromise and settlement of a pending dispute between the Parties and is the product of an arms-length negotiation. The Parties have read this Agreement carefully and completely, and have had the advice and assistance of legal counsel. This Agreement shall be interpreted, construed, and enforced in accordance with the laws of the State of Texas.

3.2. This Agreement may be executed in one or more identified counterparts or multiple originals, all of which taken together shall constitute one and the same instrument. This Agreement further may be executed by facsimile copy, and each signature shall be and constitute an original, again as if all Parties had executed a single original document.

3.3. This Agreement constitutes the entire agreement of the Parties. This Agreement supersedes all prior written and/or verbal agreements, negotiations, offers, settlement discussions, judgments, and understandings with respect to the matters covered by this Agreement.

3.4. This Agreement may not be modified, changed, altered, amended, or added to in any way except in a writing signed by all of the Parties. The Parties expressly agree that no oral modifications of this Agreement shall be effective.

3.5. It is expressly understood and agreed that the terms of this Agreement are contractual and not merely recitals and that the agreements contained herein and the consideration transferred pursuant hereto is for the purpose of compromising doubtful and disputed claims, and to avoid additional litigation, and that nothing contained herein (including, but not limited to payments made or other consideration given) shall be construed as an admission or evidence of liability or of any issue of fact or law by any of the Parties, all such issues and liability being expressly denied.

3.6. All subject headings and titles in this Agreement are provided only for reference, have no substantive meaning, and shall not be used to support or defeat any particular interpretation of this Agreement.

3.7. If a provision of this Agreement is held to be invalid by a court of competent jurisdiction, the remaining provisions shall survive and continue in full force and effect.

4. COVENANT NOT TO SUE

4.1. Plaintiffs, Third-Party Plaintiffs, and Settling Defendant agree and covenant not to sue, or prosecute, any and all Claims at any time hereafter, once the Bankruptcy Court has approved the settlement, any appeal of such order has been resolved, and the Settling Defendant makes the payments under Section 2.2 or the lump sum payments under Section 2.2A.

5. WARRANTIES

5.1. Plaintiffs, Third-Party Plaintiffs, and Settling Defendant represent and warrant that:

5.1.1. This Agreement is executed with the Parties' full knowledge and understanding of its terms and meanings and on advice of their attorneys.

5.1.2. The Parties have not assigned any portion of any Claim to any person or entity other than counsel, and this Agreement resolves all claims, debts, and liability associated with any assignment to counsel.

5.1.3. Each signatory on behalf of each Party is of legal age and is legally competent to execute this Agreement and they do so of their own free will and accord without reliance on any representation of any kind or character not expressly set forth in this Agreement.

5.2 Lyondell warrants that it has the authority to execute this Agreement subject to approval by the Bankruptcy Court, even though it is presently in Chapter 11 reorganization proceedings.

6. Dismissal With Prejudice

6.1. The Parties shall, promptly upon payment of the consideration expressed herein, take any and all actions as may be necessary to have the Litigation, including any and all appeal proceedings, discontinued as to each other, including, as necessary, filing a Joint Motion and Order to Dismiss With Prejudice.

This Agreement is effective as of June __, 2009.

Atlantic Richfield Company

By: _____ Dated: 6/3/09

Printed Name: Nathan Block Title: Attorney, BP America Inc.

Lyondell Chemical Company

By: _____ Dated: 6/8/09

Printed Name: Steven Cook Title: Senior Corp Counsel

El Paso Tennessee Pipeline Company, EPEC Corporation
EPEC Polymers, Inc., Tennessee Gas Pipeline Company

By: _____ Dated: 6/9/09

Name: Robert W. Baker Title: Executive Vice President and General Counsel

The Lubrizol Corporation

By: _____ Dated: 6/11/09

Name: Joseph W. Bauer Title: Vice President and General Counsel

EXHIBIT B

UNITED STATES BANKRUPTCY COURT
SOUTHERN DISTRICT OF NEW YORK

In re:	:	
	:	**Chapter 11**
LYONDELL CHEMICAL COMPANY, et al.,	:	**Case No. 09-10023**
	:	**Jointly Administered**
Debtors.	:	

ORDER UNDER BANKRUPTCY RULE 9019 APPROVING SETTLEMENT AGREEMENT WITH THE LUBRIZOL CORPORATION

Upon the Motion (the "Motion") of Lyondell Chemical Company ("Lyondell") and certain of its subsidiaries and affiliates, as debtors and debtors in possession in the above-captioned chapter 11 cases (collectively, the "Debtors") pursuant to Rule 9109 of the Federal Rules of Bankruptcy Procedure (the "Bankruptcy Rules") for approval of the settlement agreement (the "Settlement Agreement") between the Debtors and the Lubrizol Corporation ("Lubrizol") as more fully set forth in the Motion; and the Court having jurisdiction to consider the Motion and the relief requested therein pursuant to 28 U.S.C. §§ 157 and 1334; and consideration of the Motion and the relief requested therein being a core proceeding pursuant to 28 U.S.C. § 157(b); and venue being proper before this Court pursuant to 28 U.S.C. §§ 1408 and 1409; and due and proper notice of the Motion having been provided, and it appearing that no other or further notice need be provided; and the relief requested in the Motion being in the best interests of the Debtors and its estates and creditors; and the Court having reviewed the Motion and any opposition thereto; and the Court having determined that the legal and factual bases set forth in the Motion establish just cause for the relief granted herein; and upon all of the

proceedings had before the Court and after due deliberation and sufficient cause appearing therefor, it is

ORDERED that the Motion is granted; and it is further

ORDERED that, pursuant to Bankruptcy Rule 9019, the Settlement Agreement is approved; and it is further

ORDERED that the Settlement Agreement was entered into following good faith, arm's-length negotiations between the Debtors and Lubrizol, and the settlements reflected in the Settlement Agreement are in the best interests of Debtors, its estates, creditors, equity holders and all other parties in interest; and it is further

ORDERED that Debtors are authorized and directed to execute, deliver, implement, and fully perform any and all obligations, instruments, documents, and papers and to take any and all actions reasonably necessary or appropriate to consummate, complete, execute, and implement the Settlement Agreement in accordance with the terms and conditions of the Settlement Agreement.

Dated: New York, New York
_____, 2009

_____
UNITED STATES BANKRUPTCY JUDGE

EXHIBIT C

EOD 12-9-98

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
BEAUMONT DIVISION

UNITED STATES OF AMERICA

Plaintiff,

v.

SADEANE LANG, INDEPENDENT EXECUTRIX OF THE ESTATE OF DONALD R. LANG, WALLIS W. SMITH, ARCO CHEMICAL COMPANY, and ATLANTIC RICHFIELD COMPANY

Defendants.

CIVIL ACTION NO.
1:94CV57

CONSENT DECREE AS TO ARCO CHEMICAL COMPANY AND ATLANTIC RICHFIELD COMPANY

TABLE OF CONTENTS

I. BACKGROUND

A. The United States of America ("United States"), on behalf of the Administrator of the United States Environmental Protection Agency ("EPA"), filed a complaint in this matter pursuant to Section 107 of the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"), 42 U.S.C. § 9607, on January 28, 1994. The United States filed a first amended complaint in this matter pursuant to Sections 106 and 107 of CERCLA, 42 U.S.C. 9606 and 9607.

B. The United States in its first amended complaint seeks, inter alia: (1) reimbursement of costs incurred by EPA and the Department of Justice for response actions at the Turtle Bayou (or Petro-Chemical Systems, Inc. as it is also known) Superfund Site in Liberty County, Texas ("Site") together with accrued interest; and (2) performance of studies and response work 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 (the "State") on April 21, 1993 and on January 24, 1995 of negotiations with potentially responsible parties 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. In accordance with Section 122(j)(1) of CERCLA, 42 U.S.C. § 9622(j)(1), EPA notified the United States Department of Interior on April 20, 1993, of negotiations with potentially responsible parties regarding the alleged release of hazardous substances that may have resulted in injury to the natural resources under Federal trusteeship and encouraged the trustee to participate in the negotiation of this Consent Decree.

D. ARCO Chemical Company and Atlantic Richfield Company ("Settling Defendants") do not admit any liability to the United States, EPA, or any other person or entity arising out of the transactions or occurrences alleged in the complaint and first amended complaint, (hereinafter "complaint"), nor do the Settling Defendants admit any facts, allegations, recitations or conclusions of law alleged in the complaint or this Consent Decree. The Settling Defendants specifically deny any responsibility for the disposal of any hazardous substances or hazardous substance containing materials at the Site (including Waste Materials) and specifically deny any legal or equitable liability under any statute, regulation, ordinance or common law for any costs or damages incurred by any party in connection with the Site, or

arising from conditions presented by, or arising in connection with, the Site, or transactions or occurrences alleged in the complaint. However, Settling Defendants will not contest the entry or enforceability of this Consent Decree.

E. 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 10, 1986, 51 Fed. Reg. 21054, 21073.

F. In or around January 1986, in response to a release or a substantial threat of a release of a hazardous substance(s) at or from the Site, EPA and the State pursuant to a cooperative agreement with EPA, commenced a Remedial Investigation and Feasibility Study ("RI/FS") for Frontier Park Road (also known as CR 126)(Operable Unit 1) of the Site. In or around June 1988, EPA and the State, pursuant to a cooperative agreement with EPA, commenced a RI/FS for the remainder of the Site (Operable Unit 2).

G. ARCO Chemical Company conducted and funded a Supplemental RI & Focused FS ("SRI/FFS") under EPA oversight in or around March 1991, pursuant to an Administrative Order On Consent entered into between ARCO Chemical Company and EPA, to evaluate possible remedial alternatives.

H. The State completed a Remedial Investigation ("RI") Report for Operable Unit 1 in June 1986, and the State completed a Feasibility Study ("FS") Report for Operable Unit 1 in November 1986. The State completed a RI Report for Operable Unit 2 in November 1990, and the State completed a FS Report for Operable Unit 2 in March 1991. ARCO Chemical Company completed an SRI/FFS Report in August 1991.

I. 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 for Operable Unit 2 in June 1991, 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 Regional Administrator based the selection of the response action.

J. The decision by EPA on the Remedial Action to be implemented at the second operable unit Site is embodied in a final Record of Decision ("ROD"), executed on September 6, 1991, on which the State has given its concurrence. The ROD includes EPA' s explanation for any significant differences between the final plan and the proposed plan as well as a responsiveness summary to the

public comments. Notice of the final plan was published in accordance with Section 117(b) of CERCLA. Prior to entry of this consent decree, EPA amended the September 6, 1991, Record of Decision.

K. On December 22, 1993, EPA issued a Unilateral Administrative Order ("UAO") to Settling Defendants and other potentially responsible parties for the design and performance of the Remedial Action as described in the ROD.

L. Based on the information presently available to EPA, EPA believes that the Work as defined herein will be properly conducted by the Settling Defendants in compliance with the NCP if conducted in accordance with the requirements of this Consent Decree and its appendices.

M. Solely for the purposes of Section 113(j) of CERCLA, the Remedial Action selected by the ROD and the Work to be performed by the Settling Defendants shall constitute a response action taken or ordered by the President. The United States and the Settling Defendants agree that it is in the public's interest that the Parties in this case settle this matter and that settlement of this matter and entry of this Consent Decree is made in good faith in an effort to avoid further expensive and protracted litigation, without any admission as to liability or fault for any purpose.

N. The Parties recognize, and the Court by entering this Consent Decree finds, that: (1) this Consent Decree has been negotiated by the Parties in good faith, (2) implementation of this Consent Decree will further CERCLA'S goals, including expedited cleanup of the Site and avoidance of prolonged and complicated litigation between the Parties, and (3) this Consent Decree is fair, reasonable, and in the public interest.

NOW, THEREFORE, without trial, adjudication, or admission of any issue of law, fact, liability or responsibility by the Settling Defendants, 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. §§ 1331 and 1345, and 42 U.S.C. §§ 9606, 9607, and 9613(b). This Court also has personal jurisdiction over the Settling Defendants. Solely for the purposes of this Consent Decree and the underlying complaint, 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; however the parties do not admit, and hereby reserve their right to contest, the jurisdiction of this Court over subject matters or

activities not covered or addressed by this Consent Decree. Nor shall anything herein be construed to affect Settling Defendants' rights to invoke the Dispute Resolution provisions or any other of the Settling Defendants' rights reserved elsewhere in this Consent Decree.

III. PARTIES BOUND

2. This Consent Decree applies to and is binding upon the United States and upon Settling Defendants and their 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 Defendants' responsibilities under this Consent Decree.

3. Settling Defendants shall make available a copy of this Consent Decree to each contractor hired by Settling Defendants and their agents or representatives to perform the Work (as defined below) required by this Consent Decree and to each representative of Settling Defendants performing the Work with respect to the Site and shall include in any contract for performance of the Work a requirement that the contractor must comply with this Consent Decree. Settling Defendants or their contractors shall provide written notice of the Consent Decree to all subcontractors they hire to perform any portion of the Work required by this Consent

Decree. Settling Defendants shall nonetheless be responsible for ensuring that their contractors and subcontractors perform the Work contemplated herein in accordance with 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 the Settling Defendants within the meaning of Section 107(b)(3) of CERCLA, 42 U.S.C. § 9507(b)(3).

IV. DEFINITIONS

4. Unless otherwise expressly provided herein, terms used in this Consent Decree which 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:

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

"Consent Decree" shall mean this Decree and all appendices attached hereto (listed in Section XXX). In the event of conflict between this Decree and any appendix, this Decree shall control.

"Day" shall mean a calendar day unless expressly stated to be a working day. "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.

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

"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 items pursuant to this Consent Decree, verifying 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 Sections VII, VIII, X (including, but not limited to, attorneys fees and the amount of just compensation), XVI, and Paragraph 82 of Section XXI. Future Response Costs shall not include any costs incurred by the EPA in connection with the Administrative Order on Consent for Supplemental Remedial Investigation/Focused Feasibility Study ("SRI/FFS AOC"), dated March 6, 1991. Future Response Costs shall include all other costs, including direct and indirect costs, incurred by the United States in connection with the Site from

January 31, 1990, and continuing in perpetuity and interest on Past Response Costs.

"Interest," shall mean interest at the rate specified for interest on investments of the Hazardous Substance Superfund established under Subchapter A of Chapter 98 of Title 26 of the U.S. Code, compounded on October 1 of each year, in accordance with 42 U.S.C. § 9607(a).

"Main Waste Area" shall mean that area of the Site which is north of Frontier Park Road and is the location of former waste disposal pits, and which is depicted and described in Appendix C.

"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, including, but not limited to, any amendments thereto.

"Office Trailer Area" shall mean that area of the Site which is south of Frontier Park Road, across from the Main Waste Area, and is depicted and described in Appendix C.

"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 this Consent Decree and the Statement of Work (SOW).

"Paragraph" shall mean a portion of this Consent Decree identified by an arabic numeral or an upper case letter.

"Parties" shall mean the United States and the Settling Defendants.

"Past Response Costs" shall mean all costs, including, but not limited to, direct and indirect costs and interest, that the United States incurred with regard to the Site through January 31, 1990.

"Performance Standards" shall mean those remedial objectives, remediation goals, cleanup standards, standards of control, and other substantive requirements, criteria or limitations set forth in the ROD, the SOW and any amendments or revisions to the ROD or the SOW.

"Plaintiff" shall mean the United States.

"Power Easement Area" shall mean that area of the site which is south of Frontier Park Road and is depicted and described in Appendix C.

"Project Coordinator" shall mean as to EPA the individual designated to oversee implementation of the Decree and coordinate communications with the Settling Defendants; and as to Settling Defendants, the individual designated by the Settling Defendants to

supervise, direct and coordinate the Work required under the 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 second operable unit at the Site signed on September 6, 1991, by the Regional Administrator, EPA Region 6, all attachments thereto, and any modifications, ROD amendments and explanation of significant differences.

"Remedial Action" shall mean those activities, except for Operation and Maintenance, to be undertaken to implement the final plans and specifications submitted by the Settling Defendants pursuant to the Remedial Design Report and Construction Report, and approved by EPA.

"Remedial Action Plan" shall mean the document submitted by the Settling Defendants pursuant to Paragraph 10 of this Consent Decree.

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

"Remedial Design Plan" shall mean the document submitted by the Settling Defendants pursuant to Paragraph 12 of this Consent Decree.

"Remedial Design/Remedial Action" or "RD/RA" shall mean both the Remedial Design and Remedial Action.

"Section" shall mean a portion of this Consent Decree identified by a roman numeral.

"Settling Defendants" shall mean ARCO Chemical Company and Atlantic Richfield Company.

"Site" shall mean the Turtle Bayou (or Petrochemical Systems, Inc. as it is also known) Superfund Site, located in Liberty County, Texas, approximately 12 miles southeast of the town of Liberty, between Farm to Market Road (FM) 563 and Turtle Bayou. The Site, originally defined to encompass approximately 500 acres, has been redefined to include only that property which includes the areal extent of contamination and all suitable property in very close proximity to the contamination necessary for the implementation of the RD/RA. This property is designated as the West Road Area, the Main Waste Area, the Office Trailer Area, the Basement Area, the Bayou Disposal Area, and Country Road 126 (formerly Frontier Park Road). Survey maps and legal descriptions of the Site are provided in Appendix C.

"State" shall mean the State of Texas.

"Statement of Work" or "SOW" shall mean the attached agreed-upon statement of work for implementation of the Remedial Design, Remedial Action, and Operation and Maintenance thereof, as set forth in Appendix B to this Consent Decree and any modifications made in accordance with this Consent Decree.

"TNRCC" shall mean the Texas Natural Resource Conservation Commission and any TNRCC predecessor or TNRCC successor departments or agencies of the State having jurisdiction over remediation of releases of hazardous substances.

"UAO" shall mean the Unilateral Administrative Order issued by EPA in connection with the Site on December 22, 1993, pursuant to section 106 of CERCLA, 42 U.S.C. § 9606.

"United States" shall mean the United States of America and the United States of America on behalf of the EPA.

"Waste Material" shall mean (1) any "hazardous substance" under Section 101(14) of CERCLA, 42 U.S.C. § 9601(14), and (2) any pollutant or contaminant under Section 101(33), 42 U.S.C. § 9601(33).

"West Road Area" shall mean that area of the Site which includes the western section of Frontier Park Road, and which is depicted on the map attached as Appendix C.

"Work" shall mean all activities Settling Defendants are required to perform under this Consent Decree, except those required by 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 at the Site by the design and implementation of response actions at the Site by the Settling Defendants.

6. Commitments by Settling Defendants

a. Settling Defendants shall finance and perform the Work in accordance with this Consent Decree and all plans, standards, specifications, and schedules set forth in or developed by Settling Defendants and approved by EPA pursuant to this Consent Decree.

b. The obligations of Settling Defendants to finance and perform the Work under this Consent Decree are joint and several. In the event of the insolvency or other failure of any one Settling Defendant to implement the requirements of this Consent Decree, the remaining Settling Defendant shall complete all such requirements.

7. Compliance With Applicable Law.

All activities undertaken by Settling Defendants pursuant to this Consent Decree shall be performed in accordance with the requirements of all applicable federal and state laws and regulations. Settling Defendants shall 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. Each and all activities conducted pursuant to this Consent Decree, if approved by EPA or not expressly disapproved, shall be deemed to be consistent with the NCP.

8. Permits.

a. As provided in Section 121(e) of CERCLA and §300.5 of the NCP, no permit shall be required for any portion of the Work conducted entirely on-site. In the event that any portion of the Work requires a federal or state permit or approval, Settling Defendants shall submit timely and complete applications and take all other actions necessary to obtain all such permits or approvals.

b. The Settling Defendants may be entitled to relief under the provisions of Section XVII (Force Majeure) of this Consent Decree for any delay in the performance of the Work

resulting from a failure to obtain, or a delay in obtaining, any permit required for the Work.

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.

VI. PERFORMANCE OF THE WORK BY SETTLING DEFENDANTS

9. Selection of Project Coordinator.

a. All aspects of the Work to be performed by Settling Defendants pursuant to Sections VI (Performance of the Work by Settling Defendants), VII (Additional Response Actions), VIII (U.S. EPA Periodic Review), and IX (Quality Assurance, Sampling and Data Analysis) of this Consent Decree shall be under the direction and supervision of the Settling Defendants or the designated Project Coordinator, the selection of which shall be subject to disapproval by EPA. Within 10 days after the entry of this Consent Decree, Settling Defendants shall notify EPA in writing of the name, title, and qualifications of the proposed Project Coordinator. EPA will issue a notice of disapproval or an authorization to proceed. If at any time thereafter, Settling Defendants propose to change a Project Coordinator, Settling Defendants shall provide notification to EPA.

b. If EPA disapproves a proposed Project Coordinator, EPA will notify Settling Defendants in writing. Settling Defendants shall submit to EPA a list of one or more alternate Project Coordinator(s), including the qualifications of the alternate Project Coordinator(s), that would be acceptable to them within 30 days of receipt of EPA's disapproval of the Project Coordinator previously proposed. EPA will provide written notice of the names of any Project Coordinator(s) that it disapproves and an authorization to proceed with respect to any of the other Project Coordinator(s). Settling Defendants may select any Project Coordinator from that list that is not disapproved and shall notify EPA of the name of the Project Coordinator 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 the Settling Defendants from meeting one or more deadlines in a plan approved by the EPA pursuant to this Consent Decree, Settling Defendants may seek relief under the provisions of Section XVII (Force Majeure) hereof.

10. Remedial Action Plan.

a. Within 60 days after entry of the Consent Decree, Settling Defendants shall submit to EPA for review and approval a work plan for the design, implementation and maintenance of the Remedial Action at the Site ("Remedial Action Plan"). The Remedial Action Plan shall provide for performance of the remedy set forth in the ROD in accordance with the SOW and in accordance with CERCLA, the NCP, and applicable EPA guidance.

b. The Remedial Action Plan shall include plans and schedules for expeditious implementation and completion of the tasks identified in the SOW, and shall include, but is not limited to, the following detailed plans: (1) Field Pilot Studies Plan, which will address the requirements and schedule for treatability/pilot studies at the site, including a pilot-scale study of the soil vapor extraction technology selected in the ROD, and which also will contain a description of the qualifications and experience generally necessary for personnel implementing material portions of the Field Pilot Studies, as well as a schedule for the preparation and submission of a Field Pilot Study Report; (2) Health and Safety Plan for field 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;

(3) Site Access and Security Plan; (4) Spill Prevention, Control & Countermeasures Plan; (5) Sampling and Analysis Plan; (6) Quality Assurance/Quality Control Plan ("QA/QC Plan") in accordance with Section IX (Quality Assurance, Sampling and Data Analysis); (7) Community Relations Plan; (8) Ambient Air Management Plan; (9) RCRA Vault Maintenance Plan; and (10) Transportation and Disposal Plan. The Remedial Action Plan also shall include the following plans in draft, generalized form: (1) Remedial Design Plan; (2) Remedial Construction Plan; (3) Remedial Operations Work Plan; and (4) O & M Plan. The Remedial Action Plan shall provide for the re-submission of these general plans to include detailed plans and schedules, i.e., submission of the following: (1) Detailed Remedial Design Plan; (2) Detailed Remedial Construction Plan; (3) Detailed Remedial Operations Work Plan; and (4) Detailed O & M Plan. The Remedial Action Plan also shall provide for the submission of the following reports: (1) Field Pilot Study Report; (2) Remedial Design Report; (3) Construction Report; and (4) Remedial Action Report.

c. Plans approved by EPA pursuant to the UAO will be deemed to be approved by EPA for purposes of this Consent Decree.

d. The Remedial Action Plan may be modified in accordance with the refinement notice procedures set forth in the

SOW. The Remedial Action Plan, as well as all plans and reports submitted as part of, or pursuant to, the Remedial Action Plan and all subsequent modifications to the Remedial Action Plan, shall, upon approval by EPA, be incorporated into and become enforceable under this Consent Decree.

e. Upon approval of the Remedial Action Plan by EPA and submittal of the Health and Safety Plan for all field activities to EPA, Settling Defendants shall implement the Remedial Action Plan. The Settling Defendants shall submit all plans, reports, submittals and other deliverables described in the SOW and the approved Remedial Action Plan to EPA in accordance with the approved schedules for review and approval pursuant to Section XII Submissions Requiring Agency Approval).

f. During design and implementation of the remedy, Settling Defendants may proceed to subsequent phases of activity prior to EPA approval of deliverables, as long as such actions do not endanger the public health or the environment and as long as the Settling Defendants obtain the EPA Project Coordinator's approval.

11. Field Pilot Studies. In accordance with the schedule in the approved Field Pilot Studies Plan, Settling Defendants shall conduct the Field Pilot Studies and prepare a Field Pilot Study

Report to be submitted to EPA for review and approval. The Field Pilot Study Report shall include an evaluation of any potential improvements to, or potential problems with, the design, construction, or implementation of the site remedy which are identified during the Field Pilot Studies. In addition, the Field Pilot Study Report shall evaluate alternatives to address any potential improvements or problems identified in the Report and a proposal for any additional response actions that may be necessary.

12. Remedial Design.

a. As part of the Field Pilot Study Report, Settling Defendants shall submit a Detailed Remedial Design Plan to EPA for review and approval. Upon EPA approval of the Field Pilot Study Report, Settling Defendants shall implement the Detailed Remedial Design Plan.

b. The Detailed Remedial Design Plan will address the requirements and schedule for performance of the design of the remedy in accordance with the SOW and the ROD. If requested, the Detailed Remedial Design Plan also will contain a description of the qualifications and experience generally necessary for all personnel implementing material portions of the Remedial Design. In addition, the Detailed Remedial Design Plan also shall include

a schedule for the preparation and submission of a Remedial Design Report to EPA for review and approval.

c. The Remedial Design Report shall include, but is not limited to, the following: (1) final design calculations, plans, drawings and specifications; (2) appropriate modifications for Remedial construction activities (through the refinement notice procedure described in the SOW) to the Health & Safety Plan, Site Access and Security Plan, Spill Prevention, Control & Countermeasures Plan, Sampling and Analysis Plan, QA/QC Plan, Community Relations Plan, Ambient Air Management Plan, and Transportation and Disposal Plan; (3) Detailed Remedial Construction Plan, which is described below.

13. Remedial Action Construction.

a. As part of the Remedial Design Report, Settling Defendants shall submit a Detailed Remedial Construction Plan to EPA, which is a detailed work plan for the construction of the Remedial Action for the Main Waste Area, the Office Trailer Area, the Power Easement Area and the West Road Area at the Site. Upon approval of the Remedial Design Report by EPA, Settling Defendants shall implement the activities required under the Detailed Remedial Construction Plan.

b. The Detailed Remedial Construction Plan shall provide for construction of the remedy for the Main Waste Area, the Office Trailer Area, the Power Easement Area and the West Road Area in accordance with the SOW, the design plans and specifications in the approved final design submittal, and the ROD. Unless otherwise agreed, the Detailed Remedial Construction Plan shall include, but is not limited to, the following: (1) a description of the qualifications and experience generally necessary for all personnel implementing material portions of the Remedial Action construction; (2) plans and schedules for the completion of the Remedial Action construction including, but not limited to, the execution of the construction contract; (3) identification of the Remedial Action Construction Project Team; (4) a general description of the roles, relationships, and assignment of responsibilities among the Remedial Action Construction Project Team; (5) construction quality control plan (by Settling Defendants); (6) procedures and schedules for Pre-Final Inspections; and (7) procedures and schedules for the development and submission of the Draft and Final Construction Reports.

c. The Construction Report shall include, but is not limited to, the following: (1) as-built drawings; (2) appropriate modifications (through the refinement notice procedure described in

the SOW) to the Health & Safety Plan, Site Access and Security Plan, Spill Prevention, Control & Countermeasures Plan, Sampling and Analysis Plan, QA/QC Plan, Community Relations Plan, Ambient Air Management Plan, Transportation and Disposal Plan; (3) a summary of refinement notices approved during construction, which shall also be attached to the Construction Report; (4) the Detailed Remedial Operations Work Plan, which is described below; (5) provisions for EPA's Five Year Reviews of the constructed remedy, pursuant to 42 U.S.C. § 9621(c); (6) a summary of field activities and a copy of all analytical results; (7) documentation showing compliance with the QA/QC Plan, the Consent Decree and the SOW; and (8) a certification by a Professional Engineer registered in the State of Texas stating that the remedy was constructed as per the as-built drawings.

14. Remedial Action Operations.

a. As part of the Construction Report, Settling Defendants shall submit to EPA a detailed work plan for the operation of the Remedial Action for the Main Waste Area, the Office Trailer Area, the Power Easement Area and the West Road Area at the Site ("Detailed Remedial Operations Work Plan"). Upon approval of the Construction Report by EPA, Settling Defendants

shall implement the activities required under the Detailed Remedial Operations Work Plan.

b. The Detailed Remedial Operations Work Plan shall provide for operation of the remedy for the Main Waste Area, the Office Trailer Area, the Power Easement Area and the West Road Area in accordance with the SOW, the design plans and specifications in the approved final design submittal, and the ROD. The Detailed Remedial Operations Work Plan shall include, but is not limited to, the following: (1) plans and schedules for remedial operations activities and the completion of the Remedial Action; (2) procedures and plans for the decontamination of equipment and the transportation and disposal of contaminated materials; (3) procedures and schedules for the development and submission of the Final Remedial Action Report; (4) procedures and schedules for the Pre-Certification Inspection and certification of Remedial Action; (5) a description of the qualifications and experience generally necessary for all personnel used in performing material portions of the Remedial operation activities; and (6) identification of the Remedial Operations Project Team, including key personnel, descriptions of duties and lines of authority.

c. The Remedial Action Report shall include, but is not limited to, the following: (1) results of sampling conducted

during the Remedial Action; (2) a summary of approved refinement notices during Remedial Operations; (3) Closure Plan; and (4) Detailed O & M Plan, which is described below.

15. Operation and Maintenance.

a. As part of the Remedial Action Report, Settling Defendants shall submit to EPA a detailed work plan for the monitoring, operation and maintenance of the Remedial Action for the Main Waste Area, the Office Trailer Area, the Power Easement Area and the West Road Area at the Site ("Detailed O & M Plan"). Upon approval of the Remedial Action Report by EPA, Settling Defendants shall implement the activities required under the Detailed O & M Plan.

b. The Detailed O & M Plan shall provide for operation and maintenance of the remedy for the Main Waste Area, the Office Trailer Area, the Power Easement Area and the West Road Area in accordance with the SOW and the ROD, and shall include a schedule for implementing the operation and maintenance activities, as well as a description of the qualifications and experience generally necessary for all personnel used in performing material portions of the operation and maintenance activities.

16. The Project Coordinators may make schedule changes for performance of the remedial work upon mutual written agreement of

the Project Coordinators. Such changes shall not be considered or constitute modifications to the Consent Decree and do not require approval of the Court.

17. The Work performed by the Settling Defendants pursuant to this Consent Decree shall include the obligation to achieve the Performance Standards for the Main Waste Area, the Office Trailer Area, the Power Easement Area and the West Road Area.

18. Settling Defendants acknowledge and agree that nothing in this Consent Decree, the SOW, or the Remedial Design or Remedial Action Plan constitutes a warranty or representation of any kind by Plaintiff that compliance with the Work requirements set forth in the SOW and the Work Plans will achieve the Performance Standards. Settling Defendants' compliance with the Work requirements shall not foreclose the United States from seeking compliance with all terms and conditions of this Consent Decree, including, but not limited to, the applicable Performance Standards for the Main Waste Area, the Office Trailer Area, the Power Easement Area and the West Road Area.

19. Settling Defendants shall, prior to any off-Site shipment of Waste Material from the Site to an out-of-state waste management facility, provide written notification to the appropriate state environmental official in the receiving facility's state and to the

EPA Project Coordinator of such shipment of Waste Material. However, this notification requirement shall not apply to any off-Site shipments when the total volume of all such shipments will not exceed 10 cubic yards.

a. The Settling Defendants shall include in the written notification the following information, where available: (1) the name and location of the facility to which the Waste Material is to be shipped; (2) the type and quantity of the Waste Material to be shipped; (3) the expected schedule for the shipment of the Waste Material; and (4) the method of transportation. The Settling Defendants shall notify the state in which the planned receiving facility is located of major changes in the shipment plan, such as a decision to ship the Waste Material to another facility within the same state, or to a facility in another state.

b. The identity of the receiving facility and state will be determined by the Settling Defendants. The Settling Defendants shall provide the information required by Paragraph 19.a as soon as practicable after the award of the contract and before the Waste Material is actually shipped.

VII. ADDITIONAL RESPONSE ACTIONS

20. In the event that EPA determines or the Settling Defendants propose that additional or modified response actions are

necessary to meet the Performance Standards for the Main Waste Area, the Office Trailer Area, the Power Easement Area or the West Road Area, to carry out the remedy selected in the ROD for the Main Waste Area, the Office Trailer Area, the Power Easement Area or the West Road Area or to protect human health and the environment, notification of such additional or modified response actions shall be provided to the Project Coordinator for the other party.

21. Within 60 days of receipt of notice from EPA or Settling Defendants pursuant to Paragraph 20 that additional or modified response actions are necessary (or such longer time as may be specified by EPA), Settling Defendants shall submit for approval by EPA, after reasonable opportunity for review and comment by the State, a work plan for the additional or modified response actions. The plan shall conform to the requirements of this Consent Decree (including, but not limited to, the applicable requirements of Paragraphs 12 and 14), the NCP, and the EPA Superfund Remedial Design and Remedial Action Guidance OSWER Directive 9355.0-4A, or as modified. Upon approval of the plan pursuant to Section XII (Submissions Requiring Agency Approval), Settling Defendants shall implement the plan for additional or modified response actions in accordance with the schedule contained therein.

22. Any additional or modified response actions that Settling Defendants propose are necessary to meet the Performance Standards or to carry out the remedy selected in the ROD, or to protect human health and the environment shall be subject to approval by EPA, after reasonable opportunity for review and comment by the State, and, if authorized by EPA, shall be completed by Settling Defendants in accordance with plans, specifications, and schedules approved or established by EPA pursuant to Section XII (Submissions Requiring Agency Approval).

23. Settling Defendants may invoke the procedures set forth in Section XIX (Dispute Resolution) to dispute EPA's determination that additional response actions are necessary to meet the Performance Standards or to carry out the remedy selected in the ROD. Such a dispute shall be resolved pursuant to Paragraphs 61-64 of this Consent Decree.

VIII. EPA PERIODIC REVIEW

24. Settling Defendants shall conduct any studies and investigations as specified in the approved RAP in order to permit EPA to conduct reviews for the Main Waste Area, the Office Trailer Area, the Power Easement Area and the West Road Area at least every five years as required by Section 121(c) of CERCLA and any applicable regulations.

25. If required by Sections 113(k)(2) or 117 of CERCLA, Settling Defendants and 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 public comment period. After the period for submission of written comments is closed, the Regional Administrator, EPA Region 6, or his/her delegate will determine in writing whether further response actions are appropriate.

26. If the Regional Administrator, EPA Region 6, or his/her delegate determines that information received, in whole or in part, during the review conducted pursuant to Section 121(c) of CERCLA, indicates that the Remedial Action for the Main Waste Area, the Office Trailer Area, the Power Easement Area or the West Road Area is not protective of human health and the environment, the Parties shall negotiate in good faith alternate measures to achieve the purposes of this Consent Decree. Within 30 days after inception of good faith negotiations, Settling Defendants shall submit a plan for such work to EPA for approval in accordance with the procedures set forth in Section VI (Performance of the Work by Settling Defendants) and shall implement the plan approved by EPA or undertake any further response actions EPA has determined are

appropriate, unless their liability for such further response actions is barred by the Covenant Not to Sue set forth in Section XXI (Covenants Not to Sue by Plaintiff) or Settling Defendants invoke the dispute resolution procedures. The Settling Defendants may invoke the procedures set forth in Section XIX (Dispute Resolution) to dispute (1) EPA's determination that the Remedial Action is not protective of human health and the environment, (2) EPA's selection of further response actions ordered is arbitrary and capricious or otherwise not in accordance with law, or (3) EPA's determination that the Settling Defendant's liability for the further response actions requested is reserved in Paragraphs 78, 79, or 81 or otherwise not barred by the Covenant Not to Sue set forth in Section XXI.

IX. QUALITY ASSURANCE, SAMPLING, and DATA ANALYSIS

27. Settling Defendants shall use quality assurance, quality control, and chain of custody procedures for all pilot study, design, compliance and monitoring samples in accordance with EPA's "Requirements For Quality Assurance Project Plans for Environmental Data Operations," (EPS QA\R-5); "Data Quality Objective Guidance," (EPA/540/G87/003 and 004); "EPA NEIC Policies and Procedures Manual," May 1978, revised November 1984, (EPA 330/9-78-001-R); and subsequent amendments to such guidelines upon notification by EPA

to Settling Defendants of such amendment. Amended guidelines shall apply only to procedures conducted after such notification. Prior to the commencement of any monitoring project under this Consent Decree, Settling Defendants shall submit to EPA for approval, a Quality Assurance Quality Control Plan ("QA/QC Plan") to EPA that is consistent with the SOW, the NCP and applicable guidance documents. The QA/QC Plan is part of the approved RAP. If relevant to the proceeding, the Parties agree that validated sampling data generated in accordance with the QA/QC Plan and reviewed and approved by EPA shall be admissible as evidence, without objection, in any proceeding under this Decree. Settling Defendants shall use their best efforts to ensure that EPA personnel and its authorized representatives are allowed access at reasonable times to all laboratories utilized by Settling Defendants in implementing this Consent Decree. In addition, Settling Defendants shall ensure that such laboratories shall analyze all samples submitted by EPA pursuant to the QA/QC Plan for quality assurance monitoring. Settling Defendants shall require the laboratories they utilize for the analysis of samples taken pursuant to this Decree perform all analyses according to accepted EPA methods. Accepted EPA methods consist of those methods which are documented in the "Contract Lab Program Statement of Work for

Inorganic Analysis" and the "Contract Lab Program Statement of Work for Organic Analysis," dated February 1988, and any amendments made thereto during the course of the implementation of this Decree. Settling Defendants shall require all laboratories they use for analysis of samples taken pursuant to this Consent Decree participate in an EPA or EPA-equivalent QA/QC program except as otherwise specified in the SOW.

28. Upon request, the Settling Defendants shall allow split or duplicate samples to be taken by EPA or its authorized representatives. Settling Defendants shall notify EPA not less than 7 days in advance of any sample collection activity unless otherwise agreed to by the Project Coordinators. In addition, EPA shall have the right to take any additional samples that EPA deems necessary. Upon request, EPA shall allow the Settling Defendants to take split or duplicate samples of any samples it takes in connection with the Settling Defendant's implementation of the Work.

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

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

X. ACCESS

31. Commencing upon the date of entry of this Consent Decree, the Settling Defendants agree to provide the United States and its representatives, including EPA and its contractors, access at all reasonable times to the Site and any other property to which access is required for the implementation of this Consent Decree, to the extent access to the property is controlled by Settling Defendants, for the purposes of conducting any activity related to this Consent Decree including, but not limited to:

a. Monitoring the Work;

b. Verifying any data or information submitted to the United States;

c. Conducting investigations relating to contamination at or near the Site;

d. Obtaining samples;

e. Assessing the need for, planning, or implementing additional response actions at or near the Site;

f. Inspecting and copying records, operating logs, contracts, or other documents maintained or generated by Settling Defendants or their agents, consistent with Section XXIV; and

g. Assessing Settling Defendants' compliance with this Consent Decree.

32. To the extent that the Site or any other property to which access is required for the implementation of this Consent Decree is owned or controlled by persons other than Settling Defendants, Settling Defendants shall use best efforts to secure from such persons access for Settling Defendants, as well as for the United States and the State and their representatives, including, but not limited to, their contractors, as necessary to effectuate this Consent Decree. For purposes of this Paragraph "best efforts" includes the payment of reasonable sums of money in consideration of access. If any access required to complete the Work is not obtained within 45 days of the date of entry of this Consent Decree, or within 45 days of the date EPA notifies the Settling Defendants in writing that additional access beyond that previously secured is necessary, Settling Defendants shall promptly notify the United States, and shall include in that notification a summary of the steps Settling Defendants have taken to attempt to obtain access. The United States may, if necessary, assist

Settling Defendants in obtaining access. Any delay or inability to perform resulting from inability to obtain Site access or a subsequent loss of Site access may constitute a Force Majeure event.

33. Notwithstanding any provision of this Consent Decree, the United States retains all of its access authorities and rights, including enforcement authorities related thereto, under CERCLA, RCRA and any other applicable statute or regulations.

XI. REPORTING REQUIREMENTS

34. In addition to any other requirement of this Consent Decree, Settling Defendants shall submit to EPA and the State two copies 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 Settling Defendants or their contractors or agents in the previous month; (c) identify all work plans, plans and other deliverables required by this Consent Decree completed and submitted during the previous month; (d) describe all Work actions, including, but not limited to, compliance/progress/remediation data collection and implementation of work plans, which are scheduled for the following month and provide other information

relating to the progress and scheduling of construction, (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 during the monthly period; (f) include any modifications to the work plans or other schedules that Settling Defendants have proposed to EPA or that have been approved by EPA during the month; 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 month. Data that is generated but not supplied during the monthly period shall be identified in the report. Settling Defendants shall submit these progress reports to EPA and the State by the tenth day of every month following the entry of this Consent Decree until EPA notifies the Settling Defendants pursuant to Paragraph 51 b. of Section XV (Certification of Completion). If requested by EPA, Settling Defendants shall also provide briefings for EPA to discuss the progress of the Work.

35. The 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, unless such notification is impossible.

36. Upon the occurrence of any event during performance of the Work that Settling Defendants are required to report pursuant to Section 103 of CERCLA or Section 304 of the Emergency Planning and Community Right-to-know Act (EPCRA), Settling Defendants or their representatives shall within 24 hours of the discovery by Settling Defendants or their representatives 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 5, United States Environmental Protection Agency. These reporting requirements are in addition to the reporting required by CERCLA Section 103 or EPCRA Section 304.

37. Within 20 days of the discovery by Settling Defendants or their representatives of such an event, Settling Defendants shall furnish to EPA a written report, signed by the Settling Defendants' Project Coordinator, setting forth the events which occurred and the measures taken, and to be taken, in response thereto. Within 30 days of the conclusion of such an event, Settling Defendants

shall submit a report setting forth all actions taken in response thereto.

38. Settling Defendants shall submit three copies of all plans, reports, and data required by the SOW, the Remedial Design Plan, the Remedial Action Plan, or any other approved plans to EPA in accordance with the schedules set forth in such plans. Settling Defendants shall simultaneously submit copies of all such plans, reports and data to the State.

39. All reports and other documents submitted by Settling Defendants to EPA (other than the monthly progress reports referred to above) which purport to document Settling Defendants' compliance with the terms of this Consent Decree shall be signed by an authorized representative of the Settling Defendants.

XII. SUBMISSIONS REQUIRING AGENCY APPROVAL

40. After review of any plan, report or other item which is required to be submitted for approval pursuant to this Consent Decree, EPA shall: (a) approve, in whole or in part, the submission; (b) approve the submission upon specified conditions; (c) modify the submission as necessary to cure the deficiencies if upon resubmission it is still deficient; (d) disapprove, in whole or in part, the submission, directing that the Settling Defendants modify the submission; or (e) any combination of the above. EPA's

approval of any and all submittals and resubmittals shall not be withheld in a manner that is arbitrary and capricious.

41. In the event of approval, approval upon conditions, or modification by EPA, pursuant to Paragraph 40(a), (b), or (c), Settling Defendants shall proceed to take any action required by the plan, report, or other item, as approved or modified by EPA subject only to their right to invoke the Dispute Resolution procedures set forth in Section XIX (Dispute Resolution) with respect to the modifications or conditions made by EPA. In the event that EPA modifies the submission to cure the deficiencies pursuant to Paragraph 40(c) and the submission has a material defect, EPA retains its right to seek stipulated penalties, as provided in Section XX.

42. a. Upon receipt of a notice of disapproval pursuant to Paragraph 40(d), Settling Defendants shall, within 14 days or such other reasonable time as specified by EPA in such notice, address the deficiencies and resubmit the plan, report, or other item for approval. Any stipulated penalties applicable to the submission, as provided in Section XX, shall accrue during the 14-day period or otherwise specified period but shall not be payable unless the resubmission is disapproved or modified due to a material defect as provided in Paragraph 43 and 44.

b. Notwithstanding the receipt of a notice of disapproval pursuant to Paragraph 40(d), Settling Defendants shall proceed, at the direction of EPA, to take any action required by any non-deficient portion of the submission if technically possible. Implementation of any non-deficient portion of a submission shall not relieve Settling Defendants of any liability for stipulated penalties under Section XX (Stipulated Penalties).

43. In the event that a resubmitted plan, report or other item, or portion thereof, is disapproved by EPA, EPA may again require the Settling Defendants to correct the deficiencies, in accordance with the preceding Paragraphs. EPA also retains the right to amend or develop the plan, report or other item. Settling Defendants shall implement any such plan, report, or item as amended or developed by EPA, subject to their rights to invoke the dispute resolution provisions.

44. If upon resubmission, a plan, report, or item is disapproved or modified by EPA due to a material defect, Settling Defendants shall be deemed to have failed to submit such plan, report, or item timely and adequately unless the Settling Defendants invoke the dispute resolution procedures set forth in Section XIX (Dispute Resolution) and EPA's action is overturned pursuant to that Section. The provisions of Section XIX (Dispute

Resolution) and Section XX (Stipulated Penalties) shall govern the implementation of the Work and accrual and payment of any stipulated penalties during Dispute Resolution. If EPA's disapproval or modification is upheld, stipulated penalties shall accrue for such violation from the date on which the initial submission was originally required, as provided in Section XX.

45. All plans, reports, and other items required to be submitted to EPA under this Consent Decree shall, upon approval or modification by EPA, be enforceable under this Consent Decree, subject to Settling Defendants' right to dispute resolution. In the event EPA approves or modifies a portion of a plan, report, or other item required to be submitted to EPA under this Consent Decree, the approved or modified portion shall be enforceable under this Consent Decree, subject to Settling Defendants' right to dispute resolution.

XIII. PROJECT COORDINATORS

46. Within 20 days of entry of this Consent Decree, Settling Defendants and EPA will notify each other, in writing, of the name, address and telephone number of their respective designated Project Coordinators. If a Project Coordinator initially designated is changed, the identity of the successor will be given to the other parties at least 5 working days before the changes occur, unless

impracticable, but in no event later than the actual day the change is made. The 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. The Settling Defendants' Project Coordinator shall not be an attorney for any of the Settling Defendants in this matter. He or she may assign other representatives, including other contractors, to serve as a Site representative for oversight of performance of daily operations during remedial activities.

47. The United States may designate other representatives, including, but not limited to, EPA employees, and federal contractors and consultants, to observe and monitor the progress of any activity undertaken pursuant to this Consent Decree. EPA's Project Coordinator shall have the authority lawfully vested in a Remedial Project Manager (RPM) and an On-Scene Coordinator (OSC) by the National Contingency Plan, 40 C.F.R. Part 300. In addition, EPA's Project Coordinator or Alternate Project Coordinator shall have authority, consistent with the National Contingency Plan, 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. Any such order by an EPA representative to halt work may constitute a Force Majeure Event under the provisions of Section XVIII herein (Force Majeure). If the order is determined to be a Force Majeure Event, all affected schedules shall be extended equal to the duration of suspension of the Work plus reasonable additional time for resumption of activities.

XIV. ASSURANCE OF ABILITY TO COMPLETE WORK

48. Within 30 days of entry of this Consent Decree, Settling Defendants shall establish and maintain financial security in the amount of $18,300,000 in one of the following forms:

a. A guarantee to perform the Work by one or more parent corporations or subsidiaries, or by one or more unrelated corporations that have a substantial business relationship with at least one of the Settling Defendants; or

b. A demonstration that one or more of the Settling Defendants satisfy the requirements of 40 C.F.R. Part 264.143(f).

49. If the Settling Defendants seek to demonstrate the ability to complete the Work through a guarantee by a third party pursuant to Paragraph 48(a) of this Consent Decree, Settling Defendants shall demonstrate that the guarantor satisfies the requirements of 40 C.F.R. Part 264.143(f). If Settling Defendants

seek to demonstrate their ability to complete the Work by means of the financial test or the corporate guarantee pursuant to Paragraph 48(b), they shall resubmit sworn statements conveying the information required by 40 C.F.R. Part 264.143(f) annually, on the anniversary of the effective date of this Consent Decree. In the event that EPA determines at any time that the financial assurances provided pursuant to this Section are inadequate, Settling Defendants shall, within 30 days of receipt of notice of EPA's determination, obtain and present to EPA for approval additional financial assurance information. Settling Defendants' inability to demonstrate financial ability to complete the Work shall not excuse performance of any activities required under this Consent Decree. Settling Defendants may change the form of financial assurance provided under this Section at any time, upon notice to and approval by EPA, provided that the new form of assurance meets the requirements of this Section. In the event of a dispute, Settling Defendants may change the form of the financial assurance only in accordance with the final administrative or judicial decision resolving the dispute.

XV. CERTIFICATION OF COMPLETION

50. Completion of the Remedial Action.

a. Within 90 days after Settling Defendants conclude that the Remedial Action for the Main Waste Area, the Office Trailer Area, the Power Easement Area and the West Road Area has been fully performed and the Performance Standards have been attained, Settling Defendants shall schedule and conduct a pre-certification inspection to be attended by Settling Defendants and EPA. If, after the pre-certification inspection, the Settling Defendants still believe that the Remedial Action for the Main Waste Area, the Office Trailer Area, the Power Easement Area and the West Road Area has been fully performed and the Performance Standards have been attained, they shall submit a written report (Remedial Action Report) requesting certification to EPA for approval, with a copy to the State, pursuant to Section XII (Submissions Requiring Agency Approval) within 30 days of the inspection. In the report, the Settling Defendants' Project Coordinator shall state that the Remedial Action for the Main Waste Area, the Office Trailer Area, the Power Easement Area and the West Road Area has been completed consistent with the requirements of this Consent Decree. The written Remedial Action Report shall include as-built drawings signed and stamped by a professional

engineer. The report shall contain the following statement, signed by the Settling Defendants' Project Coordinator:

> "To the best of my knowledge, after thorough investigation, 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 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 to review and comment by the State, determines that the Remedial Action for the Main Waste Area, the Office Trailer Area, the Power Easement Area or the West Road Area 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 Settling Defendants in writing of the activities that should be undertaken to complete the Remedial Action and achieve the Performance Standards. EPA will require the Settling Defendants to submit a schedule of such activities to EPA for approval pursuant to Section XII (Submissions Requiring Agency Approval). 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 XIX (Dispute Resolution).

b. If EPA concludes, based on the initial or any subsequent report requesting Certification of Completion and after a reasonable opportunity for review and comment by the State, that the Remedial Action for the Main Waste Area, the Office Trailer Area, the Power Easement Area and the West Road Area has been fully performed in accordance with this Consent Decree and that the Performance Standards have been achieved, EPA will so certify in writing to 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 XXI (Covenants Not to Sue by Plaintiff). Certification of Completion of the Remedial Action shall not affect Settling Defendants' obligations under this Consent Decree. Certification of Completion shall not be withheld in a manner that is arbitrary and capricious.

51. Completion of the Work.

a. Within 90 days after Settling Defendants conclude that all phases of the Work (including O & M), have been fully performed, Settling Defendants shall schedule and conduct a precertification inspection to be attended by Settling Defendants

and EPA. If, after the pre-certification inspection, the Settling Defendants still believe that the Work has been fully performed, Settling Defendants shall submit a written report endorsed by a professional engineer registered in Texas, stating that the Work has been completed in full satisfaction of the requirements of this Consent Decree. The report shall contain the following statement, signed by the Settling Defendants' Project Coordinator:

> "To the best of my knowledge, after thorough investigation, 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 submitting false information, including the possibility of fine and imprisonment for knowing violations."

If, after review of the written report, EPA, after reasonable opportunity to 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 Settling Defendants in writing of the activities that must be undertaken by Settling Defendants pursuant to this Consent Decree to complete the Work. EPA will set forth in the notice a schedule for performance of such activities consistent with the Consent Decree and the SOW or require the Settling Defendants to submit a schedule to EPA for approval pursuant to Section XII (Submissions Requiring Agency Approval). 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 XIX (Dispute Resolution).

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

XVI. EMERGENCY RESPONSE

52. In the event of any action or occurrence during the performance of the Work which causes or threatens a release of Waste Material from the areas of the Site involved in the Work under the Consent Decree that constitutes an emergency situation or may present an immediate threat to public health or welfare or the environment, Settling Defendants shall, subject to Paragraph 53, 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, the Settling Defendants

shall notify the EPA Response and Prevention Branch, Region 6. Settling Defendants shall take such actions in consultation, when practicable, 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 Settling Defendants fail to take appropriate response action as required by this Section, and EPA takes such action instead, Settling Defendants shall reimburse EPA all costs of the response action not inconsistent with the NCP pursuant to paragraph 72.

53. Other than the Covenants Not to Sue or as otherwise set forth herein, nothing in the preceding Paragraph or in this Consent Decree shall be deemed to limit any authority of the United States to take, direct, or order all appropriate action or to 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.

XVII. INDEMNIFICATION AND INSURANCE

54. a. The United States does not assume any liability by entering into this agreement or by virtue of any designation of Settling Defendants as EPA's authorized representatives under

Section 104(e) of CERCLA. Settling Defendants shall indemnify, save and hold harmless the United States and its 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 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 Settling Defendants as EPA's authorized representatives under Section 104(e) of CERCLA. Nothing in this Consent Decree, however, shall require indemnification by the Settling Defendants with respect to any claim or cause of action against the United States based on negligent action taken solely and directly by the United States, its employees, agents, contractors, or subcontractors (not including oversight or approval of the Settling Defendants' plans or activities). Further, the Settling Defendants agree to pay the United States all costs it incurs 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 based on negligent acts or other wrongful acts or omissions of 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, provided that the United States submits a description and cost documentation of such costs to the Settling Defendants. The United States shall not be held out as a party to any contract entered into by or on behalf of Settling Defendants in carrying out activities pursuant to this Consent Decree. Neither the Settling Defendants nor any such contractor shall be considered an agent of the United States.

54. b. The United States shall give Settling Defendants notice of any claim for which the United States plans to seek indemnification pursuant to Paragraph 54. a., and shall consult with Settling Defendants prior to settling such claim.

55. Settling Defendants waive all claims against the United States for damages or reimbursement or for set-off of any payments made or to be made to the United States, arising from or on account of any contract, agreement, or arrangement between any one or more of 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, Settling Defendants shall indemnify and hold harmless the United States 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 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. Nothing in this Consent Decree, however, shall require indemnification by the Settling Defendants with respect to any claim or cause of action against the United States based on negligent action taken solely and directly by the United States, its employees, agents, contractors, or subcontractors (not including oversight or approval of the Settling Defendants' plans or activities).

56. a. Prior to lodging this Consent Decree, the Settling Defendants shall provide EPA with information demonstrating their financial resources and their ability to jointly provide the equivalent of comprehensive general liability insurance for the United States and the State, with limits of two (2) million dollars, combined single limit. Such equivalent may include information regarding Settling Defendants' financial resources.

b. If, at any time prior to EPA's Certification of Completion of the Remedial Action, pursuant to Paragraph 50. b., any material change occurs in the financial resources of Settling Defendants such that Settling Defendants may no longer have the

financial ability to assure their ability to provide the equivalent of comprehensive general liability insurance with limits of two (2) million dollars, combined single limit, Settling Defendants shall promptly notify U.S. EPA.

c. If, at any time prior to the first anniversary of receipt of EPA's Certification of Completion of Remedial Action pursuant to Paragraph 50. b., Plaintiff obtains information regarding any material change in the financial resources of Settling Defendants that leads EPA to believe that the Settling Defendants may no longer have the financial ability to jointly provide the equivalent of comprehensive general liability insurance with limits of two (2) million dollars, combined single limit, Plaintiff shall so notify Settling Defendants. Settling Defendants shall have sixty (60) days after receiving such written notice to respond and provide corrected or supplemental information, or otherwise assure Plaintiff that Settling Defendants have the ability to provide the equivalent of comprehensive general liability insurance with limits of Two (2) million dollars, combined single limit.

d. If Settling Defendants do not satisfactorily resolve Plaintiff's concerns that a material change has occurred in the financial resources of the Settling Defendants within sixty (60)

days after receiving notice noted in subparagraph (c) above, Plaintiff may require Settling Defendants to obtain comprehensive general liability and automobile insurance with limits of two (2) million dollars, combined single limit naming as additional insured the United States.

e. For the duration of this Consent Decree, the 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 the Settling Defendants in furtherance of this Consent Decree.

XVIII. FORCE MAJEURE

57. "Force Majeure Event," for purposes of this Consent Decree, is defined as any event, condition or situation arising from causes beyond the control of the Settling Defendants or of any entity controlled by Settling Defendants, including, but not limited to, their contractors and subcontractors, that delays or prevents the performance of any obligation under this Consent Decree despite Settling Defendants' best efforts to fulfill the obligation. The requirement that the Settling Defendants exercise "best efforts to fulfill the obligation" includes using best efforts to anticipate any Force Majeure Event and best efforts to

address the effects of any Force Majeure Event (1) as it is occurring, and (2) following the occurrence of the Force Majeure Event, such that the delay is minimized to the greatest extent practicable. "Force Majeure Event" does not include financial inability to complete the Work or a failure to attain the Performance Standards.

58. If any event, condition or situation occurs or has occurred that may delay the performance of any obligation under this Consent Decree, whether or not caused by a force majeure event, the 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 Chief of the Arkansas/Oklahoma/Texas Branch of the Superfund Division, EPA Region 6, within 48 hours of when Settling Defendants first knew that the event might cause a delay. Within 10 days thereafter, Settling Defendants shall provide in writing to EPA 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; the Settling Defendants' rationale for attributing

such delay to a force majeure event if they intend to assert such a claim; and a statement as to whether, in the opinion of the Settling Defendants, such event may cause or contribute to an endangerment to public health, welfare or the environment. The Settling Defendants shall include with any notice all available documentation supporting their claim that the delay was attributable to a force majeure. Failure to comply with the above requirements shall preclude Settling Defendants from asserting any claim of force majeure for the period of noncompliance for that event. Settling Defendants shall be deemed to have notice of any circumstance of which their contractors or subcontractors had or should have had notice.

59. If EPA agrees that the delay or anticipated delay is attributable to a force majeure event, the time for performance of the obligations under this Consent Decree that are affected by the force majeure event will be extended by EPA for such time as is necessary to complete those obligations. The Parties shall modify the applicable schedules to provide such additional time as may be necessary to allow completion of all commitments affected by the Force Majeure Event. An extension of the time for performance of the obligations affected by the force majeure event shall not, of itself, extend the time for performance of any other obligation,

except to the extent that the completion of other obligations are affected or delayed by the Force Majeure Event. If EPA does not agree that the delay or anticipated delay has been or will be caused by a force majeure event, EPA will notify the Settling Defendants in writing of its decision. If EPA agrees that the delay is attributable to a force majeure event, EPA will notify the Settling Defendants in writing of the length of the extension, if any, for performance of the obligations affected by the force majeure event.

60. If the Settling Defendants elect to invoke the dispute resolution procedures set forth in Section XIX (Dispute Resolution), they shall do so no later than 15 days after receipt of EPA's notice. In any such proceeding, 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 event, 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/or mitigate the effects of the delay, and that Settling Defendants complied with the requirements of Paragraphs 57 and 58, above. If Settling Defendants prevail, the delay at issue shall be deemed not to be a

violation by Settling Defendants of the affected obligations of this Consent Decree identified to EPA and the Court.

XIX. DISPUTE RESOLUTION

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

62. a. Any dispute which arises under or with respect to this Consent Decree shall in the first instance be the subject of good-faith informal negotiations between the parties to the dispute. The period for good-faith informal negotiations shall not exceed 30 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 receives a written Notice of Dispute.

62. b. In the event that the parties cannot resolve a dispute by informal negotiations under Paragraph 62.a., the non-binding mediation provisions of this Paragraph and Paragraph 62.c. may be

invoked by mutual agreement of the parties before invocation of the formal dispute resolution procedures of this Section.

62. c. Upon agreement to invoke the non-binding mediation procedures, all disputes among the parties may be presented to a mutually agreed-upon entity or individual for non-binding mediation. The period for such non-binding mediation shall not exceed 20 days from the conclusion of the informal negotiation period, unless this period is modified by written agreement of the parties to the dispute. The costs of the non-binding mediation services shall be paid on an equal basis between the parties involved in the dispute, unless another allocation for these services is mutually agreed upon by the parties.

63. a. In the event that the parties cannot resolve a dispute by informal negotiations or non-binding mediation under the preceding Paragraph, then the position advanced by EPA shall be considered binding unless, within 20 days after the conclusion of the informal negotiation or non-binding mediation period, Settling Defendants invoke the formal dispute resolution procedures of this Section by serving on the United States pursuant to the notice provisions herein 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 the Settling Defendants. The Statement of Position shall specify the Settling Defendants' position as to whether formal dispute resolution should proceed under paragraph 64 or 65.

b. Within fourteen (14) days after receipt of Settling Defendants' Statement of Position, EPA will serve on 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 specify the EPA's position as to whether formal dispute resolution should proceed under paragraph 64 or 65. Within 14 days after receipt of EPA's Statement of Position, Settling Defendants may submit a Reply.

c. If there is disagreement between EPA and the Settling Defendants as to whether dispute resolution should proceed under Paragraph 64 or 65, the parties to the dispute shall follow the procedures set forth in the paragraph determined by EPA to be applicable. However, if the 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 64 and 65.

64. 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: (1) the adequacy or appropriateness of plans, procedures to implement plans, or any other items requiring approval by EPA under this Consent Decree; and (2) 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 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, or his/her delegate, will issue a final administrative decision resolving the dispute based on the administrative record described in Paragraph 64. a. This decision shall be binding upon the

Settling Defendants, subject only to the right to seek judicial review pursuant to Paragraph 64 .c. and d.

c. Any administrative decision made by EPA pursuant to Paragraph 64. b. shall be reviewable by this Court, provided that a motion for judicial review of the decision is filed by the Settling Defendants with the Court and served on all Parties within 20 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 Settling Defendants' motion.

d. In proceedings on any dispute governed by this Paragraph, Settling Defendants shall have the burden of demonstrating that the decision of the Superfund Division Director, or his/her delegate, 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 64. a.

65. 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 Settling Defendants' Statement of Position submitted pursuant to Paragraph 63, the Director of the Superfund Division, EPA Region 6, or his/her delegate, will issue a final decision resolving the dispute. The Superfund Division Director's or his/her delegate's decision shall be binding on the Settling Defendants unless, within 20 days of receipt of the EPA's final decision, the 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 Settling Defendants' motion.

b. Notwithstanding Paragraph M of Section I (Background) of this Consent Decree, judicial review of any dispute governed by this Paragraph shall be governed by applicable principles of law.

66. The invocation of formal dispute resolution procedures under this Section shall not extend, postpone or affect in any way any obligation of the 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 74. 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 the Settling Defendants do not prevail on the disputed issue, stipulated penalties shall be assessed and paid as provided in Section XX (Stipulated Penalties).

XX. STIPULATED PENALTIES

67. Settling Defendants shall be liable for stipulated penalties in the amounts set forth in Paragraphs 68 and 69 to the United States for failure to comply with the requirements of this Consent Decree specified below, unless excused by events beyond the Settling Defendants' control such as those contemplated under Section XVIII (Force Majeure). "Compliance" by Settling Defendants shall include completion of the activities under this Consent Decree or any work plan or other plan approved under this Consent Decree identified below in accordance with all applicable requirements of law, this Consent Decree, the SOW, and any plans or other documents approved by EPA pursuant to this Consent Decree and

within the specified time schedules established by and approved under this Consent Decree.

68. a. The following stipulated penalties shall be payable per violation per day to the United States for any violation of or non-compliance with the items identified in Subparagraph b:

Penalty Per Violation Per Day	Period of Noncompliance
$1,000	1st through 7th day
$2,000	8th through 14th day
$5,000	15th through 30th day
$10,000	31st day and beyond

b. 1) Failure to submit a timely or adequate Remedial Action Plan; Field Pilot Study Report; Detailed Remedial Design - Plan; Remedial Design Report; Detailed Remedial Construction Plan; Construction Report; Detailed Remedial Operations Work Plan; Remedial Action Report; and Detailed O & M Plan, and any other plans, submittals or deliverables required under the approved Remedial Action Plan;

2) Failure to comply with a material requirement of an approved plan required by the Consent Decree or the approved SOW;

3) Failure to provide access as provided in Section X (ACCESS), paragraph 31 of the Consent Decree;

4) Failure to comply with provisions of paragraph 19 of the Consent Decree (Off-Site Shipment of Waste Material from the Site);

5) Failure to provide required advanced notification of sampling event;

6) Failure to allow split or duplicate samples to be taken by EPA or its authorized representatives;

7) Failure to comply with the notification requirements of Section XVI (EMERGENCY RESPONSE) of this Consent Decree;

8) Failure to provide information as required by Section XXIV (ACCESS TO INFORMATION) of the Consent Decree; and

9) Failure to comply with Section XXV (RETENTION OF RECORDS) of the Consent Decree.

69. For each failure to cease activity when the EPA Project Coordinator or EPA designated Site representative orders either an oral and written or written cessation or halt of activities pursuant to Section XIII of this Consent Decree, the Settling Defendants shall pay a stipulated penalty of $25,000 per day.

70. All penalties shall begin to accrue on the day after the completed performance is due or the day a violation occurred, 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: (1) with respect to a decision by the Director of the Superfund Division, EPA Region 6, under Paragraph 64. b. or 65. a. of Section XIX (Dispute

Resolution), during the period, if any, beginning on the 21st day after the date that 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 (2) with respect to judicial review by this Court of any dispute under Section XIX (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 herein shall prevent the simultaneous accrual of separate penalties for separate violations of this Consent Decree. However, a single act or omission shall not be the basis for more than one type of stipulated penalty. For purposes of calculating stipulated penalties for late submittals, any submittals which are submitted before they are due shall result in credits against late submittals, in the amount of one day's credit for each day the submittal is received prior to the due date. However, no more than 10 days credit will be used for any one submittal and prior notice of applicable credit shall be given to EPA. The credits may also be used to extend deadlines for submitting subsequent plans.

71. Following EPA's determination that Settling Defendants have failed to comply with a requirement of this Consent Decree,

EPA shall provide Settling Defendants with written notification of the same and describe the alleged noncompliance. If EPA seeks to impose penalties, EPA must send the Settling Defendants a written demand for the payment of the penalties. Settling Defendants are entitled to invoke the dispute resolution procedures herein in connection with any stipulated penalties that the EPA seeks to impose.

72. All penalties owed to the United States under this section shall be due and payable within 30 days of the Settling Defendants' receipt from EPA of a demand for payment of the penalties, unless Settling Defendants invoke the Dispute Resolution procedures under Section XIX (Dispute Resolution). The Settling Defendants shall make all payments required by this Section in the form of a certified check or checks made payable to "EPA Hazardous Substance Superfund," and referencing CERCLA Site/Spill Number 81 and DOJ Case Number 90-11-3-709. The Settling Defendants shall forward the certified check(s) to:

Regional Hearing Clerk (6c)
U.S. Environmental Protection Agency
Region 6
P. O. Box 360582M
Pittsburgh, PA 15251

and shall send copies of the check(s) to the United States as specified in Section XXVI (Notices and Submissions) and to:

Ms. Anne Foster
U.S. Environmental Protection Agency
Region 6
1445 Ross Avenue
Dallas, Texas 75202.

73. The payment of penalties shall not alter in any way Settling Defendants' obligation to complete the performance of the Work required under this Consent Decree.

74. Penalties shall continue to accrue as provided in Paragraph 70 during any dispute resolution period, but need not be paid until the following:

a. If the dispute is resolved by agreement or by a decision of EPA that is not appealed to this Court, accrued penalties determined to be owing shall be paid to EPA within 20 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, 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 Subparagraph c below;

c. If the District Court's decision is appealed by any Party, Settling Defendants shall pay all accrued penalties determined by the District Court to be owing 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 Settling Defendants to the extent that they prevail.

75. a. If Settling Defendants fail to pay stipulated penalties when due the United States may institute proceedings to collect the penalties, as well as interest. Settling Defendants shall pay Interest on the unpaid balance, which shall begin to accrue on the date of demand made pursuant to Paragraph 72.

b. Nothing in this Consent Decree shall be construed as prohibiting, altering, or in any way limiting the ability of the United States to seek any other remedies or sanctions available by virtue of Settling Defendants' violation of this 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. 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 herein, except in the case of a willful violation of the Consent Decree.

76. 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.

XXI. COVENANTS NOT TO SUE BY PLAINTIFF

77. In consideration of the actions that will be performed by the Settling Defendants under the terms of the Consent Decree, and except as specifically provided in Paragraph 81 of this Section, the United States covenants not to sue or to take administrative action against Settling Defendants pursuant to Sections 106 and 107(a) of CERCLA and Section 7003 of RCRA relating to the Site. These covenants not to sue shall take effect upon Certification of Completion of Remedial Action by EPA pursuant to Paragraph 50. b. of Section XV (Certification of Completion). These covenants not to sue are conditioned upon the complete and satisfactory performance by Settling Defendants of their obligations under this Consent Decree. These covenants not to sue extend only to the Settling Defendants and do not extend to any other person.

78. 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 Settling Defendants (1) to perform further response actions relating to the Site or (2) to reimburse the United States for additional costs of response if, 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 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.

79. 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 Settling Defendants (1) to perform further response actions relating to the Site or (2) to reimburse the United States for additional costs of response if, 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 these previously unknown conditions or this information together with other relevant information indicate that the Remedial Action not protective of human health or the environment.

80. For purposes of Paragraph 78, the information and the conditions known to EPA shall include only that information and those conditions set forth in the Record of Decision for the Site and the administrative record supporting the Record of Decision. For purposes of Paragraph 79, the information and the conditions known to EPA shall include only that information and those conditions set forth in the Record of Decision, the administrative record supporting the Record of Decision, and any information received by EPA pursuant to the requirements of this Consent Decree prior to Certification of Completion of the Remedial Action.

81. General reservations of rights. The covenants not to sue set forth above do not pertain to any matters other than those expressly specified in Paragraph 77. The United States reserves, and this Consent Decree is without prejudice to, all rights against

Settling Defendants with respect to all other matters, including but not limited to, the following:

(1) claims based on a failure by Settling Defendants to meet a requirement of this Consent Decree;

(2) liability arising from the past, present, or future disposal, release, or threat of release of Waste Materials outside of the Site;

(3) liability for future disposal of Waste Material at the Site, other than as provided in the ROD, the Work, or otherwise ordered by EPA;

(4) liability for damages for injury to, destruction of, or loss of natural resources, and for the costs of any natural resource damage assessments;

(5) criminal liability; and

(6) liability for violations of federal or state law which occur during or after implementation of the Remedial Action.

82. Work Takeover In the event EPA determines that Settling Defendants have ceased implementation of any portion of the Work, are seriously or repeatedly deficient or late in their performance of the Work, or are implementing the Work in a manner which may cause an endangerment to human health or the environment, EPA may

assume the performance of all or any portions of the Work as EPA determines necessary. Settling Defendants may invoke the procedures set forth in Section XIX (Dispute Resolution), Paragraph 64, to dispute EPA's determination that takeover of the Work is warranted under this Paragraph. Costs incurred by the United States in performing the Work pursuant to this Paragraph shall be considered Future Response Costs that Settling Defendants shall pay pursuant to the procedures set forth in paragraph 72.

83. Subject to any limitations set forth herein, the United States retains all authority and reserves all rights to take any and all response actions authorized by law.

XXII. COVENANTS BY SETTLING DEFENDANTS

84. Covenant Not to Sue. Subject to the reservations in Paragraph 86, Settling Defendants hereby covenant not to sue and agree not to assert any claims or causes of action against the United States with respect to the Site, past response actions, and Past and Future Response Costs as defined herein or 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, 113 or any other provision of law;

b. any claims against the United States, including any department, agency or instrumentality of the United States under CERCLA Sections 107 or 113 related to the Site, or

c. any claims arising out of response activities at the Site, including claims based on EPA's selection of response actions, oversight of response activities or approval of plans for such activities.

85. a. The 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, 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 while acting within the scope of his 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, any such claim shall not include a claim for any damages caused, in whole or in part, by the act or omission of any person, including any contractor, who is not a federal employee as that term is defined in 28 U.S.C. § 2671; nor shall any such

claim include a claim based on EPA's selection of response actions, or the oversight or approval of the Settling Defendants' plans or activities. The foregoing applies only to claims which are brought pursuant to any statute other than CERCLA and for which the waiver of sovereign immunity is found in a statute other than CERCLA.

85. b. To the extent that the United States brings a claim or cause of action against Settling Defendants, Settling Defendants reserve the right to fully defend such action, and the right to initiate dispute resolution procedure(s) available under the provisions of this consent decree.

86. 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). The Settling Defendants also reserve all rights, defenses, claims, causes of action or counterclaims which they may have at law or in equity to defend against any person or other entity not a signatory to the Consent Decree for any liability such person or entity may allege arising out of or relating to the Site.

XXIII. EFFECT OF SETTLEMENT; CONTRIBUTION PROTECTION

87. 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. Each of the Parties expressly

reserves any and all rights (including, but not limited to, any right to contribution), 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.

88. With regard to claims for contribution brought by any person or entity against Settling Defendants for matters addressed in this Consent Decree, the Parties hereto agree that the Settling Defendants are entitled to complete and full protection from any and all such contribution actions or claims as is provided by CERCLA Section 113 (f) (2), 42 U.S.C. § 9613(f) (2), and 122(h)(4), 42 U.S.C. 9622(h)(4).

89. The scope of matters addressed in this Consent Decree are the "Covered Matters." The "Covered Matters" includes, except as detailed below and without any other limitation: (1) the entire Site and matters related to the Site (including but not limited to all surface water, ground water, drinking water supply, land surface strata or ambient air thereof); (2) any and all Waste Material, hazardous substances and other regulated materials ever actually or allegedly present on, released from or related to the Site at any time; and (3) any and all cleanup or other costs ever incurred and/or to be incurred by an entity relating to the Site.

As to the United States and the State of Texas, "Covered Matters" does not include the reservations in paragraph 81, General Reservations of Rights.

90. The United States recognizes that: (1) the Settling Defendants have not been adjudicated liable relating to the Site; and (2) the Settling Defendants may be entitled to bring a cost recovery action under Section 107(a)(4)(B) of CERCLA, 42 U.S.C. § 9607(a)(4)(B), or a contribution action, except as against the United States. The United States recognizes that: (1) the basis for this Consent Decree is to expedite cleanup, protect human health and the environment and avoid the expense and delay of protracted litigation; (2) this Consent Decree is not based in any way on an agreement or a belief or an allegation that the harm at the Site is divisible; and (3) the Settling Defendants have not been determined or found to be responsible for contamination in those areas which the Settling Defendants have agreed to perform remedial activities under this Consent Decree.

91. For a period of 24 months from the date of entry of this Consent Decree, the United States agrees within its sole discretion to:

a) expressly exclude from the scope of matters addressed and from contribution protection, in any future settlements with other

PRPs relating to the Site, except for de minimis or de micromis PRPs, (1) all areas of the Site which the Settling Defendants remediate, including any cleanup costs incurred and/or to be incurred by Settling Defendants relating to such areas; (2) any Past Response Costs the Settling Defendants paid to the United States; and (3) any costs Settling Defendants may have incurred in conducting its own investigations or work at the Site (such as the SRI/FSS); or

b) share with Settling Defendants in any future settlements with other PRPs relating to the Site, costs recovered on a 50/50 percentage basis. Settling Defendants agree to share with the United States in any future settlements with other PRPs relating to the Site, costs recovered on a 50/50 basis. However, if the Settling Defendants file a judicial action ("action") against a PRP within six (6) months from the date of entry of this Consent Decree and the United States does not bring such an action within that six (6) month period, the Settling Defendants shall receive 60 percent and the United States shall receive 40 percent of any costs recovered. If however, the United States files an action against a PRP within six (6) months from the date of entry of this Consent Decree and the Settling Defendants do not bring such an action within that six (6) month period, the United States shall receive

60 percent and the Settling Defendants shall receive 40 percent of any costs recovered. These cost sharing provisions shall be further extended until any action for costs initiated against another PRP regarding the Site, within the six (6) month period, is concluded by judgment, including appeals or settlement.

c) Amounts recovered by the Settling Defendants pursuant to Subparagraph b) of this Paragraph shall not exceed the sum of $10,450,000. If and once Settling Defendants have recovered $10,450,000 in accordance with Subparagraph b) of this Paragraph, Settling Defendants agree that, unless the United States agrees otherwise in writing, Settling Defendants shall not institute, maintain or continue any litigation against any person of any claims for contribution arising out of the United States' claims against the Settling Defendants, including but not limited to Settling Defendants' claims based on payments made by Settling Defendants pursuant to this Consent Decree; on any expenditures made by the Settling Defendants in performing actions required by this Consent Decree; or on any expenditures made by the Settling Defendants to conduct investigation and litigation of such contribution claims.

d) The United States and Settling Defendants each will notify the other of any negotiations commenced and give advance notice of

any proposed settlements, with any person with respect to the Site. The Settling Defendants shall be allowed to have meaningful input and may be allowed, within the United States sole discretion, to participate in discussions and negotiations between the United States and other PRPs regarding the Site. This Subparagraph will remain in effect after Settling Defendants have recovered the amount set forth in Subparagraph c) of this Paragraph, and the United States may, upon its unreviewable discretion, agree to share further recoveries of response costs with the Settling Defendants.

e) Nothing in this Paragraph shall be construed as an agreement on the part of the United States to settle with any person or for any particular terms. Subject to the provisions of this paragraph, nothing in this Paragraph shall be construed to prohibit the United States from settling with any person at any time on any terms the United States deems appropriate. The United States shall retain its unreviewable discretion to accept or reject settlement terms offered by any person at any time.

92. The Settling Defendants agree that with respect to any suit or claim for contribution brought by them for matters related to this Consent Decree they will promptly provide the United States with a copy of the complaint after it has been served.

93. The Settling Defendants also agree that with respect to any suit or claim for contribution brought against them for matters related to this Consent Decree they will notify in writing the United States within 30 days of Settling Defendants' receipt of service of the complaint on them. In addition, Settling Defendants shall notify the United States within 10 days of service or receipt of any Motion for Summary Judgment and within 10 days of receipt of any order from a court setting a case for trial.

94. In any subsequent administrative or judicial proceeding initiated by the United States for injunctive relief, recovery of response costs, or other appropriate relief relating to the Site, Settling Defendants 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 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 XXI (Covenants Not to Sue by Plaintiffs).

XXIV. ACCESS TO INFORMATION

95. Settling Defendants shall provide to EPA, upon request, copies of all documents and information 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 related to the Work. Settling Defendants shall also make available to EPA, for purposes of investigation, information gathering, or testimony, their employees, agents, or representatives with knowledge of relevant facts concerning the performance of the Work at reasonable times and locations, subject to Settling Defendants' ability to control the availability of such persons.

96. a. Settling Defendants may assert business confidentiality claims covering part or all of the documents or information submitted to Plaintiff 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). Documents or information 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 documents or information when they are submitted to EPA, or if EPA has notified Settling Defendants that the documents or information are not

confidential under the standards of Section 104(e)(7) of CERCLA, the public may be given access to such documents or information without further notice to Settling Defendants.

b. The Settling Defendants may assert that certain documents, records and other information are privileged under the attorney-client privilege or any other privilege recognized by federal law. If the Settling Defendants assert such a privilege in lieu of providing documents, they shall provide the Plaintiff with the following: (1) the title of the document, record, or information; (2) the date of the document, record, or information; (3) the name and title of the author of the document, record, or information; (4) the name and title of each addressee and recipient; (5) a description of the contents of the document, record, or information; and (6) the privilege asserted by Settling Defendants. However, no documents, reports or other information created or generated pursuant to the requirements of the Consent Decree shall be withheld on the grounds that they are privileged.

97. No claim of confidentiality to the United States 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 data included in

documents or information evidencing conditions at or around the Site.

XXV. RETENTION OF RECORDS

98. Until 5 years after the Settling Defendants' receipt of EPA's notification pursuant to paragraph 50. b. of Section XV (Certification of Completion of the Work), each Settling Defendant shall preserve and retain all records and documents 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 or liability of any person for response actions conducted and to be conducted at the Site, regardless of any corporate retention policy to the contrary. Until 5 years after the Settling Defendants' receipt of EPA's notification pursuant to Paragraph 50. b. of Section XV (Certification of Completion), Settling Defendants shall also instruct their contractors and agents to preserve all documents, records, and information of whatever kind, nature or description relating to the performance of the Work.

99. At the conclusion of this document retention period, Settling Defendants shall notify the United States at least 90 days prior to the destruction of any such records or documents, and, upon request by the United States, Settling Defendants shall deliver any such records or documents to EPA. The Settling

Defendants may assert that certain documents, records and other information are privileged under the attorney-client privilege or any other privilege recognized by federal law. If the Settling Defendants assert such a privilege, they shall provide the Plaintiff with the following: (1) the title of the document, record, or information; (2) the date of the document, record, or information; (3) the name and title of the author of the document, record, or information; (4) the name and title of each addressee and recipient; (5) a description of the subject of the document, record, or information; and (6) the privilege asserted by Settling Defendants. However, no documents, reports or other information created or generated pursuant to the requirements of the Consent Decree shall be withheld on the grounds that they are privileged.

100. Each Settling Defendant hereby 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, documents or other information relating to its potential liability regarding the Site since 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 Section 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.

XXVI. NOTICES AND SUBMISSIONS

101. 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 herein shall constitute complete satisfaction of any written notice requirement of the Consent Decree with respect to the United States, EPA, and the Settling Defendants, respectively.

As to the United States:

Chief, Environmental Enforcement Section
Environment and Natural Resources Division
U.S. Department of Justice
P.O. Box 7611
Ben Franklin Station
Washington, D.C. 20044
Re: DJ# 90-11-3-709

and

Director, Superfund Division
United States Environmental Protection Agency
Region 6
1445 Ross Avenue
Dallas, Texas 75202

As to EPA:

Chris Villarreal
EPA Project Coordinator, Turtle Bayou Site
United States Environmental Protection Agency
Region 6
1445 Ross Avenue
Dallas, Texas 75202

As to the Settling Defendants:

Mr. Richard L. Sloan
ARCO Chemical Company
15010 FM 2100, Suite 200
Crosby, Texas 77532

Mr. Harris Rosen
ARCO Chemical Company
3801 West Chester Pike
Newtown Square, Pennsylvania 19073

XXVII. EFFECTIVE DATE

102. The effective date of this Consent Decree shall be the date upon which this Consent Decree is entered by the Court, except as otherwise provided herein.

103. For time periods anywhere in this Consent Decree that begin on "entry" of the Consent Decree, if the Settling Defendants do not receive notice of the entry within 3 days of the entry, the

Government will grant a proportionate time extension for complying with any requirements that are initiated by entry of the Consent Decree.

XXVIII. PROVISIONS OF UAO

104. Except as otherwise provided in Paragraph 105, the provisions of the UAO that address obligations of the Settling Defendants are superseded by this Consent Decree after the date of entry of this Consent Decree. After the date of entry of this Consent Decree, the obligations of the Settling Defendants required by the UAO shall be satisfied under the terms and conditions set forth herein.

105. Nothing in this Consent Decree, nor the fact that it is entered into, shall release or affect the obligations of any other party to the UAO.

XXIX. RETENTION OF JURISDICTION

106. This Court retains jurisdiction over both the subject matter of this Consent Decree and the 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 XIX (Dispute Resolution) hereof.

XXX. APPENDICES

107. 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 map and legal description of the Site, including the Main Waste Area, the Office Trailer Area, the Power Easement Area and the Office Trailer Area.

XXXI. COMMUNITY RELATIONS

108. Settling Defendants will submit for EPA approval a Community Relations Plan to the EPA within 45 days after the Consent Decree has been entered with the Court. EPA shall review and approve the plan as agreed between the parties. Upon receipt of EPA's approval, Settling Defendants will undertake the Community Relations Plan as mutually agreed by the Parties.

XXXII. MODIFICATION

109. Schedules specified in this Consent Decree for completion of the Work may be modified by agreement of the Project Coordinators. All such modifications shall be made in writing.

110. Except as provided in Paragraph 16 and refinement notice provisions of the SOW, no material modifications shall be made to the SOW without written notification to and written approval of the United States, Settling Defendants, and the Court. Prior to providing its approval to any modification, the United States will provide the State with a reasonable opportunity to review and comment on the proposed modification. Modifications to the SOW that do not materially alter that document may be made by written agreement between the Project Coordinators.

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

XXXIII. LODGING AND OPPORTUNITY FOR PUBLIC COMMENT

112. This Consent Decree shall be lodged with the Court for a period of not less than thirty (30) days for public notice and comment in accordance with Section 122 (d) (2) of CERCLA, 42 U.S.C. § 9622(d) (2), and 28 C.F.R. § 50.7. The United States reserves the right to withdraw or withhold its 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.

113. 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.

XXXIV. SIGNATORIES/SERVICE

114. Each undersigned representative of a Settling Defendant to this Consent Decree and the Assistant Attorney General for Environment and Natural Resources of the Department of Justice 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.

115. Each Settling Defendant hereby 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 the Settling Defendants in writing that it no longer supports entry of the Consent Decree.

116. 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 hereby 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.

SO ORDERED THIS 8th DAY OF December, 1998.

United States District Judge

THE UNDERSIGNED PARTIES enter into this Consent Decree in the matter of United States v. Sadeane Lang, Executrix, Case No. 1:94CV57 relating to the Turtle Bayou Superfund Site.

FOR THE UNITED STATES OF AMERICA

Date: 5/1/98

LOIS J. SCHIFFER
Assistant Attorney General
Environment and Natural Resources Division
U.S. Department of Justice

Date: 5/6/98

PATRICK M. CASEY
SEAN K. CARMAN
Environmental Enforcement Section
Environment and Natural Resources Division
U.S. Department of Justice
Ben Franklin Station
P.O. Box 7611
Washington, D.C. 20044

Date: 10-27-98

O. Kenneth Dodd
Assistant United States Attorney
Eastern District of Texas
350 Magnolia, Suite 150
Beaumont, Texas 77701

Date: 10/20/93

for MYRON O. KNUDSON, P.E.
Director
Superfund Division
U.S. Environmental Protection
Agency, Region 6
1445 Ross Avenue
Dallas, Texas 75202

Date: 10/20/93

ANNE FOSTER
Staff Attorney
Superfund Division
U.S. Environmental Protection
Agency, Region 6
1445 Ross Avenue
Dallas, Texas 75202

THE UNDERSIGNED PARTY enters into this Consent Decree in the matter of United States v. Sadeane Lang, Executrix, Case No. 1:94CV57 relating to the Turtle Bayou Superfund Site.

FOR ARCO CHEMICAL COMPANY

Date: October 16, 1998

MICHAEL CONNELLY, ESQ.
Mayor, Day, Caldwell & Keeton
700 Louisiana, Suite 1900
Houston, Texas 77002

Date: 9/29/98

HARRIS ROSEN, ESQ.
ARCO Chemical Company
3801 West Chester Pike
Newtown Square, Pennsylvania 19073

Date: 9/29/98

MORRIS GELB
ARCO Chemical Company
3801 West Chester Pike
Newtown Square, Pennsylvania 19073

Agent Authorized to Accept Service on Behalf of Above-signed Party:

Name: Harris Rosen, Esq.
Title: ARCO Chemical Company
Address: 3801 West Chester Pike
Newtown Square, Pennsylvania 19073
Tel. Number: (610) 359-6871

THE UNDERSIGNED PARTY enters into this Consent Decree in the matter of United States v. Sadeane Lang, Executrix, Case No. 1:94CV57 relating to Turtle Bayou Superfund Site.

FOR ATLANTIC RICHFIELD COMPANY

Date: October 16, 1998

MICHAEL CONNELLY, ESQ.
Mayor, Day, Caldwell & Keaton
700 Louisiana, Suite 1900
Houston, Texas 77002

Date: Oct. 14, 1998

JESS WOMACK, ESQ.
ARCO
444 South Flower Street, ALF-3577
Los Angeles, California 90071

Date: Oct 14 1998

BRUCE L. NIEMEYER, PRESIDENT
ARCO Environmental Remediation, LLC
(AERL)
As Assignee of ARCO
444 South Flower Street
Los Angeles, California 90071

Agent Authorized to Accept Service on Behalf of Above-signed Party:

Name:	JESS WOMACK, ESQ.
Title:	ARCO
Address:	444 South Flower Street, ALF-3577 Los Angeles, California 90071
Tel. Number:	(213) 486-8780

EXHIBIT D

UNITED STATES DISTRICT COURT **EASTERN DISTRICT OF TEXAS**

LYONDELL CHEMICAL COMPANY, *et al.*,	§	
	§	
Plaintiffs,	§	
	§	
versus	§	CIVIL ACTION NO. 1:01-CV-890
	§	
ALBEMARLE CORPORATION, *et al.*,	§	(Consolidated with 1:02-CV-003)
	§	(Consolidated with 1:03-CV-225)
Defendants.	§	

AMENDED FINDINGS OF FACT AND CONCLUSIONS OF LAW

I. The Court's Findings and Analysis

Pursuant to Rule 52(a) of the Federal Rules of Civil Procedure and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 ("CERCLA"), 42 U.S.C. §§ 9601-9675, the court, having assessed the credibility of the witnesses, visited the Petro-Chemical Systems, Inc., site (the "Turtle Bayou site" or the "Site"), and reviewed the documentary evidence, the parties' post-trial submissions, and the transcripts of the liability proceedings ("Phase I") held March 21 through April 21, 2005, and February 13 through 21, 2006, and the proceedings concerning allocation ("Phase II") conducted from March 21 through April 18, May 1 through 3, and on June 8, 2007, makes the following findings of fact and conclusions of law concerning allocation in this bifurcated trial. The court certifies that it is familiar with the record of the proceedings held before the Honorable Howell Cobb ("Judge Cobb") prior to his death and determines that the proceedings in this case may be completed without prejudice to the parties. *See* FED. R. CIV. P. 63.

A. Findings of Fact

Procedural History and Methodology

1. The court previously entered findings of fact and conclusions of law in this case on April 17, 2006, and amended the findings of fact on October 20, 2006, and April 2, 2007. The court incorporates by reference its original Phase I Findings of Fact and Conclusions of Law. To the extent that any conflict exists with prior findings, the findings contained herein shall control. Certain facts contained within previous findings are reiterated to provide context, however, and mere variations in language or diction should not be interpreted to connote an amendment.

2. The court found Bayer Cropscience, Inc., ("Bayer"), Chevron USA, Inc. ("Chevron"), ExxonMobil Corporation ("Exxon"), The Lubrizol Corporation ("Lubrizol"), Occidental Chemical Corporation ("Occidental"), and PPG Industries, Inc. ("PPG"), to be potentially responsible parties and liable under CERCLA. Conversely, the court determined that Albemarle Corporation ("Albemarle"), Ethyl Corporation ("Ethyl"), GATX Corporation ("GATX"), and J. M. Huber Corporation ("Huber") bore no responsibility for the disposal of hazardous substances at the Turtle Bayou site. Plaintiffs Lyondell Chemical Company ("Lyondell") and Atlantic Richfield Company ("ARCO") (collectively, "Plaintiffs") and Third-Party Plaintiff EPEC Polymers have stipulated to their liability regarding the Turtle Bayou site.

3. Numerous parties have reached settlements with Plaintiffs and Third-Party Plaintiffs El Paso Tennessee Pipeline Company, EPEC Corporation, EPEC Polymers, and Tennessee Gas Pipeline Company (collectively, "El Paso") regarding any potential liability. Although these parties are no longer participating in this lawsuit, part of the court's task in

allocating liability includes determining what equitable percentage should be assigned to these settled parties, as well as entities that were never made part of this action, but whose wastes nevertheless contributed to response costs at the Turtle Bayou site.

4. Following the conclusion of Phase I of the trial, the court permitted the remaining parties to conduct additional discovery limited in scope to events occurring subsequent to the original close of discovery on November 5, 2004, as well as certain other matters related specifically to allocation.

5. On July 31, 2006, the court appointed Dr. Charles Newell ("Dr. Newell") to serve as an independent expert and prepare a comprehensive report addressing ten distinct questions concerning allocation. Dr. Newell subsequently offered testimony from May 1 through 3 and on June 8, 2007, and his reports were admitted into evidence for the purposes of convenience and judicial economy. Each party received multiple opportunities to cross-examine Dr. Newell regarding all matters addressed in his reports.

6. Numerous other experts sponsored by the parties testified during Phase II of the proceedings. While each expert offered useful analysis, the court is not wholly persuaded by the opinions of any single expert, including Dr. Newell, for reasons elaborated more fully below.

7. On September 22, 2006, the Environmental Protection Agency ("EPA") executed a Record of Decision ("ROD") Amendment. The 2006 ROD Amendment provided, *inter alia*, a technical impracticability waiver for cleanup of specified contaminants in the groundwater at certain portions of the Site, expanded the scope of the remediation to include County Road 126 West Area ("Far West Road Area"), identified MW-109 as a target for further

analysis, changed the soil and groundwater cleanup criteria for certain chemicals, altered the remedies for the Bayou Disposal Area and the Main Waste Area's onsite soil vault, and created contingency remedies to address the possibility of groundwater plume expansion.

8. The 2006 ROD Amendment added cleanup criteria for vinyl chloride, 1,2-dichloroethane ("DCA"), cis-1,2-dichloroethylene, trans-1,2-dichloroethylene, 1,2-dichloropropane, 1,1,2-trichloroethane ("TCA"), trichloroethylene, 1,1-dichloroethylene, styrene, and toluene, based on the Federal Drinking Water Standards, also known as Maximum Contaminant Levels ("MCL").

9. The 2006 ROD Amendment also noted the presence of elevated concentrations of acetone, 1,1-dichloroethane, and tert butyl alcohol ("TBA"). Although no federal cleanup standards currently exist for these chemicals, the EPA recognized that the Texas Commission on Environmental Quality ("TCEQ") recommended certain cleanup values. These TCEQ standards were included in Table 17 of the 2006 ROD Amendment, entitled "Ground Water Protection Standards."

10. The technical impracticability waiver granted by the EPA excuses Plaintiffs and El Paso from actively remediating portions of the Site until contaminants in the groundwater fall below the relevant MCLs. They will, however, be required to expend additional funds to monitor the groundwater plumes to ensure that the contamination is contained within a defined geographical area. If the groundwater plumes expand or migrate beyond defined geographical specifications, Plaintiffs and/or El Paso must address the problem by using contingent remedial measures.

11. Plaintiffs have remediated specific areas of the Turtle Bayou site pursuant to the 1998 Consent Decree. As of December 31, 2006, Plaintiffs had paid $29,540,529.00 in accordance with 42 U.S.C. § 9607(a)(4)(B). These costs are necessary to the response Site cleanup and are consistent with the National Contingency Plan. Additionally, Plaintiffs will expend additional funds monitoring the Site as mandated by the 2006 ROD Amendment. Should the groundwater plumes at the Site expand past defined boundaries, Plaintiffs may incur additional expenses related to active remediation.

12. The RD/RA Consent Decree between El Paso and the United States ("El Paso Consent Decree") was lodged with the court on March 20, 2007, and signed by the court on August 20, 2007.

13. As of August 26, 2006, El Paso had expended $3,701,043.65 in accordance with § 9607(a)(4)(B) as part of its remedial responsibilities at the Turtle Bayou site. Additionally, El Paso contributed $150,000.00 toward the government's response costs on an earlier, separate occasion. These expenditures were necessary to the response and are consistent with the National Contingency Plan. El Paso will also incur additional costs monitoring the Site. Should the groundwater plumes expand past the delineated boundaries, El Paso will expend additional funds remediating the Site.

14. Lubrizol has contributed $150,000.00 toward the United States' response costs pursuant to § 9607(a)(4)(A). This expenditure was necessary to the response and is consistent with the National Contingency Plan.

15. A substantial amount of additional evidence was presented to the court during Phase II of trial as part of the parties' efforts to reconstruct the Turtle Bayou site's history.

In their arguments, the parties, at times, have tended to treat the evidentiary problems presented in this case as a Rubik's cube, which, though inscrutable at first, eventually yields to the logic and perseverance of a determined individual. The court believes this case is more akin to an antique jigsaw puzzle taken from a musty closet, many pieces of which are missing or deformed. Despite the massive quantities of information that are available, much of the Site's history as a waste disposal location remains obscured by the passage of time and will likely never be fully understood. As the court previously indicated, each particular type of evidence suffers from certain defects, a truth which is unchanged by the parties' more recent submissions. In combination, however, the available evidence provides an adequate basis from which the court may equitably allocate costs.

16. During the Phase II proceedings, Defendants, via the expert testimony of Robert Zoch ("Zoch"), emphasized the regulatory history of the Turtle Bayou site and Texas waste disposal law, generally. Defendants urge the court to draw certain inferences based on this historical information. Though the regulatory history is useful in providing context, much of the evidence is equally susceptible to different, conflicting interpretations. In essence, the court is unpersuaded that the regulatory history can be used as some kind of unified theory to elucidate the behavior of the relevant actors and make sense of the waste haulers' sometimes opaque behavior.

17. The individuals and entities who should, in fairness, bear primary responsibility for the costs of remediation are unable or unavailable to satisfy a judgment. The carriers, French Limited and French Limited of Houston, Inc. (collectively, "French"), and the various entities owned by C. P. Joiner ("Mr. Joiner"), including Liberty Waste Disposal and Joiner, Inc. (collectively, "Joiner"), are defunct businesses without adequate resources to

remediate the Turtle Bayou site. The owners and site operators, Wallace W. Smith ("Smith") and Donald R. Lang ("Lang"), are deceased. Smith was sued by the United States and actively participated in *United States v. Lang*, Civ. A. No. 1:94-CV-57, at the conclusion of which the United States voluntarily dismissed its case against him. Smith was served in the instant matter, but he never made a formal appearance. As part of a consent decree in *Lang*, Sadeane Lang, Executrix of the Estate of Donald Lang, agreed, without admitting liability, to pay the United States $250,000.00 toward response costs at the Turtle Bayou site. In any event, no party argues that any of these entities or individuals is available to pay a share of the costs to be allocated in the instant proceedings. Thus, the court must apportion liability among parties that neither selected the Turtle Bayou site nor possessed any apparent contemporaneous knowledge of its use.

18. The wide variances in the testimony of Plaintiffs and El Paso's allocation experts, Dr. Bernhard Metzger ("Dr. Metzger") and Dr. Robert Morrison ("Dr. Morrison"), and Defendants' expert, Zoch, when interpreting the same basic facts, illustrate the difficulties facing the court. Each expert was forced to make subjective, oftentimes questionable assumptions in an attempt to formulate a complete theory as to the Site's usage.

19. In an effort to eliminate uncertainty and create more robust allocation systems, Dr. Metzger and Dr. Newell utilized multiple lines of evidence to derive "inputs" or "data points" reflecting possible disposal volumes to calculate the most probable total volume of disposal for each facility linked to the Turtle Bayou site. Several parties are associated with multiple facilities.

20. Dr. Metzger evaluated various lines of evidence to calculate the disposal of waste attributable to each party. Although he did not use the same number of data points or lines

of evidence for each party, Dr. Metzger endeavored to "bracket a range of reasonable volume estimates, between a reasonable minimum and a reasonable maximum, and if possible, with data points in between." Dr. Metzger opined that usage of multiple data points from various different lines of evidence was a necessary part of uncertainty analysis to generate "more confidence" and reach more "robust" outcomes. He attempted to avoid relying upon any line of evidence that he considered too suspect. After selecting the individual data points for volume, Dr. Metzger calculated a statistical average to arrive at a specific volume for each facility.

21. Dr. Newell, likewise, conducted a statistical uncertainty analysis by selecting multiple data points. Typically, he identified a "maximum," "minimum," and "mode" volume for each party (though sometimes he did not use a mode where he could not ascertain a sufficient number of reliable data points) based on lines of evidence that he felt possessed at least some measure of reliability. Dr. Newell apparently was not sufficiently confident in any one data point to rely upon it exclusively. After selecting the data points, he inserted the information into a computer spread sheet program with an attachment designed to perform a "Monte Carlo" analysis. Monte Carlo analysis is a non-deterministic, stochastic, statistical method that can be employed to estimate probability distributions of potential outcomes by allowing for random variations in one or more inputs. Essentially, Dr. Newell's computer program "rolled the dice" thousands of times within the confines of a statistical universe defined by the data points selected by Dr. Newell, thus creating a "percentage distribution of disposal volumes." For his recommended allocation, Dr. Newell chose to use the median of the statistical range for each party.

22. Dr. Morrison (for the most part) and Zoch eschewed uncertainty analysis, electing instead to attempt to fashion solitary estimates of each party's usage of the Site. Dr. Morrison accounted for the significant evidentiary problems present in this case by recommending a "tiered" allocation structure, in which he classified parties within broad ranges of disposal volumes. Zoch professed his belief that the task of estimating volume in this case is not as perplexing as the other experts concluded. The court was unimpressed by Dr. Morrison's and Zock's attempts to pinpoint precise disposal volumes. While Dr. Morrison's tiering system arguably possesses some utility, the court believes that it paints with too broad a brush because it does not recognize meaningful differences in culpability between the different parties at levels not captured by the three tiers. While the court could possibly increase the number of tiers to render this system more meaningful, such an approach would be cumbersome. Meanwhile, Zoch's numbers were inordinately arbitrary—all too often, Zoch seemed to accept certain numbers or lines of evidence without regard to the presence of credible, conflicting information. Additionally, the court is skeptical about Zoch's eleventh-hour decision to change his analysis relating to El Paso, yielding severely detrimental results for Third-Party Plaintiffs in his final recommended allocation.

23. The court finds that Dr. Newell's uncertainty analysis methodology is superior for the volumetric part of allocation. In light of the conflicting, ambiguous, and sparse nature of the existing evidence, uncertainty analysis is helpful in attempting to determine probable disposal volumes. The court does not believe that individual disposal estimates are sufficiently reliable. The court finds that certain of Dr. Newell's data points, however, are not founded upon optimal data. Moreover, Dr. Newell chose not to include several lines of evidence that the court

believes are sufficiently reliable and probative for use in a Monte Carlo analysis, while utilizing other data points that the court finds questionable. The court's divergence from Dr. Newell's estimates stems largely from its greater willingness to consider the testimony and trip tickets rather than only the more technical documentary evidence that Dr. Newell, an engineer, favored.

24. Thus, the court finds that additional or different data points should have been used for certain parties. Therefore, the court chooses to employ Monte Carlo analysis after selecting input numbers that, in the court's opinion, better reflect the range of possibility for disposal volumes at the Turtle Bayou site. In selecting these data points, the court has reviewed the opinions of the expert witnesses as well as the evidentiary record.

25. The court adopts Dr. Newell's waste chemistry methodology. While Dr. Newell's remedy driver analysis may not, as Plaintiffs and El Paso point out, capture 100% of the risk, it nevertheless furnishes the court with practicable, scientifically sound means to allocate responsibility based on relative toxicity. Unlike Dr. Newell, however, the court will not attempt to discern the individual volumes of specific waste streams in performing its calculations. Rather, the constituents of specific waste streams that are included in the court's analysis will be tied to the aggregate volume of the relevant facility. Pragmatic concerns require the sacrifice of some superficial precision, which the court does not believe the evidence is sufficiently comprehensive to support. In reaching this decision, the court notes the difficulty (and sometimes futility) that Dr. Newell and the other experts experienced in their endeavors to quantify many individual waste streams (for example, the Sinclair-Koppers facility's Tank M-223 waste). In addition, the court is concerned that the French Ledger, probably the most reliable and accurate source of information

regarding total waste volume for many of the parties, would be rendered useless for most of the court's calculations if the court adopted this approach.

26. Moreover, even Dr. Newell recognized that some level of abstraction is necessary, as he eschewed attempting to quantify the percentage composition of each waste stream when performing his allocation because of the paucity of evidence concerning concentration, in favor of a "thumbs up or thumbs down" approach. In the end, justice is better served by considering the total volume of waste contributed by each party and the types of chemicals that the company may have disposed at the Turtle Bayou site. Specific objections will be addressed below.

27. Consistent with Dr. Newell's analysis, the court finds that the remedy driver chemicals in this case are benzene, tert butyl alcohol, DCA, naphthalene, vinyl chloride, TCA, toluene, and styrene. Consistent with the court's Order Appointing Expert, dated July 31, 2006, remedy drivers are defined as those wastes, or chemical constituents in the wastes, that most influenced the selection of the remedy, measurement of success or failure of the remedy, and the costs of that remedy.

General Historical Findings

28. Shortly before and during the relevant time period, the regulatory climate regarding the disposal of hazardous waste experienced a sea change. Waste disposal was transformed from an almost entirely unregulated process into a more closely monitored system amidst increased scrutiny from federal and state governments, as well as local communities, fueled by rising environmental consciousness. As a result of changes in the regulatory structures and the prevailing law, significant modifications in waste management practices occurred in the years

preceding and spanning the relevant period. Many industries found it necessary to ship waste offsite for disposal that was previously disposed or otherwise dispensed with onsite.

29. On May 29, 1970, the Texas Water Quality Board ("TWQB"), the state agency responsible for regulating waste disposal, issued Board Order No. 70-0529-7, which delineated different types of hazardous wastes and established a basic, three-tiered classification system for appropriate disposal facilities. Under criteria established by the order, the "Type I" classification allowed for the broadest range of disposal, including much of the waste that is the subject of the instant lawsuit. Meanwhile, "Type II" facilities were deemed suitable for "low toxicity organic and inorganic materials." Finally, only "substantially inert solids which are substantially insoluble in water" could be disposed of at "Type III" locations. The Board Order also implemented various disposal guidelines and requirements for the treatment of waste and established a registration process for proposed waste disposal sites.

30. Subsequently, Board Order No. 71-0820-18, dated August 20, 1971, provided additional restrictions and monitoring requirements regarding waste disposal, mandated that public hearings be held prior to the issuance of a registration permit for a waste disposal site, and imposed responsibility upon waste generators whose wastes were disposed at improper locations.

Additional Findings of Fact as to French

31. French billing records reveal payments by French to Smith and Lang from December 1969 through July 1970. The State of Texas ordered French to cease operation of the Turtle Bayou site in June 1970. Both George Whitten ("Whitten"), French's owner at the time, and Fred Bruce ("Bruce"), a supervisor, testified at deposition that the company complied with

this mandate. As the court previously determined in its Phase I findings, however, the main waste pit was not bulldozed until October 1970, suggesting that French continued using the Site after June 1970. The court finds that French continued its use of the Turtle Bayou site until some point in October 1970.

32. The parties disagree about the relationship between the disposal site that French briefly owned and operated in Winnie, Texas, and the Turtle Bayou site. The court finds that French began to dispose of waste at the Winnie site, located south of I-10 on Brush Island Road, in May 1969.

33. Defendants argue that the Winnie site was created to receive waste that was too odoriferous to be disposed of at the Highway 90 site, due to monitoring by the Harris County Pollution Control District and the complaints of nearby residents. French's reasons for construction of the Winnie site were, however, likely more complicated. French also conducted waste disposal operations in the Beaumont, Texas, area, making Winnie a convenient location for French's regional services. Moreover, the trip ticket record suggests that the Turtle Bayou site and the Winnie site were operated simultaneously from July through October 1969, rendering Zoch's replacement theory improbable.

34. At the Winnie site, French dug a pit to burn the waste that was taken to that location. Two elderly ladies who lived in the area, perhaps a quarter of a mile distant, complained to a local constable of nauseating fumes emanating from the burn pit. In turn, the constable passed their complaints along to Victor Bateman ("Bateman"), an environmental control officer for the Jefferson County Health Department.

35. Bateman visited the Winnie site, where he observed the burn pit, which had a "pipeline leading into it." He described the burn pit as "about ten or fifteen [feet] wide and maybe thirty [feet] long and about six [feet] deep." He also witnessed "two or three vacuum trucks dumping into a burning pit." On one occasion, the burn pit released "a very, very dense black smoke, [which was] heavy." At one point, the flames in the pit "were approximately fifty [feet] up in the air."

36. Bateman spoke with the truck drivers who entered the disposal site. The drivers indicated that they were from the Houston, Texas, area. Bateman recalled that they represented that they carried waste for "Tenneco, Sinclair Koppers, and maybe one other [company]." He also remembered that one of the drivers mentioned the company "Neches Butane" to the constable who originally reported the dumping activities. Subsequently, however, the drivers were apparently instructed not to speak with Bateman, and they refused to answer further questions. Bateman acknowledged that he "wouldn't be surprised" if French had other customers whose wastes it dumped at the Winnie site. Thus, the court finds that the companies mentioned by Bateman do not constitute an exhaustive list of those parties whose wastes may have been disposed of at the Winnie site.

37. As a result of the complaints of the residents and Bateman's investigation, on July 18, 1969, the Jefferson County Commissioners Court ordered the Criminal District Attorney to file suit against French. In turn, the Criminal District Attorney brought an action in Jefferson County District Court seeking injunctive relief against French. On October 8, 1969, the court entered an agreed Final Judgment, prohibiting French from both open-pit burning and "dumping, storing, or accumulating industrial wastes in open pits upon said lands where such

industrial wastes cause foul and offensive odors to be disseminated in such combination and concentration as to be injurious . . . to human beings . . . ." Bateman testified that, as a result of the agreed judgment, French ceased operations at the Winnie site.

38. The extent of French's use of the Winnie site between the time that Jefferson County initiated judicial proceedings and the October 8, 1969, Final Judgment is unclear. During this interim period, Bateman recalled visiting the Winnie site "maybe once a week." Bateman did not witness any more active disposal, but he conceded that French may have disposed of liquid wastes at the Winnie site after July without his knowledge. He acknowledged that the Winnie site was located in a "very, very isolated" part of Jefferson County, and that "it takes a vacuum truck about, approximately[,] maybe five minutes to dump a load." Moreover, Bateman stated that he could not smell the waste from the distance of a quarter of a mile, reducing the probability that the elderly ladies would have complained of further disposal not associated with burning. Alternatively, perhaps less odoriferous wastes were disposed at the Winnie site.

39. Significantly, shortly after Bateman's initial site investigation, he observed "bermed areas," approximately thirty to fifty feet in diameter and two feet high, containing liquid waste at the Winnie site. Bateman described the waste in the bermed area as "oily material" containing "polyethylene pellets" that was too "light" for road oiling; like the nearby residents, he found the odor to be powerful and offensive. He described it as "typical chemical plant waste," but he could not more precise. Bateman was informed by Luther Hendon ("Hendon"), George Whitten's business partner, that French intended to install tanks inside the bermed areas for the storage of liquid waste, but this objective was never completed. He indicated that the oily waste remained in the bermed areas until the Final Judgment was issued, at which point the berms were

pushed over. The court finds that waste was dumped in the berms after burning became impractical due to regulatory interference.

40. The Tenneco trip ticket record supports the proposition that waste disposal continued at the Winnie site until the October 8, 1969, Final Judgment. The final trip ticket bearing the notation "Winnie" is dated October 7, 1969. While subsequent invoices list Winnie as the destination, corresponding trip tickets reveal "563" or "Sheridan" as the true dump sites.

41. During Phase II of the trial, the parties expended considerable time and attention on the "25% rule" for disposal at the Turtle Bayou site by French. Unsurprisingly, each party tended to assert that the rule should be applied to situations where it was beneficial but contended that it was inapplicable and imprecise in contexts where it might mean increased liability for that party. The court never intended to establish 25% as a definitive measure of the proportion of French hauls that were dumped at the Turtle Bayou site. While this figure is useful, the court declines to view it as a fixed rule in performing its allocation analysis. Nevertheless, two relatively credible witnesses in this case, Ken Kimmons ("Kimmons") and Charlie Thomas ("Thomas"), who were French truck drivers during the relevant period, testified that approximately 25% of their hauls went to the Turtle Bayou site. If nothing else, the 25% rule serves as an appropriate fallback option where better evidence of disposal rates is not available.

42. The court will treat entries in the "Miscellaneous/Other" column uniformly with those entries in the "Highway 90" column. The precise relationship between the "Miscellaneous/Other" column in the French ledger and the Turtle Bayou site is unknown. Presumably, this column was intended to indicate loads of waste that were disposed of at locations other than the Highway 90 site, which would certainly seem to include the Turtle Bayou site. Yet,

volumetric calculations on the basis of disposal charges demonstrate that the entries in the Miscellaneous/Other column cannot account for the amount of waste that was indisputably disposed by French at the Turtle Bayou site. At the same time, however, there is no evidence that loads reflected by entries in the Miscellaneous/Other column were never dumped at the Turtle Bayou site.

Findings of Fact Related to Joiner

43. During the allocation phase of the trial, the parties spent a substantial amount of time attempting to delineate Joiner's use of the Turtle Bayou site more precisely. Although some of their new arguments and exhibits are helpful, the court is unpersuaded that the parties have fully elucidated the matter. The records and testimony related to Joiner's use of the Site are simply too incomplete. Thus, the court is forced to deal with probabilities rather than certainties in relation to Joiner even more than French.

44. On April 6, 1970, Mr. Joiner visited the Turtle Bayou site with Clarence Johnson ("Johnson") and Paul Harris ("Harris"), TWQB employees, to request permission to dispose of road oil at the Site. In a May 1, 1970, memorandum, Johnson specifically attributed Joiner's request to a need "to dispose of large quantities of road oil under a contract he [was] bidding for." On April 7, 1970, Johnson granted Joiner permission to use the Turtle Bayou site for road oiling purposes, provided that the existing water-quality problem was rectified. Defendants argue that trip ticket evidence reveals that Joiner first disposed of waste at the Turtle Bayou site on October 10, 1970, when Mr. Joiner showed Felix DeLeon ("DeLeon") the location of the Site.

45. While plausible, the court believes that Joiner more likely began its initial use of the Turtle Bayou site in April 1970. Defendants speculate that Mr. Joiner possessed an ulterior motive for bringing Johnson to the Turtle Bayou site—namely, calling the TWQB's attention to the illegal dumping practices of Joiner's competitor, French. Certainly, Joiner had an economic incentive to undermine French's business. At the same time, the court does not believe that any subterfuge was necessary. If Mr. Joiner's sole motivation was to harm a rival company, he could have informed Johnson of the illegal dumping without a pretext. Moreover, just one week later, on April 13, 1970, Joiner entered into a purchase order with Lubrizol for offsite hauling of liquid and solid wastes from Lubrizol's Deer Park and Bayport facilities. The underlying contract, signed April 1, 1970, called for Joiner to be available twenty-four hours a day, seven days a week, to haul all liquid and solid wastes offsite for disposal. The timing of the formation of this contract and the subsequent purchase order, referenced in Johnson's May 1, 1970, memorandum as the basis for Joiner's request, confirms that Joiner sought to dispose of waste oil at the Turtle Bayou site during April 1970.

46. The evidence shows that only limited volumes of liquids were disposed of at the Dayton site. Although the Dayton site was never permitted to handle liquid waste, Johnson's site inspections suggest that such disposal may have occurred. Moreover, some tankage was available at the Dayton site for temporary disposal. The evidence also indicates that wastes were sometimes dumped into pits at the Dayton site. Nevertheless, the record reflects that the Dayton site was primarily utilized as a solid waste dump.

47. Joiner's use of the Turtle Bayou site was likely intermittent. Joiner drivers probably hauled to the Turtle Bayou site when, for whatever reason, disposal at a more established

location was not advisable or feasible. For example, the dumping reflected by the trip tickets dated October 10 and 13, 1970, can possibly be explained by heavy rains that flooded the Dayton site on those days. At other times, the Dayton site may have been unavailable due to concerns related to state inspectors or public monitoring.

48. Joiner's regulatory compliance difficulties, as well as public disapprobation, rendered disposal at the Dayton site problematic. These concerns were likewise applicable to the Turtle Bayou site, as evidenced by the controversy surrounding TWQB's preliminary approval of a waste permit for the Site and the ensuing litigation. Nevertheless, the court finds the practice of using surreptitious routes described by multiple Joiner truck drivers to be compelling evidence of illicit, secretive disposal at the Turtle Bayou site. The drivers were obviously aware of the necessity for avoiding the attention of the authorities and the public. No driver has testified to any similar procedures regarding any other waste disposal site. Such evidence dovetails the testimony of several drivers that trucks loaded with waste and left in the Joiner yard overnight would sometimes be empty in the morning. Moreover, a June 23, 1971, TWQB interoffice memorandum from John B. Latchford to Dick Whittington indicates that the agency had recently discovered a possible connection between Joiner and the operation of the Turtle Bayou site. In tandem, such evidence strongly suggests that Joiner utilized the Turtle Bayou site, not the Dayton site, for illicit disposal, despite public and regulatory scrutiny at both locations.

49. The Latchford memorandum states that "Joiner has complied with [the TWQB] regulations and suggestions but it took a great deal of time and effort . . . to convince him to do so." The court finds it likely that Joiner began cooperating with regulatory officials at the

"other" site in Liberty County described by the memorandum only to shift its noncompliance to the Turtle Bayou site, given the economic benefits of illicit disposal.

50. At this point, it is impossible to sort out precisely what Mr. Joiner's plans, motivations, procedures, and rationale may have been for the conduct of his operations. Based on the substantial evidence of illegal dumping as well as his possible bribery of public officials and at least one employee of Lubrizol, a customer, it is abundantly clear that Mr. Joiner was not always an upstanding businessman. Mr. Joiner's two payments to Harris, a TWQB employee, for engineering services are extremely suspicious. Mr. Joiner's purchase of a government-owned vehicle from Claude Brabston ("Brabston"), the Lubrizol employee responsible for procuring Joiner's waste disposal services, was certainly irregular and potentially illegal; moreover, the transaction may have been a thinly-veiled bribe. Pointing out Mr. Joiner's lack of scruples, however, is not a substitute for proof, and his dishonesty does not necessarily translate to disposal of hazardous waste at the Turtle Bayou site. Mr. Joiner's unscrupulous behavior does, however, weaken Defendants' arguments concerning state law, regulatory history, and the likelihood of Joiner's compliance with the applicable laws and regulations. The court is inclined to believe that Mr. Joiner was willing to engage in illegal dumping as long as the potential benefits of cost-saving and convenience outweighed the risks of regulatory enforcement actions, litigation, and prosecution. Moreover, in other situations, the inherent economic pressures of the waste disposal business rendered Mr. Joiner sufficiently desperate to risk illicit disposal at the Turtle Bayou site despite the perils involved.

51. The Joiner trip ticket record is useful but unreliable. Many of the tickets have not survived. Other tickets bear ambiguous or interim designations, such as "yard,"

"disposal," or "Dayton disposal on the Road." The court finds that the purported destinations stated on the tickets are not necessarily accurate. First, as found during Phase I, the testimony confirmed that the drivers did not always record the disposal location properly. Moreover, Frank Rogers ("Rogers"), a Joiner truck driver, testified that "all [of the] different drivers had different names for this location." Rogers indicated that he called it "the dump" or "the dump site in Wallisville." The record bears out that the truck drivers referred to the Turtle Bayou site by a variety of names, some not entirely logical or intuitive (such as "Anaheim"). Thus, it is possible that some trip tickets indicating disposal at ambiguous locations—such as the "dump," a common designation on Joiner trip tickets—could represent disposal at the Turtle Bayou site.

52. Second, a comparison of the Sheridan documents, a collection of waste-in records generated by Sheridan Disposal, Inc. ("Sheridan"), with the available trip tickets demonstrates inconsistencies between the volume of waste that was purportedly received by Sheridan and the amount of waste that was supposedly hauled by Joiner. For example, in June 1973, Sheridan reported receiving twelve 5,400 gallon loads from Joiner. The trip ticket record, however, reveals two 2,100 gallon hauls and two 3,000 gallon hauls of Exxon's D4580 waste to the Sheridan site during that month. At best, the Sheridan records can explain only one of these hauls—Sheridan reported receiving one 3,000 gallon load from Exxon (though this waste was not attributed to Joiner). Thus, either the Sheridan records or the Joiner trip tickets are inaccurate. As the court has received testimony and evidence attacking the reliability of the Joiner trip tickets, but not the Sheridan records, the court finds that these inconsistencies further establish that the waste destinations indicated on the Joiner trip tickets were not always correct.

53. The court finds that Joiner began dumping at the Turtle Bayou site in April 1970. Joiner discontinued its use of the Turtle Bayou site around January 1974, when Mr. Joiner withdrew his application for a permit for the Site. Other evidence supports this conclusion, including Bruce Rowland's ("Rowland") testimony that Joiner utilized the Turtle Bayou site in the early months or years of the company (Rowland recalled arriving at Joiner sometime during 1970 or, more likely, 1971) and Garland Menifee's ("Menifee") testimony that the Turtle Bayou site was "dead" by the time he began official employment with Joiner sometime during 1973. Moreover, while there were indications of road oiling in a January 1973 aerial photograph of the Turtle Bayou site, no evidence of road oiling was apparent in the next sequential aerial photograph, taken in February 1976. Wayne Grip ("Grip"), an aerial photography expert called by Defendants, testified that road oiling from 1974, but not 1973, would likely have been apparent in the 1976 photograph.

Findings of Fact as to the Truck Driver Testimony

54. During the Phase II proceedings, the court received testimony from defense witnesses Terrell Benoit ("Benoit"), Richard Wells ("Wells"), and Jules Simien ("Simien"), truck drivers who did not testify during Phase I.

Testimony of Terrell Benoit

55. Benoit worked as a vacuum truck driver for both French and Joiner. On the stand, Benoit exhibited some uncertainty as to the precise timing of his employment at each company. Nevertheless, the court can ascertain the approximate dates of Benoit's time at Joiner within a reasonable degree of confidence based on his testimony regarding the circumstances of his employment.

56. Benoit testified that he performed only in-plant work while at French, which, if true, was apparently unique among the French drivers. In fact, at one point, Benoit stated that the Highway 90 site was no longer receiving waste when he came to work for French. He admitted, however, that he visited the Highway 90 site on one occasion to clean up oil "that was on top of the water" while the facility was in the process of closing. The evidence suggests that the Highway 90 site ceased operations sometime during March or April 1971. Most of the evidence indicates that the Highway 90 site shut down in March 1971. The French ledger, however, reveals documented disposal fees for the Highway 90 site during late March 1971. Additionally, some trip ticket evidence suggests that limited waste disposal may have occurred at the Highway 90 site in April 1971.

57. Benoit recalled French drivers disposing of waste exclusively at the Sheridan site during his time at the company.

58. From his tenure at French, Benoit professed familiarity with Whitten, Bruce, Simien, Tommy Legg, Kimmons, W. E. Thornton ("Thornton"), Thomas, and Clifton Montief ("Montief"). Benoit stated that neither Rowland nor Herman Stanhope ("Stanhope") worked for French during his own period of employment there.

59. Benoit initially testified that he left French for Joiner sometime in the "early [1970s]." Under cross-examination, he agreed that he probably began working for Joiner somewhere "in [the] neighborhood" of March 1971, approximately when French ceased operations at the Highway 90 site. When he left French, the company had recently closed the Highway 90 site and sold its equipment to Sheridan. This information is at tension with Benoit's testimony that the Highway 90 site had already closed when he arrived at French.

60. Benoit remembered working for Joiner for about "five and a half, six years." He recalled leaving the company in 1978.

61. The first trip tickets the parties located that list Benoit as the driver are dated April 1972. Thus, while the trip ticket record is incomplete, April 1972 nevertheless serves as an outer boundary for when Benoit began to work for Joiner.

62. Benoit also testified that he followed Bruce from French to Joiner and that there was no gap in time between his employment at French and Joiner. At deposition, Bruce stated that he departed French for Joiner in "1970 or 1971," most likely in January 1970. Later, however, Bruce acknowledged that he was present at French in April 1970 when the company received an order from state authorities to cease disposal at the Turtle Bayou site. After his recollection was refreshed, Bruce indicated that he probably worked for Joiner from 1971 until September of 1983. Thus, based on Bruce's belief that he began work at Joiner in January or February, his recollection of receiving the April 1970 letter from state authorities, and the termination of operations at the Highway 90 site around March 1971, the court concludes that Bruce most likely left French for Joiner at some point between January and March 1971. While Benoit did not specify the duration of the intervening period between Bruce's departure and his own, his use of Bruce's departure as a temporal marker suggests that any such period was not significant.

63. Thus, Benoit began working for Joiner at some point between March 1971 and April 1972. Benoit hauled waste primarily from Exxon's and Lubrizol's facilities, though he performed waste hauling and in-plant work for other companies, as well.

64. While at Joiner, Benoit recalled hauling waste to the Dayton site, the Texas Ecologists ("TECO") site at Robstown, Texas, the Sheridan site in Hempstead, Texas, the Malone site in Texas City, Texas, and the Rollins-Purle site in Deer Park, Texas. He denied having ever visited the International Pollution Control ("IPC") site in Corpus Christi, Texas, or the Renner site in Port Arthur, Texas, to dispose of waste while working for Joiner. Benoit indicated that he did not dispose of liquids at the Dayton site. On another occasion, Benoit denied having hauled any waste at all to the Dayton site.

65. The first trip ticket showing disposal by Benoit at the Sheridan site is dated November 21, 1972. Benoit agreed with defense counsel, however, that he might have hauled waste to the Sheridan site before this date.

66. Benoit denied having ever disposed of waste at the Turtle Bayou site. He conceded, however, that other drivers at both French and Joiner spoke of dumping waste at the Site, referring to it as "563." Some of the "older drivers" allegedly professed to Benoit that "they were glad the place was closed, because the roads [were] bad and everything." During further cross-examination, Benoit stated that these drivers referred to the Site as "Turtle Bayou" rather than "563." Benoit acknowledged that he did not know whether Joiner "had hauled stuff over there before I went to work for [Joiner]." This statement is somewhat corroborated by Rowland's deposition testimony that Joiner utilized the Turtle Bayou site to dispose of Lubrizol's wastes "in the early years, the early months of [Joiner]." Still, Benoit joined Joiner relatively close to the beginning of its inception as a major waste disposal business, well within the period to which Rowland might have been referring.

67. Benoit signed Ticket No. 14389, dated June 4, 1973, which contains a notation of "secret disposal (LA)." He denied that he had written the notation, declared that the handwriting was not his, and stated that the designation was absent when he signed the ticket. Benoit professed that he had never visited a "secret place" or a "Liberty/Anahuac" or "LA" disposal location as a truck driver.

68. According to Benoit, another person wrote the final disposal location on other trip tickets signed by Benoit, as well. On Ticket 5047, for example, Benoit testified that someone else listed "Malone" as the destination. Benoit speculated that this person or persons matched his trip ticket to a disposal ticket to discern the dump site.

69. At times, Benoit simply recorded the dump site on his trip ticket as "disposal." He indicated that there was no pattern to this practice—any given load of waste associated with a trip ticket in which the disposal location was listed as "disposal" could have gone to the Sheridan site, the TECO site, or even the Joiner yard. He further testified that he filled out additional tickets at the disposal site, which would reveal the final destination of the load of waste. Benoit was unable to identify the disposal locations of loads of waste on certain tickets based on the information recorded on the documents.

70. Benoit was familiar with the practice, previously described by other drivers during the Phase I proceedings, of placing waste from customers in a tank at the Joiner yard. Often, another driver would subsequently transport the waste to its final destination. Thus, although the Joiner yard served as an interim resting place for the disposal of certain loads of waste, any volumes of waste taken to the Joiner yard were ultimately dumped elsewhere. Benoit testified that the total capacity of the tanks at the Joiner yard was approximately 8,400 gallons.

71. Benoit also indicated that interim storage at the Joiner yard would not always be reflected on a trip ticket. Thus, he explained, a December 11, 1973, ticket represented a load of waste that went to the Joiner yard, even though "Robstown, Texas," was listed as the disposal location on the ticket. Presumably, Benoit drew this inference from the fact that the ticket showed two and a half hours of work, which would not be a sufficient period of time to allow for transport to Robstown. While Benoit opined that the waste would have ultimately been transported to Robstown for proper disposal, the court is skeptical of his ability to ascertain such, especially given his testimony that other drivers would frequently transport loads of waste from the Joiner yard without regard to which employee originally hauled the waste from the customer's facility. The driver filling out the original ticket, unless prescient, would not be able to know where the next driver might take the waste. Thus, the weight of the evidence suggests that waste that was placed in the Joiner yard sometimes went to locations other than the dump site indicated on the disposal ticket. Additionally, the court notes that, at other times, the destination "yard" was used for trip tickets related to hauling Exxon's waste, as evidenced by a ticket dated June 6, 1972. These loads, of course, were ultimately disposed of elsewhere. Thus, Benoit's explanation is not entirely consistent with the documentary evidence.

72. Benoit claimed to have never engaged in the practice of "road oiling" during his employment at Joiner, despite the fact that Joiner indisputably conducted road oiling operations. While it is entirely possible that other drivers performed Joiner's road oiling services, this testimony nevertheless highlights the limited scope of Benoit's involvement in Joiner's operations. Benoit's lack of familiarity with Joiner's road oiling practices is particularly

significant because the evidence suggests that Joiner drivers typically disposed of wastes at the Turtle Bayou site on or alongside Frontier Park Road, a dirt road that traversed the Site.

73. Benoit believed that the Lubrizol's Deer Park facility was thirty-five to forty miles distant from Malone site. He indicated that one would "take 225 Highway to 146 South, follow 146 South all the way to the other side of Texas City," comprising a distance consistent with Benoit's recollection. Benoit, however, initially professed that a trip from Lubrizol's Deer Park facility to the Sheridan site typically took approximately an hour and fifteen minutes, though he was uncertain of the distance. He described his route by saying that he "would take Highway 225 over to 610, 610 over to I-10 West to Highway 6, Highway 6 over to 290, 290 on to Hempstead." Given the distances involved, Benoit's testimony concerning the duration of this trip is implausible, especially given his declaration that he always followed the speed limit.

74. Benoit understandably placed considerable emphasis upon recording the hours he worked on his trip tickets accurately because he was paid on an hourly basis. Thus, the court finds that the times listed on the various trip tickets are probably correct. Moreover, even if they are inaccurate, Benoit had an economic incentive to expand, rather than reduce, the amount of time he worked on any particular haul or project. Conversely, Benoit had no similar motivation to record the waste disposal location accurately. Thus, where the time information is inconsistent with the disposal location, the court finds that the hours worked are more likely to reflect the reality of what actually happened.

75. While not wholly lacking in credibility, the contradictions and limitations contained in Benoit's testimony substantially restrict its probative value. First, the French ledger depicts significant disposal activities occurring at the Highway 90 site during March 1971. While

the ledger may not be entirely accurate, the sheer volume of waste attributed by the ledger to the Highway 90 site for part of March 1971 undermines Benoit's claim that it was no longer receiving waste when he began to work for French.

76. It is also difficult to reconcile Benoit's testimony that the Highway 90 site was no longer available for waste disposal when he joined French with his agreement that he left French "in the neighborhood" of March 1971. Moreover, as Benoit followed Bruce to Joiner because "he was a good guy to work for and everything," he almost certainly must have worked with Bruce for some period of time. Based on the circumstantial evidence, it appears that Benoit's tenure with French was not as inconsequential as he claimed. His testimony is simply not consistent with describing a *de minimis* period of employment with the company. Thus, Benoit's claim that the Highway 90 site was no longer functioning for purposes of waste disposal upon his arrival cannot be credited.

77. Benoit's testimony that he never disposed of waste at the Turtle Bayou site and that he exclusively performed in-plant work is, likewise, not believable. Thomas, a credible witness, claimed that he personally observed Benoit at the Turtle Bayou site. Additionally, Kimmons testified that Benoit drove a truck for French. While this statement might conceivably refer exclusively to in-plant work, Kimmons stated that he "could not recall" whether he saw Benoit at the Turtle Bayou site. Had Benoit performed only in-plant hauling, Kimmons likely would have simply stated this in response.

78. Moreover, while the evidence suggests that most drivers sometimes performed in-plant labor, it is unclear why any specific driver would have been designated to perform only in-plant work at French's customers' facilities. As explained in detail by Kimmons,

French was a service company—it made every effort to accommodate its customers in order to retain their business. Often, the same customers who sought in-plant work, such as Ethyl (for whom Benoit performed labor), likewise needed waste disposed offsite. Kimmons testified that he frequently performed in-plant work for Ethyl, often for lengthy, continuous periods of time. Yet, when waste needed to be hauled offsite from Ethyl's facility, Kimmons did so. Under such circumstances, it is exceedingly improbable that any driver would never have hauled waste offsite. As Kimmons described this aspect of French's operations, "if you were available, and that's the size truck they needed then, you know, you got the call." While Benoit may have typically performed in-plant work, the court rejects his testimony that he never hauled waste offsite.

79. Benoit's testimony that he did not haul waste to the Turtle Bayou site while employed by Joiner is not entirely credible. First, Rowland testified that he dispatched either Benoit or Gary Voight to the Turtle Bayou site. Second, as stated above, a ticket dated June 4, 1973, and signed by Benoit, contains the notation "secret disposal (LA)." Although Benoit denies any knowledge of the import and provenance of this notation, it is probable that a Joiner employee added the information so that the ticket would reflect the ultimate disposal location, a practice which Benoit confirmed regarding a different ticket. It is unlikely that this notation originated with any person other than a Joiner employee, given that the documents were transferred directly from the Joiner collection to the EPA, at which point the notation already existed. Viewed most favorably to Benoit, it is possible that he originally deposited this load of waste in the tank at the Joiner yard and that the suspicious notation reflects that it was subsequently transported to the Turtle Bayou site by a different driver.

80. Finally, the testimony of other Joiner truck drivers, namely Rogers, Menifee, and Cecil Gonzales ("Gonzales"), constitutes strong evidence that Joiner was still disposing of at least some waste at the Turtle Bayou site during Benoit's tenure at the company.

81. Benoit appears to have contrived his testimony to avoid any personal involvement with waste disposal at the Turtle Bayou site. It is indisputable that French hauled substantial amounts of waste to the Turtle Bayou site and implausible that any driver who hauled waste offsite during the relevant period could have completely avoided participation in disposal at the Site. Too conveniently, Benoit testified that he never hauled waste offsite while employed by French and attempted to restrict his period of employment at French past the point of reasonable conjecture. Then, Benoit acknowledged that other drivers at Joiner described having dumped waste at Turtle Bayou, while claiming that the practice ceased before his arrival. Yet, based on other evidence, the period in which Joiner disposed of waste at the Turtle Bayou site almost certainly extended well into Benoit's time at the company. Finally, the designation "secret place, LA" appears on a trip ticket signed by Benoit. Considering the totality of the evidence, the court is unpersuaded that Benoit's denial of hauling waste to the Turtle Bayou site is credible.

Testimony of Richard Wells

82. Wells testified that he worked as a 130-barrel vacuum truck driver for Joiner for a period of about a year and half beginning sometime during 1973. The first ticket in evidence with Wells's signature is dated April 18, 1973, which corroborates his recollection that he probably began working for Joiner sometime that spring. Thus, the scope of Wells's testimony is limited to portions of 1973 and 1974. Although Wells had previous experience as a truck driver, he never hauled waste offsite for disposal before arriving at Joiner.

83. Wells recalled performing hauling services for Exxon, Lubrizol, and Texaco.

84. Wells testified that he hauled waste to Rollins Purle disposal sites in both Deer Park and Baton Rouge, Louisiana, a site in Corpus Christi (probably the IPC site), and the TECO site.

85. Wells estimated that it took him between twelve and fourteen hours to dispose of waste at TECO and return.

86. He denied having ever disposed of waste at the Turtle Bayou site. Wells claimed that he learned of the existence of the Turtle Bayou site only through newspaper articles discussing its status as a superfund site.

87. Wells corroborated the Joiner practice of temporarily storing waste in the Joiner yard overnight. In addition to describing the tank in which partial loads of waste were deposited, Wells also stated that drivers would sometimes leave their trucks at the yard overnight, filled with waste that other drivers would handle. Wells contradicted Benoit's testimony, however, by stating that the drivers were instructed to write "disposal" as the destination for trip tickets representing hauls that went to the yard, even when confronted with a ticket that reflected hauling for Exxon, a company that showed heightened concern about the location of disposal.

88. Wells testified that Joiner employed "five or six" drivers who performed extensive, offsite hauling during his time at the company. Four of these drivers used 130-barrel trucks. Joiner employed other drivers, however, who drove smaller, "local" trucks, which were generally used to perform in-plant work. Other drivers were specifically assigned to particular plants.

89. Wells explained that Exxon requested Joiner to haul D4580 waste offsite when the D4580 tank reached a capacity of 3,000 gallons. Consequently, he agreed that tickets that listed a volume of 3,000 probably related to D4580 hauling.

90. Wells took his orders directly from his dispatcher, not Exxon.

91. Wells's testimony was mostly credible, despite his occasional faulty memory. The fact that Wells may not have disposed of waste at the Turtle Bayou site during his employment at Joiner, however, does not mean that Joiner did not utilize the Turtle Bayou site during this period.

Testimony of Jules Simien

92. Simien originally worked at French's Beaumont location in the 1960s. After an automobile accident that resulted in the loss of his driver's license, Simien moved to Houston to obtain alternative employment. After obtaining a new license in the early 1970s, Simien returned to French to work as a vacuum truck driver at its Houston location. Subsequently, Simien left French to become a truck driver for Joiner.

93. Simien testified that the Sheridan site in Hempstead was the only waste disposal site that was available during his second period of employment with French. He claimed that he never personally delivered waste to any site other than the Sheridan site during this time. He denied ever hearing of the Turtle Bayou site by any name. Simien disposed of waste at the Highway 90 site on one occasion, during his first period of employment at French, but he claimed that it had closed by the time he returned.

94. By the time Simien arrived at French the second time, Kimmons was no longer driving trucks—Simien described him as a "truck pusher" and "salesman." Simien also

recalled Thomas, Thornton, Bruce, Rowland, Lawrence Palmer, Frank Stockton ("Stockton"), Montief, and individuals identified only as "Cochran" and "Stevens." Simien could not recollect working with Stanhope.

95. Simien did not move directly from French to Joiner. Rather, he first "went and lived on the road." At some point, he worked as a truck driver in California for "a bit," likely in 1974. He recalled joining Joiner after departing California in either 1974 or 1975. His employment with Joiner lasted for only a short period of time, probably between thirteen and sixteen months. Simien stated that Benoit was already working at Joiner when he arrived and that he met Benoit for the first time at Joiner. This testimony, however, is inconsistent with Kimmons's description of Benoit and Simien as "good friends."

96. At Joiner, Simien knew "Big" Tommy Irvin, James Wallace ("Wallace") (whom he knew as "Joe"), and DeLeon. He could not recall Rogers or Gonzales.

97. The Joiner trip tickets indicating disposal by Simien begin on January 22, 1974, corroborating his testimony.

98. At Joiner, Simien hauled waste from an Exxon facility, which he disposed of at "Robstown, Texas Ecology[,] or whatever." As a driver for Joiner, he also disposed of waste in Corpus Christi, presumably at the IPC site. Simien testified that he never hauled any waste to the Sheridan site, the Dayton site, the Highlands site, the Turtle Bayou site, or any location in Louisiana during his time at Joiner. Simien, however, recalled visiting the Highlands site on one or two occasions, but he recollected that no liquids were disposed there. He indicated his belief that he filled out his trip tickets accurately, though he admitted he could not remember whether he may have filled out any particular ticket inaccurately.

99. When confronted with June 21, 1974, June 28, 1974, and August 8, 1974, trip tickets, which he signed, indicating disposal at a "contractor dump" or "conts dump," Simien initially expressed ignorance as to the location or nature of this site. Later, however, he recalled that this location was part of Exxon's facility. Thus, these tickets likely represent onsite disposal, not dumping at the Turtle Bayou site.

100. Simien acknowledged that the term "D4580" "[rang] a bell," but he could not remember any specifics regarding the waste.

101. Likewise, he professed ignorance regarding the Joiner practice of storing partial loads of D4580 in tanks located at the Joiner yard, although he admitted that his memory might be faulty on this issue.

102. Simien testified that he hauled waste oil from Lubrizol to Robstown. He estimated that the round trip to Robstown, including loading and unloading, took about sixteen hours. In fact, Simien recalled requiring two to three hours to reach Houston's city limits via U.S. Highway 59 if he left around 4:00 p.m.

103. Simien estimated that Joiner owned "five or six" 130-barrel vacuum trucks, but he stated that the company employed more drivers so that the trucks would be available on a continuous basis to service customers.

104. Simien denied ever performing any road oiling.

105. At the Rule 63 hearing, Kimmons could not recall having encountered Simien at the Turtle Bayou site, but he speculated that, as Simien was employed by French at the same time as Kimmons, "he would have had to go there." On the other hand, at the trial before Judge Cobb, Kimmons responded affirmatively when asked if he had ever observed Simien at the

Turtle Bayou site. When confronted with this contradiction, Kimmons explained, "Do I right now recall seeing anybody else and all of them out there? Like I said before, I saw a lot of people out there from time to time. I don't try and concentrate on specifically who." The court notes, however, that Kimmons's employment with French exceeded the duration of French's use of the Turtle Bayou site. Moreover, Simien testified that Kimmons had become a supervisor by the time he began his second period of employment with French. At deposition, Thomas likewise indicated that he observed Simien at the Turtle Bayou site.

106. Ultimately, the court need not resolve the question of whether Simien ever disposed waste at the Turtle Bayou site. The court found Simien's testimony to be candid and substantially credible. Nevertheless, Thomas and Kimmons were also generally believable witnesses. Given the lapse of time, it is entirely possible that either Simien has simply forgotten having disposed of waste at the Turtle Bayou site or that Kimmons and Thomas were simply mistaken. In the end, the probative value of Simien's testimony is minimal. His testimony establishes, at most, that by January 1974, Joiner's disposal at the Turtle Bayou site was not so pervasive that all of its employees were aware of it. Moreover, Simien expressly denied having ever engaged in road oiling activity, a likely method of disposal for Joiner at the Turtle Bayou site.

Findings of Fact as to Plaintiffs

Findings of Fact as to Oxirane Chemical Plant

107. In 1967, Oxirane Chemical Company ("Oxirane") was formed as a partnership between Aprox Corporation ("Aprox"), a wholly-owned subsidiary of ARCO, and Belmont Chemical Corporation, Inc. ("Belmont"), a wholly-owned subsidiary of Halcon International, Inc. ("Halcon"). In 1980, ARCO purchased Halcon's interest in Oxirane, and what

had previously been Oxirane ultimately became a part of ARCO Chemical Company, a division of ARCO, which became a wholly-owned subsidiary of ARCO in 1987. ARCO created Lyondell Petrochemical Company as an operating division in 1985 and incorporated Lyondell Petrochemical Company as a wholly-owned subsidiary in 1988. Lyondell Petrochemical Company was renamed Lyondell Chemical Company in 2004. ARCO divested its interest in Lyondell in 1997. In 1998, Lyondell acquired ARCO Chemical Company.

108. The Oxirane plant was designed to produce 125 million pounds per year of propylene oxide from feed streams of isobutane, oxygen, and propylene. The plant was also intended to produce derivatives of propylene oxide, such as propylene glycol, TBA, and isobutylene.

109. In March 1969, French entered into an agreement with Oxirane to haul and dispose of liquid wastes from the Oxirane facility at the request of Oxirane's shift supervisors and marketing coordinator. French expressly agreed to obtain Oxirane's approval before selling any waste obtained under the contract to a third party, as a precautionary measure to ensure that a rival company would not reverse-engineer Oxirane's patented production process.

110. R. J. Cutler ("Cutler"), an engineer who worked at the Oxirane facility, testified that French and Oxirane entered into a separate agreement that required French to burn Oxirane's fuel wastes. The surviving documentary evidence, however, does not corroborate this assertion. Nevertheless, French clearly made efforts to burn Oxirane's wastes at its Highway 90 site as part of its oil reclamation process. The Oxirane material, unfortunately, damaged French's equipment, making further disposal via burning at the Highway 90 site commercially impracticable. Thus, determining whether French and Oxirane had a written (or oral) contract for

French to burn Oxirane's fuel wastes is immaterial. Even assuming *arguendo* that some form of agreement existed, the evidence reflects that French eventually disregarded any such requirement. At the same time, however, it is evident that French burned some quantity of Oxirane's wastes before discontinuing the practice.

111. Cutler worked as a project engineer and a process engineer at the Oxirane facility until his retirement. During 1968, Cutler bore responsibility for ensuring that "the actual construction" corresponded with the plant design and obtaining "various contractors to do various projects around [the] plant site." Later, after "actual start-up operations" commenced in January 1969, Cutler helped initiate the plant's operations and "assisted with any changes that were necessary to the plant site . . . ." Cutler was familiar with all aspects of the Oxirane facility's pre-startup because he participated in daily meetings concerning the process.

112. Oxirane initially anticipated that its "clean" wastewater would be handled by Friendswood Development Company ("Friendswood"), a nearby wastewater treatment facility. The planning team expected waste fuels to be "consumed by burning" in an onsite furnace at Oxirane. Other less proprietary process wastes with commercial value, such as acetone, molybdenum, and TBA, were intended to be sold for a profit.

113. Oxirane's waste disposal plans, however, did not proceed as smoothly as originally hoped. At least initially, Friendswood was unable to handle some of Oxirane's wastes. Moreover, Oxirane could not procure a buyer for its crude TBA byproduct. Thus, Oxirane was forced to make alternative arrangements to dispose of such wastes.

114. The documentary evidence related to waste constituency and production volumes derived from pre-startup calculations is problematic. The Oxirane facility was a "first-of-

a-kind plant" that utilized a "brand new[,] patented [propylene oxide and TBA] process." The anticipated figures were calculated based on design estimates, pilot plant studies, and engineering theory. While such evidence informs the court about the expectations of the Oxirane facility's designers, the record is replete with evidence that the projected production and chemical constituency data were not always accurate. Thus, the pre-startup predictions are useful but not authoritative.

115. As part of the plant's pre-startup procedures, in November 1968, Oxirane "flushed" its system to remove any residual iron oxides that conceivably could have contaminated the chemical process. Cesco, the contractor that Cutler engaged to perform the cleaning, was delegated the responsibility of transporting caustic, wash water waste offsite. Cutler stated that a similar flush was never performed again because the precaution was deemed unnecessary. Cutler acknowledged, however, that French played some role in hauling the wash water.

116. Rowland testified at deposition that he hauled this waste to the Turtle Bayou site as a truck driver for French. Based on the timing of the system flush, however, the court is unable to credit Rowland's testimony. The Turtle Bayou site was not available for disposal until July 1969 at the earliest, when Lang purchased an interest in the property at the Turtle Bayou site. Moreover, it is unmistakable that Cutler and Rowland were speaking of the same waste. Rowland described it as "green water," "real slimy or slippery," and "caustic." He also mentioned that it was "flush water for [Oxirane's] system" that was only generated because "[Oxirane was] bringing [its] system up." While the court believes Rowland's testimony that he hauled the waste water as well as his testimony that he hauled significant quantities of other wastes to the Turtle Bayou site, it cannot conclude that he transported this specific waste to the Site.

117. Oxirane experienced unanticipated difficulties burning some of its waste onsite as originally planned. Cutler explained that "the molybdenum in the steam atomizers for the burners for the furnace was precipitating out, plugging the burners" and that the "molytrioxide that was formed from the combustion of the molybdenum . . . would lay down on the furnace tubes." Thus, such waste was transported offsite for disposal.

118. Oxirane segregated its wastewater into two separate streams. The first, called the "clean" stream, was relatively lightly contaminated, and Oxirane anticipated that this stream could be discharged directly to Friendswood for treatment. The second was a more heavily contaminated, "biological" stream that required pretreatment prior to shipment to Friendswood.

119. Friendswood, however, experienced difficulties processing both of Oxirane's wastewater streams because of the supposedly high concentrations of biological contamination. Thus, considerable dilution of the waste was required before it could be sent to Friendswood. Lacking any other alternative, the Oxirane plant sent more waste offsite in vacuum trucks than originally expected.

120. Cutler testified that Oxirane resolved its wastewater disposal problems when Friendswood added additional treatment capacity, increasing its overall capacity by a factor of four, and recalibrated its biological treatment system to accommodate a greater proportion of Oxirane's wastewater. Oxirane also took measures to ensure that its wastes conformed to Friendswood's specifications for acceptance. Nevertheless, French continued to haul some wastewater from tanks F-104 and F-850, even after these measures were implemented.

121. Initially, Oxirane contracted with Malone to provide offsite waste hauling services. Oxirane's business records show that payments were made to Malone from January 18,

1969, through May 13, 1969. Other Oxirane records reflect payments to French starting April 14, 1969. Although the records suggest a period of overlap, Cutler testified that French was selected as a direct replacement for Malone.

122. The payments made to Malone from January 1969 through May 1969 total $109,257.70, approximately $21,851.54 per month. By contrast, the total payments to French from Oxirane during its first five months of service aggregate to only $26,800.18, approximately $5,360.04 per month. Plaintiffs argue that the differential reflects the fact that substantially lower volumes of waste were hauled offsite by French than by Malone. While there may be some validity to this conjecture, it is not borne out by the relationship between the latter payments to Malone and the earlier payments to French—there is no natural, downward progression. Moreover, Cutler testified that Oxirane had "problems" with Malone, subsequently making it a point of emphasis in its contract with French to create a method to verify the extent of the services provided. Thus, the payment differential can at least partially be explained by Malone's inflated fees.

123. In February 1970, a large pit called "Bressler's Pond" was constructed at the Oxirane facility. The pond was designed to discharge wastewater to Friendswood via a "gravity feed." Though not part of the ordinary waste disposal process, the pond was meant to provide surge capacity during maintenance or upset events. Cutler testified that material in Bressler's Pond would generally be sent to Friendswood via normal plant operations, but he conceded there were occasions on which material was removed directly from the pond and hauled offsite.

124. The extent to which French hauled waste from Bressler's Pond is hotly contested between the parties. Plaintiffs maintain that the wastewater contained within Bressler's Pond was discharged to Friendswood, except perhaps on the most rare of occasions. In contrast, Defendants assert that truck driver testimony, particularly that of Bruce, indicates that massive hauling operations were conducted to remove wastewater from Bressler's Pond during the period in which French utilized the Turtle Bayou site. The superintendent logs, despite being incomplete, substantiate that French periodically hauled considerable quantities of wastewater offsite from Oxirane's facility. The court finds compelling the notations indicating that French temporarily discontinued hauling waste on two occasions to permit truck drivers to rest, corroborating truck driver testimony concerning the intensity and frequency of hauling operations from Oxirane.

125. French hauled wastes for Oxirane continuously from April 1969 through April 1971. Such wastes included D-502 bottoms (sometimes called F-1213 waste), D-705 bottoms (also called TBA rerun bottoms), D-805 bottoms (or polypropylene glycol bottoms), and D-905 bottoms (also called isobutylene rerun bottoms). Additionally, French periodically hauled wastewater offsite from the Oxirane facility, depending on the availability of Friendwood's services.

126. The wastewater streams contained varying amounts of TBA, monopropylene glycol, dipropylene glycol, propylene oxide, acetone, methanol, sodium hydroxide, sodium formate, and ethers.

127. Plaintiffs argue that the superintendent logs represent the best available evidence of the volume of disposal attributable to Oxirane, reasoning that the logs were meticulously kept in order to ensure the existence of accurate records for billing purposes. These

logs, however, are incomplete. First, the surviving logs cover only approximately half of the relevant period. Second, the available logs are internally flawed, missing specific pages and entries. Finally, the logs do not appear to have been kept with perfect precision, as certain ambiguous entries exist regarding French's hauls. Nonetheless, the logs shed light on the interactions between Oxirane and French; given the uncertainty underlying the other possible sources of volumetric data, they should not be rejected entirely as evidence of volume. The court is confident that every hauling event recorded in the log actually took place.

128. Truck driver testimony from Bruce, Rowland, Kimmons, Thomas, and Stanhope confirms that both "aqueous" (wastewater) and "nonaqueous" wastes from Oxirane were disposed of at the Turtle Bayou site. While some waste may have been disposed of at the Highway 90 site or other facilities, at least a portion of these wastes was sent to the Turtle Bayou site.

129. Dr. Newell determined that TBA was the sole remedy driver chemical present in Oxirane's wastes. The court adopts this aspect of his analysis.

130. Plaintiffs do not dispute that TBA was present in Oxirane's wastes. Rather, they object to Dr. Newell's conclusion that TBA should be considered a remedy driver chemical. To support this position, Plaintiffs point out that there is no federal MCL standard for TBA and that TBA is only mentioned as a marker chemical in the EPA's analysis. The EPA has never specifically identified TBA as a chemical of concern that poses a danger to human health or the environment.

131. Nevertheless, Dr. Newell and Zoch provided persuasive testimony in favor of designating TBA as a remedy driver chemical. Dr. Newell explained that he included TBA as a remedy driver because of the repeated references to TBA in the various RODs and supporting

documentation, ARCO's development of an action level for TBA as early as 1991, and the active remediation of TBA that occurred at the Turtle Bayou site. Finally, Dr. Newell testified that, in his expert opinion, the government would still have implemented remediation had TBA been the only waste constituent discovered at the Site. Zoch testified that he considered TBA to be a remedy driver chemical because it was given a cleanup standard in the 2006 ROD Amendment. Like Dr. Newell, Zoch opined that, standing alone, the TBA present at the Site would have required remedial action to effectuate the goal of allowing "the groundwater to have use for drinking water supply purposes." On balance, the record reflects that TBA was a driving force of remediation at the Turtle Bayou site. Moreover, the court notes that TBA dominates the chemical profile of the entire Site.

132. Plaintiffs also argue, somewhat more persuasively, that Dr. Newell's evaluation of the relative toxicity of TBA is skewed by flaws within his analysis of TBA's recalcitrance to remediation. They correctly point out that "the sampling locations and procedures at the site were not set up or selected to measure difficulty of remediation." Moreover, the relative focus of the remediation and corresponding remedy selections might promote more effective cleanup of certain chemicals, regardless of any particular chemical's "general" recalcitrance to remediation. These are valid concerns.

133. Nevertheless, the court finds that, on balance, Dr. Newell's risk magnitude analysis is superior to Dr. Metzger's alternative (and either method would be preferable to abandoning relative toxicity as a component of allocation in favor of a simple volumetric analysis). Dr. Metzger's methodology did not adequately account for the relationship between a particular chemical and response costs. Moreover, Dr. Metzger's "grouping mechanism" was

simultaneously less precise, in that it created only three groups and failed to distinguish between chemicals within each group, and more arbitrary, because the system was significantly dependent on Dr. Metzger's discretion rather than objective criteria or formulas.

134. The Oxirane wastes disposed of at the Turtle Bayou site contained hazardous substances as that term is defined under CERCLA.

135. When the Oxirane wastes containing hazardous substances were disposed of at the Turtle Bayou site, those hazardous substances were released at the Site, causing the incurrence of response costs.

136. The court, following Dr. Newell's example, has chosen to employ multiple lines of evidence for the disposal volumes of each facility.

137. For a minimum value, the court will utilize Cutler's superintendent log analysis. Cutler used the existing superintendent logs and extrapolated the resulting volumes over periods for which no logs were available. Thus, the volumetric estimate for July 1969 through October 1970, the relevant period, is 2,115,000 gallons. In the absence of a more complete trip ticket record, the superintendent logs reflect the best concrete evidence of disposal by French—certainly, the court is confident that every recorded haul actually took place. While the superintendent logs may underrepresent the extent of French hauling for Oxirane, they nevertheless serve as a useful floor for disposal amounts.

138. For its intermediate volume, the court will use Dr. Newell's upper boundary estimate of 4,252,920 total gallons over the relevant period, which Dr. Newell derived from Plaintiffs' March 10, 1983, 104(e) response to the EPA. As Defendants point out, this estimate excludes French's disposal of Oxirane's wastewater. This omission, however, is counterbalanced

by the fact that the 104(e) response was premised upon numbers derived from production estimates, which were inaccurate and did not account for interruptions and temporary shutdowns. Thus, the court concludes that this number is suitable for use in the court's calculations. Moreover, the court notes that Defendants' expert, Zoch, employed Plaintiffs' 104(e) response as the primary basis for his Oxirane volume estimate.

139. For its upper boundary, the court will employ its own calculation based on the December 9, 1986, letter from Peter Wynne to Judith Caskey and the Eckhardt survey (the "Wynne letter"). According to this evidence, French hauled 6,263.94 tons of hazardous waste from June to December 1969. Because the Turtle Bayou site was not used until July, this number should be prorated to 5,369.09 tons. Using the density factor of 7.47 pounds per gallon for non-aqueous waste contained within the Wynne letter, this represents approximately 1,437,507 gallons of waste. The Wynne letter estimated French's total hauling of Oxirane's wastes at 14,126.27 tons for the entirety of 1970. Prorated for January through October, when French ceased using the Turtle Bayou site, this sum is reduced to 11,772 tons or 23,543,780 pounds. After applying a density factor of 7.47, the total of French hauling for the relevant portion of 1970 is 3,151,778 gallons. Thus, by this method, the total volume of "hazardous waste," as delineated by the Wynne letter, hauled offsite from Oxirane by French during French's usage of the Turtle Bayou site is 4,589,285 gallons.

140. For its maximum volume, estimate, however, the court will include the aqueous waste as well. Although it was designated "nonhazardous," these streams contained TBA, a remedy driver chemical in this case. The Wynne letter states that 4,005.56 tons of aqueous wastes were disposed by French in 1969. The prorated portion of this aqueous waste is

3,433.34 tons. Using the specific gravity of 8.34, mentioned in the Wynne letter for aqueous wastes, this amount translates to 823,343 gallons. For 1970, the Wynne letter lists 9,030.15 tons of offsite disposal by French. This figure, prorated for the relevant time period to 7,525.13 tons, translates to 1,804,588 gallons. Thus, according to this method, French disposed of a total of 2,627,931 gallons of Oxirane's aqueous waste offsite during the relevant period. Combined with the "hazardous" wastes, the total volume estimate under this method is 7,217,216 gallons of waste.

141. In its Phase I findings of fact, the court determined that truck driver testimony established that approximately 25% of the waste hauled by French was disposed of at the Turtle Bayou site during its period of operation. The court never intended this finding to constitute a conclusive holding that 25% of all of French's hauling went to the Turtle Bayou site. Nevertheless, in the absence of a better option, the court will employ this percentage in its allocation. The figure is supported by the testimony of both Kimmons and Thomas, collectively the two most credible French drivers. The alternatives proposed by the parties are excessively arbitrary, and the court cannot ascertain a superior uniform, principled means of discerning which hauls went to the Turtle Bayou site, with few exceptions. Here, specifically, Plaintiffs argue that the 25% rule should not be applied because of the value of certain of Oxirane's wastes as fuel for the boilers at the Highway 90 site. This contention, however, is contradicted by credible testimony that the Oxirane waste damaged French's equipment.

142. Thus, after applying the 25% rule, the court's minimum volume estimate for Oxirane is 528,750 gallons, its intermediate estimate is 1,063,230 gallons, and its maximum volume estimate is 1,804,304 gallons.

Findings of Fact as to Plaintiffs' Sinclair-Koppers Facility

143. In 1969, ARCO merged with Sinclair Petrochemicals, Inc., and assumed an interest in Koppers Company and the Sinclair-Koppers facility. In 1974, ARCO Polymers, Inc., a newly formed corporation that eventually became a wholly-owned subsidiary of ARCO, acquired full ownership of the Sinclair-Koppers facility.

144. The Sinclair-Koppers facility contained a styrene unit that came online in September 1961 and an ethylene unit that started production in April 1967.

145. The styrene unit produced styrene in a process that utilized ethylbenzene fractionated from a mixed xylene feed. The styrene product was subsequently utilized as the primary component of styrene-butadiene rubber. A variety of waste streams were generated as a result of this process, including styrene tar residue, spent catalyst from the styrene reactor, water separated from the benzene/toluene byproduct stream, and cooling water blowdown. The wastewater streams were directed to the American Petroleum Institute ("API") separator and wastewater treatment system.

146. The ethylene unit combined ethane and propane to yield an ethylene-rich stream, which was subsequently fractionated into the desired products and byproducts. This process produced a variety of waste streams, including cracking residue from the water scrubber, spent DEA adsorbent and spent caustic from the acid gas removal system, water separated from the wash oil used to prevent polymerization in the compression stage, and cooling water blowdown. The wastewater streams were subsequently filtered through the facility's API separator and wastewater treatment system.

147. The Sinclair-Koppers facility used a multi-stage API separator wastewater treatment process to separate organic wastes from wastewater. Following construction of the ethylene unit in 1967, the treatment facility contained a below-ground API separator, an above-ground API separator, and a "guard basin." Several waste streams were sent directly to the guard basin, including cooling water blowdown from the styrene unit and the ethylene unit and water separated from the benzene/toluene stream. Water from the ethylene unit drainage system was first went to the below-ground API separator. The oil was then directed to Tank M-223, while the water proceeded to the guard basin. Wash oil from the ethylene unit compressors was sent to the above-ground API separator. After the separation process, the oil was piped back to the refinery, and the water was sent along to the below-ground API separator. From the guard basin, oil skimmings were directed to Tank M-223, and the water was discharged as wastewater. The oil contained within Tank M-223 was hauled offsite for disposal.

148. The Sinclair-Koppers facility utilized French's disposal services for the entirety of the relevant period from July 1969 through October 1970.

149. During the relevant period, the Sinclair-Koppers facility sold its styrene tar byproduct, collected in Tank A-205, to other entities. The Kellogg Report fully documents that, during the period in question, the styrene residue was accounted for in a manner inconsistent with disposal at the Turtle Bayou site. The Kellogg Report is buttressed by the deposition testimony of plant personnel, particularly William Hall, and it was deemed reliable by Dr. Newell, Dr. Metzger, and Zoch.

150. The documentary evidence, namely French invoices and trip tickets and Sinclair-Koppers requisition forms and purchase orders, however, shows that French disposed of

some waste offsite during the relevant period. These documents show routine offsite disposal from Tank A-205, Tank M-223, and Tank F-156 by French (although, as stated above, the Tank A-205 styrene residue was not disposed at the Turtle Bayou site). More rarely, French hauled tank bottoms from the "flare pit" (or "flare pot"), "miscellaneous drums," and wastes from the API separators.

151. The court adopts Dr. Newell's analysis of the chemistry of the waste hauled offsite by French from the Sinclair-Koppers facility. Among the remedy driver chemicals, Dr. Newell concluded that the Sinclair-Koppers facility's wastes contained benzene, toluene, and styrene. At trial, Dr. Newell testified that benzene and toluene were present in the flare pit waste and the API separators. The court finds that benzene, toluene, and styrene were contained in the wastes generated by the Sinclair-Koppers facility that was disposed of at the Turtle Bayou site.

152. On cross-examination by Plaintiffs, Dr. Newell conceded that it was possible that all of the styrene residue from Tank A-205 was sold to Lowe Chemical. Ultimately, however, Dr. Newell still concluded that styrene was present in the API separator waste.

153. Zoch concurred in this assessment. He reasoned that the wash water from the benzene/toluene scrubber, which was discharged to Tank M-223 and hauled offsite, would have contained at least some quantities of dissolved benzene and toluene. Even Richard Bost ("Bost"), El Paso's expert, mentioned various lines of evidence indicating the presence of benzene, toluene, styrene, and naphthalene in Tank M-223. Dr. Newell agreed on cross-examination that Tank M-223 may have contained benzene and toluene, but he maintained that the data was not adequate to support a definitive conclusion. The court finds that Tank M-223 contained benzene and toluene.

154. There is convincing documentary evidence that French hauled waste from the Sinclair-Koppers facility to the Turtle Bayou site. In December 1969, two separate truck drivers, Stockton and Thomas, recorded the disposal location of Tank M-223 waste as "563" on their trip tickets.

155. Thomas, Kimmons, Rowland, and Stanhope specifically testified that they transported wastes from the Sinclair-Koppers facility to the Turtle Bayou site.

156. The Sinclair-Koppers wastes disposed of at the Turtle Bayou site contained hazardous substances as that term is defined under CERCLA.

157. When the Sinclair-Koppers wastes containing hazardous substances were disposed of at the Turtle Bayou site, those hazardous substances were released at the Site, causing the incurrence of response costs.

158. Forming reliable estimates for volume is particularly problematic regarding the Sinclair-Koppers facility. The direct evidence of disposal at the Turtle Bayou site, in the form of two trip tickets is not proper evidence from which to derive a minimum value because truck drivers other than Thomas and Stockton testified that they disposed of wastes from the Sinclair-Koppers facility at the Turtle Bayou site. Moreover, no Eckhardt survey for the facility is available.

159. Plaintiffs argue that the court should utilize the direct evidence of waste hauling from the Sinclair-Koppers facility to the Turtle Bayou site, the surviving trip ticket record, and driver testimony. As mentioned above, only two surviving trip tickets relating to waste from the Sinclair-Koppers facility reflect disposal at the Turtle Bayou site. Three other drivers, not listed on those trip tickets, testified that they disposed of waste from the Sinclair-Koppers facility

at the Turtle Bayou site. Of those drivers, Stanhope testified that he "in all probability" hauled waste from the Sinclair-Koppers facility to the Site more than once in a single day. Kimmons also implied that he took more than one load to the Turtle Bayou site, although he was uncertain of the exact frequency. If nothing else, Kimmons indicated that he always took two loads from the Sinclair-Koppers facility in succession because the Tank M-223 material would help clean out the "heavy, tarry, real thick material" that he first transported from Tank F-156. Finally, while Thomas agreed that the Sinclair-Koppers wastes were good fuel and thus used in the oil reclamation process at the Highway 90 site, he estimated that he disposed of more than ten, but probably less than twenty-five, loads of waste from the Sinclair-Koppers facility at the Turtle Bayou site. The credibility of these truck drivers was crucial to Plaintiffs during Phase I—their testimony is equally believable when it inures to the benefit of Defendants, rather than Plaintiffs.

160. For its minimum value, the court will utilize the analysis of Dr. Newell, who relied upon the Wynne letter. Based on his analysis of the Wynne letter, Dr. Newell concluded that French hauled 70,916 gallons per month offsite from the Sinclair-Koppers facility, excluding the styrene residue which was sold to realize its commercial value. The court chooses to prorate disposal volumes over a sixteen-month period, rather than the fifteen-month period favored by Dr. Newell. The court prefers this time frame because it contemplates disposal during every month, whether partial or full, from July 1969 through October 1970, and it is unclear precisely when in July 1969 disposal commenced. Thus, over the relevant sixteen-month period, this volume extrapolates to 1,134,656 gallons of total disposal. After applying the 25% rule, the court estimates that a minimum volume of 283,664 gallons of waste from the Sinclair-Koppers facility was disposed of at the Turtle Bayou site. Defendants concede that Dr. Newell's estimate

is "reasonable," but they nevertheless argue that he failed to account for waste from the styrene plant. Defendants acknowledge, however, that during the relevant period, the styrene residue was sold to Lowe Chemical. Thus, any inaccuracies intrinsic to Dr. Newell's calculation on this basis are minor.

161. For its maximum estimate, the court will utilize Dr. Metzger's comprehensive hybrid analysis of the plant records and the French ledger. During cross-examination, Defendants pointed out certain hauls that were omitted from the data summary and, thus, were not included in Dr. Metzger's calculations. When confronted with these discrepancies, Dr. Metzger candidly acknowledged the errors in the summary tables, which were prepared by Plaintiffs' counsel at his direction. Based on these mistakes, Defendants argue that this data point is unreliable. The court disagrees—given the sheer scope of the evidence, a few errors are to be expected. Defendants have fallen far short of proving that the overall estimate is unreliable or materially inaccurate in the context of the aggregate volume. The volume of waste that Dr. Metzger failed to include in his calculations will be included by the court.

162. Dr. Metzger originally opined that the maximum volume hauled offsite from the Sinclair-Koppers facility by French during the relevant period was 1,312,080 gallons. Dr. Metzger, however, failed to account for certain transactions in the French ledger, constituting 2,050 barrels or 86,100 gallons, in reaching his maximum volume estimate. Thus, the total for French hauling from the Sinclair-Koppers facility should be 1,398,180 gallons. After applying the 25% rule, the court's maximum estimate for the Oxirane facility stands at 349,545 gallons.

163. For determining the portion of the Sinclair-Koppers waste that went to the Turtle Bayou site, as opposed to other locations, the court has applied the 25% rule. Dr. Metzger

utilized a 20% figure, which he considered more appropriate due to the utility of Sinclair-Koppers's wastes as fuel for the boilers at the Highway 90 site. Plaintiffs argue that the 25% rule should not be utilized in connection with the Sinclair-Koppers facility because of the historical records indicating disposal at the Highway 90 site and the wastes' fuel value. The court previously determined, however, that the recorded destination of waste may not always reflect the actual disposal site of the waste. Moreover, truck driver testimony establishes that even good fuel wastes were sometimes disposed at the Turtle Bayou site. Finally, Kimmons and Thomas testified that approximately 25% of their total hauls went to the Turtle Bayou site—discounting those tickets that represent disposal at the Highway 90 site from the overall equation would skew the results by limiting the pool of trip tickets to an artificial number lower than the aggregate hauling that was subject to Kimmons's and Thomas's estimates. The 25% rule is a crude tool, but it is the best implement at the court's disposal in this situation.

164. Thus, the court's minimum volume estimate for Sinclair Koppers is 283,664 gallons, and its maximum volume estimate is 349,545.

Findings of Fact as to the Channelview Facility

165. ARCO assumed ownership and operation of the Lyondell Channelview facility in March 1969, when ARCO merged with Sinclair, its predecessor-in-interest. In July 1988, ARCO transferred ownership of the facility to Lyondell Petrochemical Company, then a wholly-owned subsidiary. Lyondell Petrochemical Company completed an initial public offering in January 1989, and ARCO divested its remaining interest in Lyondell in 1997.

166. The Channelview facility consisted of a number of interdependent operating units, each producing a different product, some of which were utilized in other plant processes.

The facility contained an alkylation unit that produced various alkylates and solvents from isobutene, a Houdry dehydrogenation unit for the processing of n-butane, a recovery unit for purifying the products from the Houdry unit, a methyl ethyl ketone ("MEK") unit, a styrene maleic anhydride ("SMA") unit, a polybutadiene ("PBD") unit, a meta-xylene unit, and an isophthalic acid unit.

167. The Channelview facility also included a wastewater treatment plant comprised of two API separators (east and west) and a settling lagoon. After treatment, wastewater was alternately stored in Tank 35, discharged into the San Jacinto River, or sent offsite for disposal by waste haulers.

168. Waste byproducts were hauled directly offsite from the recovery unit, the MEK unit, the SMA unit, and the PBD unit.

169. Various waste streams were funneled into Tank 35, a slop oil tank. Following collection, this material was often used as fuel onsite at the Channelview facility. Sometimes, however, material from Tank 35 was transported offsite for disposal. Tank 35 was used to store waste such as quench oil from the dehydrogenation quench oil system (heavy aromatics and parafins), absorber bottoms from the butylene absorber located in the Houdry unit, deoiler bottoms from the recovery unit's butene-2 fractionator, heavy alkylate bottoms from the alkylation unit's heavy solvent splitter (heavy gasoline and heavier fuel oil), hydrocarbon waste from the PBD unit's solvent decanter (including styrene), off-spec polymers from the MEK unit, skimmings from an API separator, acetone reject from the PBD unit, aromatic reject from the PBD's evaporator vacuum hotwell (including styrene), and toluene flush from the PBD unit.

170. Documentary evidence shows that French hauled various types of wastes offsite from the Channelview facility during the relevant period, including waste polymer and acid concentrator sludge from the MEK unit, skimmings from the west API separator, waste alcohol and solvents from the SMA unit, skimmings from the settling lagoon, API separator sludge, slop oils from Tank 35, various wastes from the PBD unit, and miscellaneous polymers, oils, sludges, and skimmings.

171. French drivers Thomas, Rowland, Kimmons, Stanhope, and Thornton all testified that they hauled liquid wastes from the Channelview facility.

172. Dr. Newell testified that wastes from the Channelview facility containing three remedy driver chemicals—benzene, toluene, and styrene—were dumped by French at the Turtle Bayou site. More specifically, Dr. Newell opined that benzene and toluene were constituents of the wastes associated with the SMA, PBD, and Houdry processes, and he linked styrene to the SMA process.

173. The court adopts Dr. Newell's analysis of the chemical constituents of the Channelview waste, which was based upon multiple lines of evidence and is amply supported by the record. Most significantly, a report prepared by Environmental Resources Management for Michael Connelly, counsel for Plaintiffs, reveals that wastes associated with the PBD unit and disposed offsite contained toluene and styrene. Moreover, Randolph Smith, Lyondell's corporate representative and engineer, conceded that benzene and toluene "may very well" have been formed in trace quantities in the Channelview facility's Houdry unit and that some of this benzene and toluene may have been discharged into Tank 35.

174. Dr. Metzger testified that the Channelview facility's waste would have contained only "indicator" chemicals such as MEK. The court is unpersuaded by this testimony, however, which does not squarely address Dr. Newell's opinions and is contrary to the weight of the evidence.

175. The Channelview wastes disposed at the Turtle Bayou site contained hazardous substances as that term is defined under CERCLA.

176. When Channelview wastes containing hazardous substances were disposed of at the Turtle Bayou site, those hazardous substances were released at the Site, causing the incurrence of response costs.

177. For its minimum volume estimate, the court will employ the analysis of Dr. Newell, who relied upon Plaintiffs' 104(e) letter regarding the Channelview facility, signed by E. B. Bradley on March 19, 1983 ("the Bradley letter"). Newell adjusted the total volume in proportion to the percentage of disposal that occurred during the operation of the Turtle Bayou site, which yielded an aggregate volume of 345,533 gallons. Because the court has chosen to use a sixteen-month window, this figure is further prorated to 368,569 gallons. Applying the 25% figure for the reasons enumerated above, the minimum volume estimate for disposal at the Turtle Bayou site is 92,142 gallons.

178. Defendants object to Dr. Newell's calculation on the basis that he failed to consider approximately 60% of the total waste hauled offsite from the Channelview facility by French because it was not categorized by ARCO as "hazardous" at the time the Bradley letter was drafted. Defendants argue that ARCO's delineation of what constituted a hazardous waste in 1983 is unconnected to whether a waste is, in fact, hazardous under CERCLA (or, presumably, whether

it contained one of the remedy driver chemicals in this case). During cross-examination, Dr. Newell explained that, while he recognized Defendants' concerns, he believed that the discount was still appropriate. At least for its minimum estimate, the court agrees. While it is conceivable that the waste that ARCO considered non-hazardous contained hazardous wastes under CERCLA (or, more importantly for the allocation phase, remedy drivers), it is also plausible that the waste was not hazardous and contained no remedy drivers. Thus, for a minimum volume estimate, the court draws this inference in favor of Plaintiffs.

179. The court prefers Dr. Newell's estimate to that of Dr. Metzger (Dr. Morrison's method yielded substantially similar results to Dr. Newell's analysis), which was subject to the vagaries of an incomplete database. Given the relatively limited scope of the Channelview waste disposal, these omissions were unacceptable. Moreover, the court is unpersuaded that Dr. Metzger's decision to designate a certain portion of tickets and treat them as "ambiguous," while discarding others, is optimal—the court prefers Dr. Newell's more objective approach.

180. As an intermediate data point, the court will assume that Dr. Newell erred by failing to include the wastes that ARCO considered non-hazardous. Assuming that Dr. Newell should have incorporated the remaining 60% of the waste hauled offsite from Channelview by French, the intermediate data point is 225,476 gallons.

181. For its maximum volume, the court will employ the French ledger method advocated by Defendants. First, Defendants used French invoices from the relevant period to ascertain that French charged ARCO 15¢ per barrel from, at a minimum, January 1969 through February 1970, following which French charged 35¢ per barrel throughout the relevant period.

Disposal charges from December 29, 1969, through February 27, 1970, amount to $495.00, which equates to 3,300 barrels, or 138,600 gallons, based on 15¢ per barrel. For the remainder of the relevant period, disposal charges equaled $3,706.50, which equates to 10,590 barrels, or 444,780 gallons, at the rate of 35¢ per barrel. Combined, these volumes equal 583,380 gallons.

182. Given the lack of available information for the preceding period, it is necessary to extrapolate backward for the period from July 1969 through December 28, 1969. Assuming the same disposal rate, the volume for French disposal for this period is 350,028 gallons. The probable accuracy of this calculation is supported by the relative consistency of disposal throughout the January through October 1970 time frame.

183. Thus, applying this method, the aggregate volume of offsite hauling by French from the Channelview facility is 933,408 gallons. After applying the 25% rule, under this maximum estimate, French disposed a total of 233,352 gallons of hazardous waste from the Channelview facility at the Turtle Bayou site.

184. Thus, the court's minimum volume estimate for Channelview is 92,142 gallons, its intermediate estimate is 225,476 gallons, and its maximum volume estimate is 233,352 gallons.

Findings of Fact as to El Paso

185. El Paso is the successor-in-interest to the Tenneco entities that owned and operated the Tenneco facility in Pasadena, Texas, during the relevant time period.

186. During this time, the Tenneco facility was comprised of an acetylene plant, a vinyl chloride monomer ("VCM") plant, an ammonia plant, a methanol plant, and an oxygen,

nitrogen, and argon plant. Jim Kachtick ("Kachtick"), a retired engineer who worked at the plant, testified about the plant processes.

187. The VCM plant used an acetylene (or VCM-A) process, in contrast with other methods of producing VCM. The acetylene plant cracked natural gas—methane—to produce acetylene, which was in turn used in the VCM plant as a feedstock in combination with hydrogen chloride, which was purchased from an external supplier. These feedstocks were then preheated and reacted over a mercuric chloride catalyst to produce VCM. Collectively, the VCM and acetylene plants generated waste streams that were disposed of offsite, including oil purge (which potentially contained wash oil, naphtha, ammonia, and acetylene polymers) and VCM heavy ends.

188. The ammonia plant produced anhydrous ammonia by passing a mixture of nitrogen and hydrogen over an iron catalyst.

189. The methanol plant produced methanol from synthesis gas (also known as acetylene off-gas) using a high pressure method. A waste stream of methanol tails was sometimes disposed of offsite.

190. Although process wastes from the sumps and sewer system were ideally discharged into the Houston Ship Channel or handled onsite, occasional upset events—such as clogged sewers—required cleaning and disposal by vacuum trucks. On such occasions, the wastes were sometimes hauled offsite.

191. The court adopts Dr. Newell's most recent analysis of the Tenneco facility's waste chemistry, with the exception of his final conclusion concerning TCA. Dr. Newell testified that DCA and vinyl chloride were present in the Tenneco wastes that were hauled offsite by

French to the Turtle Bayou site. The evidentiary record, as detailed below, comports with this analysis.

192. Tenneco contracted with French to dispose of its waste offsite on or about April 30, 1968. El Paso's internal documentation indicates that the last haul by French occurred on either November 14, 1969, or November 30, 1969. Problematically, Kimmons testified that he hauled "light ends" from the Tenneco facility to the Turtle Bayou site, where he dumped the waste into the main waste pit via a pipe that emptied beneath the surface of the liquid into the pit. According to Kimmons's account, a white vapor cloud arose from the main waste pit during this disposal, which is consistent with the testimony of the other drivers. Aerial photography, however, establishes that the main waste pit was not constructed until, at the earliest, January 7, 1970. This contradiction gives rise to three possibilities: (1) Kimmons did not dispose of Tenneco's VCM heavy ends at the Turtle Bayou site at all, (2) he disposed of the heavy ends in a location at the Turtle Bayou site other than the main waste pit, or (3) French continued to dispose of Tenneco's wastes during January 1970.

193. The court is inclined to infer the latter possibility, although it admits that this is a matter of some uncertainty. Kimmons was indisputably familiar with the Tenneco "heavy ends" (though Kimmons, like the other truck drivers, exhibited understandable confusion about calling material "heavy ends" when it displayed a tendency to evaporate at ambient temperatures), as evidenced by his accurate description of the waste. It is possible that Kimmons's familiarity was derived solely through his role at the Highway 90 site, where he regularly handled Tenneco's wastes. Kimmons, however, consistently testified throughout the course of this litigation that he disposed of Tenneco's waste at the Turtle Bayou site. Ultimately, the court relies upon the

continuous and firm recollection of a generally credible witness over the permissible negative inference that could be drawn from an absence of additional, internal documentation, especially when the time differential is so small. Finally, the court discounts (as less likely, not implausible) the conjecture that Kimmons disposed of the waste outside of the main waste pit because Kimmons himself emphatically rejected this possibility. Thus, despite some doubt, the court concludes that Kimmons hauled one or, at most, two loads of waste from the Tenneco facility to the Turtle Bayou site.

194. Nevertheless, this determination does not serve as a general reproof undermining the credibility of El Paso's records. The single load that Kimmons likely hauled was probably anomalous, as Kimmons himself seemed to recall only one such load (though, on another occasion, Kimmons mentioned hauling a "couple" of loads). If French had continued to haul many loads of Tenneco's wastes during the time Kimmons spent hauling waste to the Turtle Bayou site, he would likely have hauled more than a single load. Moreover, even if the trip ticket evidence is incomplete, at least one such ticket would probably have survived had many tickets been generated by Kimmons.

195. French drivers hauled VCM-A heavy ends waste from Tank C-18 at the Tenneco facility to the Turtle Bayou site. This waste contained the remedy driver chemicals vinyl chloride, DCA, and TCA. El Paso concedes that the heavy ends hauled from the Tenneco facility to the Turtle Bayou site contained vinyl chloride and DCA. It maintains, however, that no TCA was present in its VCM heavy ends.

196. Dr. Newell has, at different times, advocated both positions. Until his final report, Dr. Newell maintained that TCA was present in Tenneco's waste stream. After the initial

cross-examination of Dr. Newell, the court perceived the TCA link to El Paso's heavy ends to be one of the closest scientific questions in this case, with each side presenting strong arguments based on conflicting evidence. Due to the persuasive arguments of counsel on this point, the court specifically instructed Dr. Newell to reexamine this particular issue anew. In his subsequent report and testimony, the court-appointed expert retracted his earlier opinion and opined that TCA was not present in Tenneco's VCM heavy ends.

197. Helpfully, Dr. Newell identified the evidence supporting both positions in his testimony and final report. His original rationale for including TCA in Tenneco's wastes was based upon the presence of chlorine in the feedstock to the VCM-A plant; his understanding, formed after examining a 1982 patent, that the reaction of chlorine in a VCM-rich gas stream would result in the formation of TCA; and the presence of trichloroethylene, a compound similar to TCA, in the groundwater where the VCM-A plant was once located. In reaching his ultimate conclusion that TCA was not present in Tenneco's waste, Dr. Newell relied upon a 1968 analysis that did not reveal the presence of TCA in the VCM heavy ends (called VCM distillation column bottoms in the document); the fact that TCA was not listed on a July 1968 waste composition document (the "Bartlett-Snow proposal") describing the VCM heavy ends; the absence of any reactions resulting in the creation of trichlorinated compounds, such as TCA, on a 1966 process flow diagram; and the absence of TCA in most of the groundwater samples taken from beneath the Tenneco facility. Finally, Dr. Newell considered Bost's testimony that certain plant processes shown on the 1966 process flow diagram were never built, theoretically including the chlorine vapor line which would have injected chlorine into the VCM-A process.

198. The evidence excluding TCA from Tenneco's waste weakens under scrutiny. As for the 1968 chemical analysis, the author of the attached letter indicated that the "spot sample" subjected to the analysis "would not be truly representative of the material to be burned." Additionally, Dr. Newell exhibited uncertainty as to whether the gas chromatograph used to conduct the 1968 analysis would have been capable of recognizing a chemical such as TCA (though it did capture the presence of dichlorobutane, a chemical with a similar boiling point). Dr. Newell also conceded on cross-examination that the presence of dichlorobutane and dichlorethane could have masked the presence of TCA because of the proximity of the peaks on the chromatograph feedback due to the similar boiling points of the chemicals.

199. The Bartlett-Snow proposal was not authored by a Tenneco employee—it represents an attempt by Bartlett-Snow to solicit Tenneco's business. Strangely, it does not list vinyl chloride as a constituent of the VCM heavy ends, despite the fact that vinyl chloride was certainly present within the waste stream. Moreover, the Bartlett-Snow proposal appears to be incomplete when compared to the 1968 chemical analysis. The 1968 analysis indicated the presence of chloromethane, oxygenated species, 2-chloropropene, propyl chloride, dichloroethylene, DCA, dichloroacetylene, dichlorobutenes, dichlorobutanes, and vinyl chloride. In contrast, the Bartlett-Snow proposal mentioned only 2-chloropropene and DCA. Thus, the Bartlett-Snow proposal is not worthy of credence, and the court considers its probative value to be nil.

200. The third point upon which Dr. Newell relied, the absence of any mention of reactions creating TCA on a 1966 process flow diagram, lacks significant value. On cross-examination, Dr. Newell admitted that the chlorine stream shown on the 1966 process flow

diagram did not survive the VCM-A process, as it is not listed as an effluent on the diagram. Thus, the chlorine must have reacted in some fashion, even if the reaction is not explicitly described by the process flow diagram.

201. The absence of TCA in certain groundwater samples beneath the former VCM-A plant does not preclude the possibility that TCA, at some point in time, was a waste constituent in the VCM heavy ends. In any event, although at least one sample from MW-32 beneath Tenneco's facility possibly revealed the presence of TCA, the results were inconclusive and ambiguous.

202. Dr. Newell concluded that TCA was present in the Occidental VCM plant's waste primarily on the basis of the nature of the chemical reaction, which, in this respect, is seemingly identical to the reaction at the Tenneco facility. Dr. Newell purported to distinguish the two facilities on two grounds: (1) Bost's testimony that certain portions of the Tenneco facility shown on the 1966 process flow diagram were never constructed, and (2) Occidental's discovery response admitting that TCA was a possible constituent of its VCM waste stream. Neither justification for distinguishing the chemical constituents of the two facilities is compelling. First, Bost never offered any testimony regarding the chlorine line—assuming that the chlorine line was not constructed would be utter speculation. Second, Occidental's concession that TCA *may* have been present in its waste stream has no bearing on whether TCA actually was present in Tenneco's waste stream; likewise, the admission does not explain why only one of the two facilities, despite a similar chemical process, would generate TCA as a waste byproduct. In the absence of any meaningful distinction in the processes at each facility in this respect, the court is extremely reluctant to include TCA as a constituent in only one facility's waste. If TCA is indeed produced

in the VCM process in the presence of chlorine, a scientific proposition that has not been attacked by any party, then TCA should be considered a remedy driver chemical attributable to both El Paso and Occidental.

203. Furthermore, the EPA considers TCA to be a chemical constituent of VCM heavy ends—particularly those produced through the VCM-A process. *See* 40 C.F.R. § 261.32 & Appendix VII, EPA Listing Background Document for the Chlorinated Aliphatics Listing Determination (Final Rule), June 30, 2000, available at http://www.epa.gov/epaoswer/hazwaste/id/chlorali/index.htm. In an Administrative Order for Remedial Design and Remedial Action, dated December 22, 1993, the EPA specifically found that TCA was present in Tenneco's VCM heavy ends waste stream.

204. Although El Paso's evidence is not without probative value, the court is inclined to follow the hard science underlying Defendants' position. There are numerous reasons to conclude that, despite the presence of TCA in Tenneco's VCM heavy ends, it was nevertheless not detected in the sampling process. Conversely, El Paso has not supplied the court with any arguments undermining the general scientific principle that TCA is uniformly created in the VCM-A process in the presence of chlorine.

205. No direct evidence links any El Paso waste stream, other than the VCM-A heavy ends, to the Turtle Bayou site. In this case, the circumstantial evidence before the court is not sufficient to permit the conclusion that any other waste stream at the Tenneco facility was hauled offsite to the Turtle Bayou site.

206. The Tenneco wastes disposed of at the Turtle Bayou site contained hazardous substances as that term is defined under CERCLA.

207. When the Tenneco wastes containing hazardous substances were disposed of at the Turtle Bayou site, those hazardous substances were released at the Site, causing the incurrence of response costs.

208. Next, the court turns to the issue of volume. Ten French trip tickets directly show disposal of VCM heavy ends at the Turtle Bayou site. In addition, Kimmons testified that he hauled VCM heavy ends from the Tenneco facility to the Turtle Bayou site. El Paso maintains that French transported only these ten loads (approximately 42,197 gallons by El Paso's estimate), and maybe a load or two disposed of by Kimmons, of VCM heavy ends waste from the Tenneco facility to the Turtle Bayou site. Defendants, in contrast, argue that El Paso's documentation is incomplete and favor a calculation of waste disposal based on anticipated production values and other El Paso documents.

209. To support its argument that the trip ticket record for Tenneco is complete, El Paso relies upon the testimony of Kachtick, who purported to corroborate the overall accuracy of the surviving trip ticket record. After receiving an EPA request for information related to the VCM heavy ends waste stream, Kachtick directed Joe Hall ("Hall"), the head of the accounting department, to consolidate the relevant historical documents. Frank Robins, Tenneco's superintendent of offsites, whose responsibilities "consisted of all the loading, railroads, tank cars, pipelines, waste treatment, and the steam plant," recalled that Kachtick discovered a large number of boxes containing historical documents in an offsite storage warehouse. Hall hired an "outside person" to examine the documents contained within the boxes. After receiving the results of this review, Hall prepared a memorandum, dated July 25, 1984 (the "Hall memorandum"), analyzing records from 1963 to 1975 relating to VCM heavy ends. At the time, Kachtick was unfamiliar

with the Turtle Bayou site, so he limited his inquiry to the known superfund sites in the greater Houston area. Initially, Kachtick and Hall assumed that all of the French hauls were directed to the Highway 90 site. Kachtick expressed his opinion that the Tenneco waste hauling records were "very complete" with "no gaps" or "isolated pieces of paper" unconnected to other documents in the record. Moreover, El Paso points out that the records cover the entire period from July 1969 through December 1969, without any interruptions. Thus, El Paso reasons, it is unlikely that particular documents within this time period were misplaced, given the breadth of the records that are currently available.

210. Defendants respond that the Hall memorandum and the production projections for the Tenneco facility undermine the probable accuracy of El Paso's records. According to the trip ticket record, French made between three and seven hauls of VCM heavy ends per month and hauled a total of twenty-four loads during the July through November 1969 timeframe. Defendants argue that this amount of hauling is inconsistent with the Hall memorandum, which they interpret to mean that 913,823 gallons of VCM heavy ends were disposed of offsite during 1969. Defendants' calculations miss the mark, as they include waste hauling performed by Service Transport, Liquid Carriers, and Vacuum Tanks, Inc., in addition to French. Loads hauled by these other companies, at least based on the balance of the available evidence, were not dumped at the Turtle Bayou site. Rather, the meaningful number in the Hall memorandum is 269,947—the number of gallons of VCM heavy ends hauled offsite by French.

211. The Tenneco paper trail, however, is not without arguable omissions. As mentioned above, the documentary evidence does not include any hauls performed by Kimmons, who testified that he hauled Tenneco's heavy ends to the Turtle Bayou site. Defendants, however,

overstate these concerns—the Hall memorandum, upon which Defendants rely, indicates that companies other than French hauled Tenneco's VCM heavy ends wastes during 1969. Thus, lapses in time between French tickets do not indicate that the trip ticket record is incomplete. Finally, the court places some reliance on the testimony of Dr. Newell, who opined that the Tenneco trip ticket record "was very strong evidence," despite his general aversion to relying on trip tickets.

212. Likewise, the various estimates based on production capacity are persuasive but not dispositive. These estimates are suspect because the Tenneco facility was not operating at full capacity in 1969 due to economic circumstances—the VCM-A process used at the Tenneco facility was not cost-competitive with other more recently developed techniques in which propylene, ethylene, and chlorine were used to manufacture vinyl chloride. Moreover, El Paso had a contract to sell some of its acetylene to Air Liquide, rendering the acetylene unavailable for manufacturing vinyl chloride in the VCM-A plant, and further reducing its output. Finally, the production capacity estimates do not take into account ordinary upset events that might have disrupted VCM generation.

213. El Paso also contends its volume estimate should be reduced because much of its waste material vaporized on contact with the soil at the Turtle Bayou site. The record substantiates El Paso's claim that the volatile VCM heavy ends vaporized when exposed to ambient temperatures—the truck drivers uniformly noted this property of Tenneco's waste. It is impossible, however, to quantify the precise amount of possible evaporation with any precision. Given the court's election to adopt Dr. Newell's methodology that considers the risk associated with individual chemical constituents at the Site, El Paso's argument lacks persuasive force. The

vinyl chloride that evaporated is, obviously, no longer present at the Turtle Bayou site. Thus, it was not incorporated into Dr. Newell's remedy driver analysis, and El Paso will not be subjected to any liability on the basis of the waste that evaporated upon disposal.

214. Finally, Defendants urge the court to assign an additional amount of waste to El Paso based on its ownership of the Petro-Tex facility located in Pasadena. Defendants have not, however, offered sufficient credible evidence to establish the necessary linkage between Petro-Tex and the Turtle Bayou site. Kimmons's cursory and vague testimony about hauling from Petro-Tex was too inconsistent and ambiguous to constitute a reliable basis for liability.

215. For its minimum volume estimate, the court will utilize the direct evidence of the trip tickets and the testimony of Kimmons. Based on a density factor of eight pounds per gallon, Dr. Newell calculated that the ten documented hauls constituted approximately 40,079 gallons of VCM heavy ends. For a minimum estimate, the court will assume that Kimmons hauled one additional load to the Turtle Bayou site, which the court will account for by proportionally increasing Dr. Newell's total by 10%. Thus, the court's minimum volume for El Paso is 44,087 gallons.

216. For its maximum volume, the court will look to the Tenneco facility's production capacity. The court concurs with Dr. Newell that the best estimate of the VCM heavy ends production rate is 848 pounds per hour. This figure, derived from an interoffice memorandum from W. E. Simmons to D. C. Lee, dated April 16, 1968, was based on actual production records from the first quarter of 1968. While this data point is imperfect because it concerned a time before the relevant period, the higher production rates suggested by Defendants are inferior. First, the 1961 process flow diagram was nothing more than a projection based on

engineering theory, was eight years remote, and did not account for upset events or below-capacity operation. Second, the May 6, 1968, letter's figure of 1,063 pounds per hour is specifically premised on "full production rates" and thus represents an ideal, rather than an actual, figure. Third, the September 1968 memorandum estimated 7,120,000 pounds per year of VCM heavy ends production. This document, however, does not reveal the basis for this number, and thus it is less reliable than the April 16 memorandum. While it may be somewhat overstated because of the reduced operation of the Tenneco facility, the April 16 memorandum serves as a reasonable, useful basis for the court's maximum estimate.

217. Assuming twenty-four hours per day production over the five-month period from July to November 1969 and a density of eight pounds per gallon, the Tenneco facility's VCM heavy ends production equals 389,232 gallons. For the maximum estimate, the court will assume that French, and not any other carrier, transported the entirety of this waste offsite. Application of the 25% rule reduces the volume to 97,308 gallons.

218. Accordingly, the court's minimum volume estimate for El Paso is 44,087 gallons, and its maximum volume estimate is 97,308 gallons.

Findings of Fact as to Bayer

219. As previously determined, Bayer is the corporate successor to Stauffer Chemical Company ("Stauffer"). During the relevant period, Stauffer owned and operated the Manchester Road facility, which produced and regenerated sulfuric acid. Following Phase I of the trial, the court found by a preponderance of the evidence that hazardous waste from the Manchester Road facility was disposed of at the Turtle Bayou site.

220. The court adopts Dr. Newell's analysis of the waste constituents of Stauffer's waste. The court finds that naphthalene was a constituent of the spent acid sludge hauled by Kimmons.

221. Plaintiffs and El Paso contend that Stauffer's waste contained benzene, toluene, ethylbenzene, and xylene in addition to naphthalene. Conversely, Bayer maintains that no remedy driver chemical was present in Stauffer's waste.

222. No document in evidence reveals the chemical composition of Stauffer's spent acid. Bayer received spent acid for subsequent regeneration from various suppliers. This spent acid would contain some percentage of hydrocarbons, some of which might have been aromatic. Jess McAngus ("McAngus"), an expert witness retained by Bayer, Kenneth Kirksey ("Kirksey"), Bayer's corporate representative, and Zoch all testified that these aromatic hydrocarbons would react with the sulfuric acid to form heavier hydrocarbons over the lengthy periods between tank cleanings. Moreover, Bayer points out that Kimmons hauled the spent acid sludge at the bottom of the tank, which it claims had "settled out" from the spent acid. Bayer asserts that this sludge would have contained only "heavier hydrocarbons," none of which is a remedy driver chemical in this case.

223. Plaintiffs and El Paso, relying on the testimony of Douglas Mast, an expert who testified during the first phase of trial, and Dr. Newell, as well as various Material Safety Data Sheets ("MSDS"), assert that the spent acid sludge retained at least some lighter hydrocarbons.

224. Dr. Newell refrained from undue speculation regarding the contents of Bayer's waste. For example, in an MSDS for Citgo Petroleum Corporation's ("Citgo") spent acid

waste, benzene was described as present, if at all, at levels less than 0.1%, which Newell construed as a non-detect. On the three other MSDSes that Dr. Newell examined, benzene was not listed as a potential hazard at all. There is simply insufficient evidence of the presence of benzene or toluene to find them to be constituents of Stauffer's spent acid sludge.

225. Dr. Newell assigned naphthalene to Stauffer's spent acid stream partly on the basis of MSDSes from Exxon and Valero Energy Corporation ("Valero"), which McAngus agreed were representative of the spent acid provided to Stauffer. Most importantly, the Exxon MSDS listed the composition of the spent acid as 3% naphthalene. The Valero MSDS indicated the presence of "[d]istillates (petroleum), alkylate" at a level ranging between 6% and 8%. On this basis, Dr. Newell inferred that it was "possible to have naphthalene in this spent acid waste."

226. Dr. Newell also opined that the MSDS from Rhodia, Inc. ("Rhodia"), and Citgo were consistent with his analysis. He pointed to an MSDS from Rhodia, another operator of the Manchester Road facility, which indicated the presence of 6% mixed hydrocarbons in its spent acid waste. While the document did not reveal the precise breakdown of the hydrocarbons, it nevertheless supports the existence of "organics in [the spent acid] stream." Moreover, the MSDS from Citgo revealed the presence of C-4 olin polymers, a synonym for spent alkylation acid, again confirming that naphthalene could have existed in a spent acid stream.

227. Dr. Newell conceded that Stauffer's processes would strip out some volatile chemicals, but he maintained that some amount of lighter hydrocarbons would remain. As previously found by the court during Phase I, the spent acid tanks were cleaned out only once every five to ten years. Nevertheless, material was not directed to the spent acid tanks solely at the beginning of such a period. In the end, Dr. Newell concluded that newer material introduced

to the spent acid tank would not have had time to react so that all of the lighter hydrocarbons were eliminated. Thus, while the court agrees with Kirksey, Zoch, and McAngus that the sulfuric acid reacted with the lighter hydrocarbons to form heavier hydrocarbons, it finds that some lighter hydrocarbons survived long enough to be hauled offsite.

228. Accordingly, the court finds that naphthalene was present in the spent acid sludge hauled by French from the Manchester Road facility to the Turtle Bayou site.

229. Plaintiffs and El Paso did not submit any compelling new evidence during the Phase II proceedings concerning the volume of waste that was hauled from the Manchester Road facility to the Turtle Bayou site. Nevertheless, Plaintiffs and El Paso argue that there "is a wide range of possible offsite waste volumes from Bayer," and that the court should employ a statistical analysis of the circumstantial evidence to determine Bayer's waste volume.

230. For its minimum volume, the court assigns to Bayer the discrete, fifty-barrel load described by Kimmons, representing 2,100 gallons of waste.

231. For its maximum load, the court will assume that additional upset events forced Bayer to utilize French's services for offsite hauling on other occasions. This data point is consistent with Kimmons's testimony that he hauled some of Stauffer's wastes to "Rollins Environmental Services" and perhaps one load to the Highway 90 site, as well. He believed that French hauled "more than five" total loads offsite from Stauffer's facility. The court is skeptical, however, that upset events would have forced Stauffer to dispose of its waste offsite very frequently, given the lack of supporting evidence. Bayer persuasively demonstrated that its waste was typically handled onsite. Thus, for a maximum, the court will assume that two such upset

events caused the diversion of Stauffer's wastes to the Turtle Bayou site. Therefore, the maximum volume for Bayer is 4,200 gallons, or two fifty-barrel loads of waste.

232. The court's minimum volume estimate for Bayer's contribution to the Turtle Bayou site is 2,100 gallons, and its maximum volume estimate is 4,200 gallons.

Findings of Fact as to Chevron

233. As previously determined in the court's Phase I findings, Chevron is the corporate successor to Gulf Chemical Company ("Gulf") in the operation of the Gulf Olefins Cedar Bayou Facility (the "Cedar Bayou facility"). During 1969 and 1970, the Cedar Bayou facility consisted of an ethylene unit, a normal alpha olefins unit, and a polyethylene unit.

234. The Cedar Bayou facility produced three primary waste streams prior to the expansion of the facility in 1976. First, each unit had a dedicated API separator that yielded oil skimmings and wastewater. Additionally, the polyethylene unit separator contained a mechanism for the removal of plastic pellets that were produced by the polyethylene production process. The polyethylene unit also produced a slop hexane that was ordinarily transported by tank truck to the Gulf refinery in Port Arthur for reuse. The normal alpha olefins unit generated a slop xylene that was likewise typically transported by tank truck to Port Arthur for reuse. While Chevron suggests that its slop hexane and xylene would always have been sent to the Port Arthur refinery, the court previously found that various upset events occasionally precluded Gulf from realizing the commercial value of these wastes. Nevertheless, no evidence directly links either of these waste streams with offsite disposal by French.

235. Two waste streams at the Cedar Bayou facility contained the plastic pellets described by Kimmons. The first such stream consisted of oily pellets and wastewater from the

oil/water separator serving the polyethylene unit. Alternatively, Kimmons's testimony could also refer to waste from Tank 902, which contained slop hexane, mineral oil, and possibly a small amount of pellets from the polyethylene unit. John Strausser ("Strausser"), who served as manager of plant operations at the Cedar Bayou facility from 1968 through 1971, testified that the waste from Tank 902 was invariably shipped to the Port Arthur refinery in eighteen-wheeler tanker trucks.

236. The waste stream that Kimmons described hauling was most likely API separator sludge, based on the presence of plastic polyethylene pellets in the stream. Moreover, while the court remains unconvinced that the slop hexane and xylene streams were always disposed of at the refinery in Port Arthur, there is no evidence of a similar economic incentive to retain the API separator sludge waste. Additionally, the offsite hauling mentioned on the Cedar Bayou facility's Eckhardt survey referred exclusively to the API separator waste. Thus, although inconclusive, it is probable that Kimmons disposed of the API separator sludge from the polyethylene unit, rather than the slop hexane or xylene, at the Turtle Bayou site.

237. Dr. Newell opined that the API separator sludge contained the remedy driver chemicals benzene, naphthalene, and toluene. He based his inclusion of benzene and naphthalene on a 1982 analysis of the sludge from the API separator. Dr. Newell concluded that toluene was present in the API separator sludge because it was detected in a wastewater effluent laboratory analysis.

238. The court finds that benzene and naphthalene were components of the Cedar Bayou facility's polyethylene unit's API separator sludge during the relevant period. In reaching this conclusion, the court relies upon the testimony of Dr. Newell and an environmental sample

analysis, dated July 27, 1982, performed upon the polyethylene unit's API separator sludge. Despite the intervening plant expansion in the mid-1970s, there is no indication that the chemical properties of Chevron's polyethylene unit wastes would have changed.

239. The court concludes that the remedy driver chemical toluene should not be assigned to Chevron. Dr. Newell opined that toluene was present in Gulf's wastes on the basis of a wastewater effluent laboratory analysis at the facility's wastewater treatment plant. This sample, however, would have been collected after wastewater and rainwater from throughout the plant had commingled in the retention basin. Thus, it is uncertain which process at the Cedar Bayou facility produced toluene as a waste product. On cross-examination, Dr. Newell admitted that he was not aware of any connection between toluene and the polyethylene unit. Thus, there is insufficient evidence linking toluene to the polyethylene unit separator sludge waste stream that French hauled to the Turtle Bayou site.

240. For its minimum volume estimate, the court will utilize the testimony of Kimmons, who testified that he took one "partial" load from the Cedar Bayou facility to the Turtle Bayou site. Typically, Kimmons drove a fifty-barrel truck, though he occasionally utilized a 130-barrel truck or attached a fifty-barrel "pup trailer" to his fifty-barrel truck. As this is a minimum volume estimate, the court will assume that he drove a fifty-barrel truck on this occasion. Thus, the minimum volume for Chevron is 2,100 gallons.

241. For its intermediate estimate, the court selects the French ledger as well as the testimony of Kimmons as appropriate data points. The sole entry in the French ledger during the relevant period that shows hauling services provided by French's Houston division to the Cedar Bayou facility is dated July 28, 1970, with a disposal fee of $26.00. It seems likely,

considering the divisibility of this fee, as Chevron suggests, that this charge represents a single 130-barrel load, representing 5,460 gallons of waste. For purposes of the intermediate volume estimate, the court will assume this load went to the Turtle Bayou site. Kimmons, however, very rarely drove a 130-barrel truck; therefore, the court will assume that Kimmons dumped an additional fifty-barrel load of waste at the Turtle Bayou site. Thus, the intermediate volumetric estimate is 7,560 gallons.

242. For a maximum volume estimate, the court will employ the 1979 Eckhardt survey for Gulf. The Eckhardt survey response was prepared by Mel Vyvial ("Vyvial"), an engineer at the Cedar Bayou facility. According to the Eckhardt survey, the Cedar Bayou facility utilized the services of French Limited from 1967 through 1971. Gulf reported on the Eckhardt survey that French hauled approximately 600,000 gallons of its wastes offsite from the Cedar Bayou facility, which translates to 120,000 gallons per year from 1967 through 1971.

243. At trial, Vyvial testified that his Eckhardt survey estimates were overstated. Vyvial testified that the 600,000 number was a rough estimate based on how frequently he observed vacuum trucks at the Cedar Bayou facility. He claimed that the actual amount hauled offsite was likely much smaller, as he purportedly failed to account for the mid-1970s plant expansion in forming his estimate of hauling during the 1967 through 1971 period. Vyvial reasoned that the actual volume of waste hauled offsite during the relevant period was probably between 30,000 and 60,000 gallons per year, based on a comparison of the production capacity of the polyethylene unit before and after the expansion. Vyvial supplied an affidavit, dated May 28, 1987, identifying this purported mistake.

244. The court is inclined to believe that Vyvial's original estimate is more accurate. Presumably, Vyvial strove to ensure that Gulf's response to the Eckhardt survey was correct. Vyvial began working at the Cedar Bayou facility in 1977, in the middle of a period of expansion that lasted from 1976 through 1978. Because he joined in the midst of the expansion, Vyvial had contemporaneous knowledge that the Cedar Bayou facility's production capacity was increasing. Thus, it is inexplicable that he would remember in 1987, almost a decade later, that he overstated the volume estimate for French hauling by neglecting to account for the facility's smaller capacity during the relevant time period. Therefore, the court concludes that Vyvial's 1979 response to the Eckhardt survey is more likely to be reliable than his 1987 affidavit—the passage of nearly a decade would likely have made any new estimate less accurate.

245. The court will apply the 25% rule. Chevron has not retained any records concerning Gulf's waste disposal during the relevant period. Thus, the court has no other principled basis for determining the proportion of the waste that went to the Turtle Bayou site.

246. Prorated over a sixteen-month period and following application of the 25% rule, this line of evidence yields a maximum volume estimate of 40,000 gallons.

247. Thus, the court's minimum volume estimate for Chevron is 2,100 gallons, its intermediate estimate is 7,560 gallons, and its maximum volume estimate is 40,000 gallons.

Findings of Fact as to Exxon

248. As discussed in the Phase I findings, Exxon, as Humble Oil and Refining Company, operated an integrated refinery and chemical plant in Baytown, Texas (collectively the "Baytown facility"), during the relevant period.

249. The only waste from the Baytown facility that has been sufficiently linked to the Turtle Bayou site is D4580, a viscous, liquid waste that would cool to a consistency similar to Vaseline. The waste was called "D4580" because that was the name of the tank from which it was hauled. Joiner hauled other wastes for Exxon, as well, but there is no persuasive evidence of disposal of such wastes at the Turtle Bayou site, no reliable evidence of volume, and no real indication of what constituents these wastes may have contained. Thus, the court will not consider these wastes in rendering an allocation. Irvin LaBorde ("LaBorde"), a Joiner truck driver, claimed that he hauled crude tank bottoms from the Exxon facility to the Turtle Bayou site. His testimony, however, is too unreliable to serve as more than general corroboration of Joiner's use of the Site.

250. There is no evidence suggesting that any of the eight remedy driver chemicals was contained within the D4580 amorphous polymer waste in its pure form. Before D4580 was hauled offsite, however, a heavy atmospheric gas oil was added to make the polymer less viscous to facilitate the disposal process. The court adopts Dr. Newell's conclusion that the heavy atmospheric gas oil contained two remedy driver chemicals—toluene and napthalene.

251. In Phase I, Norman Master ("Master"), an expert for Plaintiffs and El Paso, testified that the heavy atmospheric gas oil would have contained benzene. Exxon did not attack Master's testimony in this regard on cross-examination nor did it object to Master's testimony as lacking foundation. Meanwhile, Rogers, a Joiner truck driver, testified that he recognized the smell of benzene, recalled smelling benzene in D4580, and remembered observing D4580 at the Turtle Bayou site. Thus, the court initially found that benzene was a constituent of the D4580 waste stream disposed of at the Site.

252. During Phase II, Exxon introduced ample evidence to controvert this testimony. Most significantly, a Refinery Stream Speciation published by the API in November 2002 (the "API study") establishes that heavy atmospheric gas oil does not contain detectable levels of benzene. Moreover, Zoch convincingly testified that benzene would never be contained within heavy atmospheric gas oil because the boiling point of benzene is much lower than that of the constituents of heavy atmospheric gas oil, which is produced as one of the "cuts" in the distillation process in the refining of crude oil. During this process, the crude oil is heated so that its constituents vaporize and separate, allowing refineries to isolate certain chemicals from others with different boiling points. Because the boiling point for the components of heavy atmospheric gas oil is much higher than benzene, benzene would be extracted during an earlier cut. Thus, the court finds that the heavy atmospheric gas oil used by Exxon did not contain benzene.

253. Master never explained the basis for his conclusion that the heavy atmospheric gas oil contained benzene. His conclusory assertion cannot stand in the face of Exxon's detailed, persuasive evidence. While Rogers appeared to be a candid and sincere witness, he has an eighth grade education and no expertise in chemistry. Thus, the weight of the evidence, particularly the API study and Zoch's convincing testimony, favors a finding contrary to his testimony.

254. Plaintiffs and El Paso argue that two gas chromatograms attached to a March 13, 1982, letter indicate the presence of benzene in Exxon's heavy atmospheric gas oil. One of the chromatograms contains a handwritten comment that reports the presence of either C2 through C11 hydrocarbons or C7 through C11 hydrocarbons. Benzene, a C6 hydrocarbon, would be present only under the former interpretation. Despite some ambiguity, the court believes that the

notation is more likely "C7" than "C2." Moreover, counting the "peaks" on the chromatograms provides no greater clarity. At best, the chromatograms are inconclusive.

255. Based on the evidence adduced during Phase II of the trial, it is apparent that benzene was not a chemical constituent of D4580. While Phase II was not intended to provide the parties with a second bite at the apple, the court cannot, in fairness, allocate costs to Exxon based on a remedy driver chemical that was not, in fact, in its waste that was hauled to the Turtle Bayou site.

256. The volume of D4580 that went to the Turtle Bayou site is difficult to ascertain. Based on the testimony of Rowland, Rogers, Menifee, Gonzales, and LaBorde, as well as the documentary evidence, as described within this opinion and in the Phase I findings, it is unmistakably clear that Joiner utilized the Turtle Bayou site. Nevertheless, quantifying that use is problematic.

257. Plaintiffs and El Paso argue that the court should account for volumes of Exxon waste potentially hauled to the Turtle Bayou site by French, pointing out that Exxon appears in the French ledger for the year 1970. The court, however, has refrained from viewing a business relationship with either French or Joiner as sufficient evidence for liability at the Turtle Bayou site. Plaintiffs and El Paso have not pointed to any specific evidence of French's disposal of Exxon's wastes at the Turtle Bayou site. Moreover, Plaintiffs and El Paso cannot bootstrap the French hauls into consideration based on the Joiner record because the two lines of evidence are almost totally distinct. The court has employed French ledger analysis to determine what quantity of waste French may have hauled from a particular party to the Turtle Bayou site. Entries in the

French ledger, however, do not satisfy the threshold requirement of adequate linkage between a given facility's wastes and the Turtle Bayou site.

258. Joiner's use of the Turtle Bayou site was probably most significant during the early part of the period ranging from 1970 through 1973. Rowland testified that the Turtle Bayou site was utilized frequently "in the early years, the early months of [Joiner]." Menifee recalled traveling to the Turtle Bayou site several times as an apprentice truck driver during high school, but he believed that the Site was "dead" when he graduated from high school and obtained his commercial driver's license sometime during 1973. Benoit recalled that some of the "older drivers" talked about having disposed of waste at the Turtle Bayou site. As Joiner did not begin hauling Exxon's D4580 waste until February 1972, much of Joiner's usage of the Site had probably already occurred.

259. Five trip tickets point strongly to disposal at the Turtle Bayou site. The first, Ticket No. 14389, dated June 4, 1973, and signed by Benoit, relates to the disposal of D4580 waste. Although Benoit appears to have written simply "disposal" on the ticket, the notation "Secret Disposal (LA)" is written on the ticket in a different hand. As discussed above, the court finds that "LA," in this context, represents disposal at Liberty Anahuac Road, or the Turtle Bayou site. The "secret disposal" notation is likewise suggestive of disposal at the Site.

260. The second, Ticket No. 14392, also signed by Benoit, is dated June 6, 1973, and (though it is difficult to decipher) seems to relate to the disposal of D4580. The original driver appears to have listed "disposal" as the destination. Once again, however, an additional notation of "secret place" has been added to the ticket. Based on the notation itself and the similar

notation on Ticket No. 14389, the court concludes that this load of waste was dumped at the Turtle Bayou site.

261. The third, Ticket No. 8696, signed by Benoit, is dated June 24, 1973, and the original destination is listed only as "disposal." An additional remark, however, indicates "LA" as the dump site. The court finds that this load of waste was disposed at the Turtle Bayou site off Liberty Anahuac Road.

262. The fourth, Ticket No. 8028, dated June 23, 1973, was signed by Wallace. The destination of the waste is listed as "Disp.," with "LA" written diagonally across this section of the trip ticket. Unlike the Benoit tickets, the handwriting related to the remainder of the ticket and the "LA" notation appears similar (albeit to an untrained eye). The court concludes that this load of waste was disposed of at the Turtle Bayou site. Wallace's name also appears on another trip ticket, associated with Lubrizol, indicating disposal at the Turtle Bayou site.

263. The fifth, Ticket No. 14179, dated June 18, 1973, and signed by B. M. Taylor, reveals disposal of D4580 waste at "LA." The court concludes that this load of waste was dumped at the Turtle Bayou site.

264. In an effort to sever, or at least undercut, the association between the "LA" notations and the Turtle Bayou site, Exxon points to two trip tickets bearing the notation "RP La" (Ticket Nos. 18065 and 8436). These notations appear to have been added by someone other than the drivers who originally filled out the tickets. Exxon argues that these trip tickets, especially when compared to the surrounding trip tickets, relate to hauls to the Rollins-Purle site in Louisiana. Thus, Exxon reasons that the "LA" notations on the suspect trip tickets likewise refer to disposal at the Rollins Purle facility in Louisiana. This evidence, however, actually undermines

Exxon's argument. Most obviously, these tickets include an "RP," while the suspect notations do not. Additionally, on the suspect tickets, both letters of "LA" are capitalized. Similarly, both letters in the"RP" on the non-suspect tickets are capitalized. The "a" in the "La" on the non-suspect tickets, however, is not capitalized. Thus, the court infers that the originator of these notations capitalized only the first letter of a word in an abbreviation. Accordingly, "LA" stands for "Liberty Anahuac," while "La" represents "Louisiana."

265. Curiously, other trip tickets bear an additional notation "RP La" that is crossed out (Ticket Nos. 18062 and 17613). Thus, it would seem that these loads did not go to Rollins Purle but to some other destination. While peculiar, this oddity is not, standing alone, an adequate basis for the court to infer that these loads went to the Turtle Bayou site. Nevertheless, it is indicative of the general unreliability of the Joiner trip ticket record and the inconsistent disposal practices of Joiner.

266. There are many other tickets on which the destination site is listed only as "disposal," "yard," "dump," or similar designations. Based on a review of the five trip tickets discussed above and the testimony in this case, it is probable that some loads of waste associated with trip tickets bearing these notations likely went to the Turtle Bayou site. This likelihood is buttressed by the testimony of Rowland concerning the subterfuge surrounding the disposal of Exxon's wastes, as discussed in the court's Phase I findings. Although Exxon correctly points out that D4580 would not have simply evaporated or been absorbed into the soil, the earth-moving operations described by Vernon McGee ("McGee") and captured by aerial photography suggest that the waste may have been tilled into the soil. The court, however, will not include these hauls in its minimum estimate, as the level of uncertainty as to where each load was dumped is too high.

267. For its minimum volume estimate of Exxon's contribution to the Turtle Bayou site, the court will utilize the five trip tickets that strongly suggest disposal of waste at the Site. The total volume reflected in these five tickets is 15,000 gallons. While it is likely that other loads of Exxon's waste were dumped at the Turtle Bayou site, this amount nevertheless represents a credible minimum amount of disposal.

268. Dr. Newell derived his intermediate and maximum volume estimates through an analysis of D4580 generation rates and documented disposal of Exxon's wastes at other sites, such as the Sheridan site and the TECO site. Problematically, however, Dr. Newell did not consider Exxon's generation of wastes other than D4580 in determining whether Exxon's waste production was "accounted for" by disposal at sites other than the Turtle Bayou site. The fact that the Exxon facility produced wastes other than D4580 is undisputed. Thus, Dr. Newell's conclusion that the D4580 was "accounted for" at other sites, based solely on a comparison of D4580 generation rates and waste disposal records that do not always specifically identify the type of waste, is questionable. Moreover, Dr. Newell's Sheridan hypothesis breaks down at the month-to-month level. While Exxon's D4580 production could possibly be accounted for on a yearly basis, assuming that Exxon generated no other wastes, the Sheridan site did not receive sufficient Exxon wastes in individual months to account for the quantity of D4580 produced. Thus, in these months, it is probable that some D4580 was disposed of elsewhere.

269. Plaintiffs and El Paso argue that the court can determine the proportion of D4580 that was disposed of at the Sheridan site by counting the number of 3,000-gallon loads that were received by the Sheridan site. Exxon requested that Joiner haul away waste from the D4580 tank when it reached the 3,000-gallon mark. While several Joiner drivers mentioned the practice

of combining loads in a tank at the Joiner yard, Plaintiffs and El Paso point out that only seven of the 171 trip tickets surviving from 1972 and early 1973 show disposal volumes of greater than 3,000 gallons. Thus, Plaintiffs and El Paso reason, combining loads of D4580 in the Joiner yard was the exception, rather than the rule. Certainly, the practice could not have been uniform, as the Sheridan records reveal that some of Joiner's disposals were 3,000 gallons.

270. Plaintiffs and El Paso's position is undermined, however, by the ambiguity surrounding Joiner's trip ticket procedure for loads of waste that were combined in a tank in the Joiner yard. Certainly, the original trip ticket might not accurately reflect the final disposal location. Moreover, it is not evident that additional trip tickets were generated. Still, the court would expect a record of some sort to be created, as the Joiner drivers were paid based on the times noted on the trip tickets. These inconsistencies are difficult, perhaps impossible, to reconcile.

271. In the end, the court does not find Plaintiffs and El Paso's "3,000 gallon" hypothesis to be useful. The relatively low percentage of 3,000-gallon loads received by Sheridan casts considerable doubt on the conjecture that the loads were not simply reconstituted into larger ones in the Joiner yard. For example, during March 1972, not a single 3,000-gallon load of Joiner's waste was disposed at Sheridan. During this month, however, Sheridan reported receiving eight 2,100-gallon loads, sixty 5,500-gallon loads, and sixteen 5,000-gallon loads. Given the scope of Joiner's disposal at the Sheridan site that month, it is implausible that not a single load of D4580 was disposed there. Moreover, Joiner had an economic incentive to avoid trips with almost half-empty trucks—the 130-barrel trucks that Joiner used for offsite hauling had capacities of 5,460 gallons.

272. Even if the court could resolve the problems presented by the disposal records of the Sheridan site, it would be unable to determine satisfactorily what percentage of the Joiner hauls from Exxon's facility went to the Turtle Bayou site. While Dr. Newell, Dr. Metzger, and Dr. Morrison all used percentage estimates, the court was unpersuaded by any of the supporting rationales. Exxon's case is particularly complicated because of the unique character of the D4580 waste. If left untended, the D4580 waste would have been readily visible to even a casual observer, which would have been contrary to Joiner's covert disposal strategy.

273. For its maximum volume estimate, the court will utilize a method similar to that of Zoch. In forming his maximum hauling estimate for Lubrizol, Zoch testified that he believed that Joiner possibly could have disposed of five loads every three months at the Turtle Bayou site without being discovered. This number could be considered somewhat conservative for an entire quarter, given that the trip ticket record for Exxon reveals five loads that were probably hauled to the Turtle Bayou site in the space of a month. On the other hand, there are only five such suspect trip tickets in the entire record regarding Exxon. Moreover, it is probable that Joiner utilized the Turtle Bayou site, at least by February 1971, only when disposal elsewhere was impracticable. Thus, the court expects that disposal at the Turtle Bayou site likely occurred unevenly in punctuated bursts followed by periods of non-use. For its maximum estimate, the court concludes that five loads were hauled to the Turtle Bayou site per quarter for 1972 and 1973. While it is possible that some dumping continued into 1974, the court views this possibility as too remote.

274. The court will assume that each load contained 3,000 gallons. While it is possible that a full load taken from a tank at the Joiner yard could have been dumped at the Turtle

Bayou site, each of the five suspect trip tickets indicated only 3,000 gallons in volume. Thus, considering the period from February 1972 through January 1974, the court's maximum estimate is that Joiner disposed of forty 3,000-gallon loads of Exxon's D4580 waste at the Turtle Bayou site, constituting 120,000 total gallons.

275. Thus, the court's minimum volume estimate for Exxon is 15,000 gallons, and its maximum volume estimate is 120,000 gallons.

Findings of Fact as to Lubrizol

276. Lubrizol operated two facilities, located at Deer Park and Bayport, Texas, that are implicated in the instant litigation.

277. Although French hauled Lubrizol's wastes offsite during 1969 and 1970, there is no evidence that French disposed of these wastes at the Turtle Bayou site. Neither the truck driver testimony nor the documentary evidence supports the proposition that a single load of Lubrizol waste was dumped at the Turtle Bayou site by a French employee.

278. For the same reasons, the court finds that Plaintiffs and El Paso have not demonstrated a sufficient connection between the Bayport facility and the Turtle Bayou site. While a closer question, the court is unable to conclude that any waste from the Bayport facility was hauled to the Turtle Bayou site because the Bayport facility was covered under the same operating contract with Joiner as the Deer Park facility.

279. Lubrizol maintained a set of "delivery" tickets or "d-tickets" for waste disposal. These tickets, however, do not reveal information regarding where drivers leaving Lubrizol's facilities actually dumped the wastes. Apparently, Lubrizol's security guards stationed

at the gate to Lubrizol's Deer Park facility habitually recorded the disposal location as "Dayton," irrespective of any particular load's actual destination or the driver's efforts to tell them otherwise.

280. As mentioned above, Brabston, Lubrizol's waste procurement officer, seemingly accepted improper benefits from Mr. Joiner, albeit outside of the relevant time period. Plaintiffs and El Paso, however, have offered no evidence of a *quid pro quo*. Moreover, such evidence does nothing to strengthen the relationship between Lubrizol's wastes and the Turtle Bayou site. At best, Brabston's possible corruption suggests that Lubrizol did not make substantial efforts to ensure that its wastes were disposed of properly.

281. Brabston testified that he recommended Joiner for Lubrizol's waste disposal needs based solely on price. The record evidence, however, does not support this assertion. In a June 23, 1971, memorandum to W. P. Martens, Brabston recommended declining a bid by Rollins-Purle in favor of the continued use of Joiner, despite the fact that the Rollins-Purle bid reflected potential savings of $6,000.00 per year. Brabston commented that "[Lubrizol's] relations with [Joiner] are the very best, and their services have been provided on a twenty-four hour on-call basis." He also mentioned, however, that Lubrizol should "utilize [Joiner's] services until such time as enforcement authorities restrict their operation or until such time as costs become unreasonable." Thus, it seems that Brabston was aware of some of Lubrizol's regulatory compliance issues.

282. The court adopts Dr. Newell's overall analysis of the chemical constituents of Lubrizol's wastes, which contained benzene, toluene, and naphthalene. In making this finding, the court also relies on the testimony of Dr. Morrison and Dr. A. L. Baxley ("Dr. Baxley"), an expert in chemical engineering from Phase I, who testified that Lubrizol's wastes contained, among

other waste constituents, benzene, naphthalene, and toluene. The court further relies upon the testimony of Steve Oxley ("Oxley"), a Lubrizol engineer, who indicated that benzene was present in Lubrizol's wastewater based on his review of certain documents related to chemical analyses of the wastewater.

283. Lubrizol has renewed its objections to Dr. Newell's inclusion of naphthalene in Lubrizol's C-61 waste, which were the subject of an earlier *Daubert* challenge. First, Lubrizol argues that the chain of custody number for the analysis did not match the number of the sample removed from the Deer Park facility. Lubrizol is mistaken. The Texas Department of Water Resources ("TDWR") took two samples of Lubrizol's C-61 waste. One sample, dated May 24, 1983, was labeled SW0475. The other sample, dated May 23, 1983, was designated SW04746. Each sample's corresponding form is associated with a Texas Department of Health laboratory findings report with that sample's chain of custody number. The issue to which Lubrizol refers involves a summary sheet that purports to describe each sample. Nevertheless, the samples can be readily distinguished by examining the samples' forms and the laboratory analyses. Thus, Lubrizol's purported chain of custody problem is nothing more serious than a typographical error on a secondary document.

284. Next, Lubrizol argues that the fact that naphthalene was detected in only one of the two samples prevents the court from concluding by a preponderance of the evidence that Lubrizol's C-61 waste contained naphthalene. This argument presupposes that one of the two samples was necessarily erroneous. It is more likely, however, that the constituents of Lubrizol's C-61 wastes varied from day to day. There is testimony indicating that Lubrizol's products were tailored to different clients and that the chemical constituents of its waste products would change

accordingly. Thus, there is no reason to believe that either sample was inaccurate. At most, Lubrizol's argument suggests that naphthalene was present only intermittently in the C-61 waste or that the concentration was low.

285. Lubrizol also asserts that the C-61 samples are unreliable because of phthalate contamination. As part of its Phase I findings, the court concluded that phthalates did not serve as a marker chemical for Lubrizol's wastes because the detection of phthalates in these samples was probably a result of laboratory contamination. The court noted that the TCEQ instructs its investigators to ignore phthalate concentrations of less than 100 parts per billion based on the assumption that such small traces probably come from the testing equipment rather than the tested sample, given the ubiquity of phthalates as a laboratory contaminant. The fact that the detection of phthalates may have been the result of contamination, however, has no relevance to the detection of naphthalene. Lubrizol has not presented any evidence that naphthalene is a common laboratory contaminant or that this specific laboratory experienced difficulties with naphthalene contamination.

286. Next, Lubrizol contends that Dr. Newell should not have relied on the API study in determining that certain Lubrizol waste streams containing naphtha also contained naphthalene. Lubrizol reasons that, because only four of the eleven different types of naphtha tested in the study contained naphthalene in at least 50% of its samples, Dr. Newell is mistaken in his conclusion that Lubrizol's wastes likely contained naphthalene. Dr. Newell approached the problem differently than Lubrizol, basing his opinion on the fact that more than half of the different varieties of naphtha contained naphthalene in some portion of the samples. Like Dr. Newell, the court has not incorporated concentration into its waste chemistry analysis. Thus, the fact that certain types of naphtha sometimes do not contain naphthalene is less significant than the fact that

a majority of the naphthas tested in the API study contained detectable quantities of naphthalene in at least some portion of the samples.

287. Oxley demonstrated only a limited understanding of "naphtha," as he was not very familiar with the term. Indeed, he had to research the word specifically as part of his preparation for providing testimony in this case. According to Oxley, naphtha is a generic term used to describe any combination of light hydrocarbons. He opined that Lubrizol's use of the umbrella term naphtha was intended to describe only aliphatic compounds, which are straight-chained hydrocarbons, rather than benzene, a ring-shaped hydrocarbon. Oxley, however, provided no documentary evidence to support these assertions. Moreover, despite Oxley's lack of familiarity with naphtha, Lubrizol has consistently identified naphtha, not "aliphatic hydrocarbons," as a constituent of its wastes. If Lubrizol's wastes uniformly contained only aliphatic hydrocarbons, the court believes it more likely that Lubrizol would have designated the substance as such more regularly. Other documentary evidence in this case reveals that "aliphatic hydrocarbons" are sometimes listed as a constituent on waste analyses. Lubrizol's use of the generic term "naphtha" implies that the underlying substances were not necessarily aliphatic hydrocarbons.

288. Lubrizol's 104(e) response to the EPA in relation to the Malone site in Texas City indicates that Lubrizol's T-20x wastes contained naphtha. Based on Dr. Newell's analysis of naphtha and the API study, the court concludes that the T-20x waste contained, at least periodically, benzene, toluene, and naphthalene.

289. Joiner hauled wastes containing remedy driver chemicals offsite from, at a minimum, the following tanks at the Deer Park facility: B-32 (benzene, toluene, and naphthalene), C-61 (naphthalene), P-61 (benzene, toluene, and naphthalene), T-19x (benzene, toluene, and

naphthalene), T-20x (benzene, toluene, and naphthalene), and 237-A (toluene). While Lubrizol argues that 237-A does not exist, it appears repeatedly in the documentary record. Lubrizol has furnished no evidence explaining why the October 2, 1972, letter from David Muskat to Dean Soules (relied upon by Dr. Newell) indicating the composition of 237-A is incorrect.

290. Waste from tank T-20x is directly linked to the Turtle Bayou site by five trip tickets. These tickets show dumping at "Liberty Anahuac road," another name for the Turtle Bayou site. The court will use these tickets to fashion its minimum volume estimate for Lubrizol.

291. Ticket No. 177, dated October 10, 1970, indicates that DeLeon dumped fifty barrels of T-20x waste "off of Liberty Anahuac road." Interestingly, "Dayton Dump" is listed in the blank where the disposal site is usually recorded. This entry serves as persuasive evidence that waste was sometimes deposited at the Turtle Bayou site even when "Dayton" is listed on the trip ticket. Had DeLeon not scribbled a notation explaining that Mr. Joiner had to show him the location of the dump site, this trip ticket would not have revealed the true destination of the waste.

292. Ticket No. 178, dated October 10, 1970, shows the disposal of fifty barrels of T-20x waste at the Turtle Bayou site by De Leon.

293. Ticket No. 179, dated October 10, 1970, signed by DeLeon, reveals the dumping of fifty barrels of T-20x waste at the Turtle Bayou site.

294. Ticket No. 181, dated October 11, 1970, notes the disposal of fifty barrels of T-20x at the Turtle Bayou site waste by DeLeon.

295. Ticket No. 226, dated October 11, 1970, signed by Wallace, reveals the dumping of fifty barrels of T-20x waste at the Turtle Bayou site. The ticket also includes a remark indicating that the trip took longer than expected because Wallace had to wait for DeLeon,

presumably to show him how to get to the Site (which is corroborated by DeLeon's own October 11 ticket).

296. These five, fifty-barrel loads of T20-x waste represent 10,500 gallons of disposal at the Turtle Bayou site. Thus, 10,500 gallons serves as the court's minimum volume estimate. Utilizing this line of evidence rests on an assumption that the October 1970 hauls to the Turtle Bayou site were anomalous. In light of the circumstantial evidence, this proposition is unlikely. Indeed, the court has found that Joiner began hauling to the Turtle Bayou site in April 1970, based largely on its acquisition of a contract with Lubrizol. Nevertheless, the court has endeavored, where feasible, to use the direct evidence against each party for its minimum estimate.

297. The court, partially for similar reasons explained in relation to Exxon, will not utilize Dr. Newell's opinion regarding disposal at the Sheridan site in forming either its intermediate or maximum volume estimates. In Lubrizol's case, as Plaintiffs and El Paso point out, documented Joiner hauls suggest that more waste was hauled offsite from Lubrizol's facilities than predicted by production rates. Perhaps most significantly, many trip tickets document hauls to locations other than the Sheridan site during times in which Dr. Newell concluded that Lubrizol's waste was fully accounted for in the Sheridan documents. Obviously, Lubrizol's wastes were not fully accounted for by the Sheridan records if they were, in fact, going to disposal sites other than the Sheridan site.

298. For its intermediate estimate, the court will use a methodology similar to that which it used for its maximum volume estimate for Exxon. For the period from January 1971, when the Sheridan records begin, through January 1974, the court will assume that Joiner hauled five fifty-barrel loads of Lubrizol's wastes to the Turtle Bayou site on a quarterly basis. Because

of evidence suggesting that disposal at the Turtle Bayou site was more substantial in the pre-Sheridan period, the court will assume that Joiner hauled ten loads of Lubrizol's wastes to the Turtle Bayou site per quarter from April 1970 through December 1970. Thus, under this theory, Joiner disposed of ninety fifty-barrel loads of Lubrizol's wastes at the Turtle Bayou site. Accordingly, the court's intermediate volume estimate is 189,000 gallons. This amount represents a small fraction of the waste that Joiner hauled offsite from the Deer Park facility from 1970 through 1974. It is entirely consistent with the testimony and documentary evidence concerning Joiner's site usage. These loads likely went to the Turtle Bayou site when, for whatever reason, no better option was available.

299. For its maximum volume estimate, the court will assume that 10% of Lubrizol's waste from the Deer Park facility during the relevant period was disposed of at the Turtle Bayou site. This estimate comports with the patterns of site usage established by the testimony of Rowland, Rogers, Gonzales, and Menifee. In particular, the court found Rogers to be a highly credible witness who described hauling many loads of waste to the Site. While Rogers may not have hauled Lubrizol waste to the Site, his testimony illuminates Joiner's general practices in relation to the Turtle Bayou site. Moreover, the surreptitious route to the Turtle Bayou site described by the drivers suggests that the use of the Site was not always infrequent. The court deems it improbable that the drivers would have developed such a subterfuge for a Site that was seldom used. The court notes that many ambiguous trip tickets likely reflect loads of waste that were dumped at the Turtle Bayou site. Significantly, Joiner began using the Turtle Bayou site because of the demands imposed by its new contract with Lubrizol (and likely, its expanding

business in general). Thus, it is probable that a substantial quantity of Lubrizol's waste was dumped at the Turtle Bayou site before disposal at the Sheridan site became commonplace.

300. In fashioning this estimate, the court has considered Joiner's probable reduced use of the Site after Joiner began using the Sheridan site for the vast majority of its waste hauling. Unfortunately, the Joiner drivers did not provide testimony estimating what specific percentage of hauls went to the Turtle Bayou site. Thus, the court has not broadly utilized a Joiner equivalent to the "25%" rule for French disposal. At the same time, however, the 25% rule is only a rough estimate fashioned by two French truck drivers. The court is capable of constructing an estimate for Joiner usage based on the voluminous record before the court. While largely circumstantial, the evidence supports the proposition that Joiner disposed of significant amounts of waste at the Turtle Bayou site. Nevertheless, the totality of the evidence indicates that Joiner's used the Site less frequently than French. This maximum estimate represents that reality. The court notes that Dr. Metzger fashioned a much higher, though not entirely implausible, estimate based on an analysis of ambiguous trip tickets. The court declines to use the ambiguous trip tickets directly in fashioning its estimate for reasons elucidated below.

301. Lubrizol has argued that covering up Joiner's use of the Site would have required an unrealistically vast conspiracy. This contention is unsupported by the evidence or reason. The evidence demonstrates that drivers received instructions regarding trip tickets and hauling directly from their supervisors. If a supervisor ordered the driver not to list the Turtle Bayou site by name on his trip tickets, the driver would have likely complied. It would not be difficult for an employer to control a handful of relatively unsophisticated truck drivers, especially given their economic reliance. Meanwhile, the truck drivers had no practical incentive to disclose

use of the Turtle Bayou site. Moreover, the word "conspiracy" is rather grandiose, given the evidence before the court. At most, the drivers were probably simply instructed not to record the name of the Turtle Bayou site on trip tickets and to avoid being observed dumping waste at the Site.

302. Based on Dr. Newell's analysis of Lubrizol's Annual Reports (which assumes a density of eight pounds per gallon) and the June 7, 1979, Adams memorandum, which was derived from the Annual Reports (the calculations contained within vary only slightly from Dr. Newell's), Lubrizol's Deer Park facility produced wastes in quantities of 1,084,688 gallons in 1970, 2,008,000 gallons in 1971, 2,167,500 gallons in 1972, and 1,368,250 gallons in 1973, for a four-year total of 6,628,438 gallons. The trip ticket evidence and an October 1970 invoice indicate that these volumes may be somewhat understated. Nevertheless, sufficient evidence does not exist from any other source which could be used to fashion a superior calculation.

303. Thus, the court's maximum volume estimate is 662,844 gallons.

304. Following Phase I, Lubrizol has repeatedly emphasized the supposed similarities between the circumstantial evidence against Lubrizol and GATX, which the court determined not to be liable. Lubrizol, however, overlooks the fundamental difference between Lubrizol and GATX: the evidence against Lubrizol was sufficient to support a threshold finding of liability, while there was insufficient evidence against GATX to link its wastes specifically to the Turtle Bayou site. The only real evidence against GATX came in the form of the testimony of Rowland, which had not been subjected to cross-examination by GATX's counsel. Throughout this litigation, the court has been unwilling to link any facility to the Turtle Bayou site without persuasive evidence. Once that link has been established, however, the court must, by necessity,

given the state of the record, examine the circumstantial evidence to ascertain the full extent of disposal.

305. The court has opted against an analysis of the trip tickets for its maximum volume estimate because the trip ticket record is incomplete, excessively ambiguous, and complicated by the practice of using the Joiner yard for temporary disposal. The court does not believe that the ambiguous tickets reveal sufficient information for the court to fashion a viable estimate.

306. Thus, the court's minimum volume estimate for Lubrizol is 10,500 gallons, its intermediate estimate is 189,000 gallons, and its maximum volume estimate is 662,844 gallons.

Findings of Fact as to Occidental

307. Diamond Shamrock Chemical Corporation ("Diamond Shamrock") owned and operated the Diamond Shamrock Deer Park Works ("Deer Park Works") in Deer Park, Texas, during the relevant period. Occidental succeeded to Diamond Shamrock's interest in the Deer Park Works.

308. As previously determined, the Deer Park Works was comprised of several different plants, including a power plant, an acetylene plant, an ammonia plant, a chlorine/caustic plant, a solvents plant, and a plastics plant (which was comprised of VCM and polyvinyl chloride ("PVC") units). As a result, the Deer Park Works generated multiple waste streams, including naphthalene waste, solvents plant heavy ends, VCM heavy ends, and sump waste from the chemical sewers.

309. The court adopts Dr. Newell's analysis of the chemical constituency of the wastes from the Deer Park Works that were hauled to the Turtle Bayou site. The court finds that

wastes including VCM heavy ends, acetylene tank washings, and wastewater from the sumps and sewers were hauled by French from the Deer Park Works to the Turtle Bayou site. The court finds that, collectively, these wastes contained benzene, DCA, naphthalene, vinyl chloride, TCA, and toluene.

310. The VCM heavy ends waste contained DCA, vinyl chloride, and TCA. The acetylene tank washings contained benzene, naphthalene, and toluene. Occidental does not dispute that these chemicals were contained in its wastes.

311. The chemical 2-chloropropene, although not among the eight remedy driver chemicals, is present in large quantities at the Turtle Bayou site. Furthermore, it is associated with the vinyl chloride found at the Site. Dr. Newell and Dr. Farenthold testified that Occidental's VCM heavy ends contained 2-chloropropene. Conversely, Zoch opined that Occidental's VCM heavy ends did not contain 2-chloropropene.

312. Dr. Farenthold testified that the use of methyl acetylene in the VCM process invariably leads to the production of 2-chloropropene as well as vinyl chloride. Occidental, based on the testimony of Zoch and Robert Adams ("Adams"), who worked as an engineer at the Deer Park Works, argues that the Diamond Shamrock process was different from El Paso's and did not produce 2-chloropropene.

313. First, Occidental points out that the Deer Park Works employed a system of carbon beds to filter out impurities from the acetylene feed that, it contends, absorbed the methyl acetylene before it could enter the reactor. Occidental concedes, however, that toward the end of the useful life of a carbon bed, some methyl acetylene might have broken through during the final stages of the production process. An internal memorandum from A. A. Dibble to Ralph Persons

indicates that, as of September 5, 1967, the carbon beds were performing only "marginally" and that the facility was experiencing problems with excess methyl acetylene in the process. Moreover, the carbon beds are not mentioned at all in a description of the VCM process in a March 1970 report by Richard Hall (the "Hall Report"), a Diamond Shamrock engineer, filed with the State of Texas as part of a permit application for its wastes. While eliminating heavy acetylenes was evidently still a concern, the document referred only to the gas stream being "chilled and scrubbed with solvent to remove heavy acetylenes." It is unclear just how successful this process proved to be.

314. Thus, the court concludes that some methyl acetylene likely broke through in the VCM-A process, where it reacted and produced 2-chloropropene. Because of distinct differences in operating temperatures, size, and number and configuration of the reactors between the Tenneco and Diamond Shamrock VCM-A processes, as well as Diamond Shamrock's greater efforts to remove methyl acetylene from the feed stream, it is likely that far less 2-chloropropene was produced as a waste product at the Diamond Shamrock facility.

315. Occidental concedes that the French ledger is a reasonable means of ascertaining the volume of waste that French hauled offsite from the Deer Park Works. Nevertheless, Occidental maintains that these wastes did not include VCM heavy ends or sump and sewer cleanings (Occidental does not clarify precisely which wastes could explain the volumes indicated by the French ledger). Furthermore, Occidental argues that only minimal quantities of acetylene tank washings were hauled offsite.

316. Occidental asserts that its VCM heavy ends were not shipped offsite at all or, if they were, in only very limited amounts. Dale Muehlenbrock ("Muehlenbrock"), a retired

process engineer who worked in the plastics plant during the relevant period, testified that the heavy ends tank had an open vent that was used for capturing VCM-rich gases from the heavy ends tank for reclamation. This testimony is supported by a process flow diagram for the VCM unit showing a pipe labeled "to gas holder header" coming from the VCM heavy ends disposal tank. Muehlenbrock testified that the remaining material in the tank was reused as a feedstock in the Deer Park Works's perchloroethylene ("PCE") unit at the solvents plant. Similarly, Zoch testified that the VCM heavy ends stream was recycled in the facility. Finally, Occidental points out that there is no testimony from the French drivers concerning the Diamond Shamrock VCM heavy ends stream, despite the fact that the drivers recalled the similar Tenneco stream.

317. The court concludes that French hauled some of the Deer Park Works's VCM heavy ends offsite. First, Muehlenbrock's testimony is not entirely consistent with Occidental's position that its VCM heavy ends were handled exclusively onsite. Muehlenbrock testified that a railcar, with a probable capacity of 10,000 gallons, was temporarily used to store VCM heavy ends waste because of a disagreement between the manager of the PVC unit and the manager of the solvents plant, stemming from operational problems utilizing the heavy ends at the solvents plant. The manager of the solvents plant refused to accept additional VCM heavy ends until the problem was fixed. Muehlenbrock was unaware of how this issue was ultimately resolved, but he remembered that the railcar remained onsite for several months.

318. Second, after Diamond Shamrock sold its chemical company to Occidental in the fall of 1986, Gary Smythe ("Smythe"), a Diamond Shamrock employee, assumed the responsibility for the management of certain Diamond Shamrock superfund projects, which included some environmental liabilities retained from its chemical company. His notes from an

interview with Muehlenbrock, attached to Diamond Shamrock's Supplemental Report to French Ltd. Allocation Subcommittee (the "January 1987 Smythe Report"), dated January 22, 1987, state that "[m]aterial sent to French was [VCM] heavy ends." Smythe also issued two other reports, one dated December 16, 1986, and the other June 5, 1987 (the "June 1987 Smythe Report"). Smythe's interview notes from the January 1987 Smythe Report provide a valuable source of information created at a time more proximate to the relevant period.

319. Third, a 1961 process flow diagram for the VCM unit shows the heavy ends going "to disposal by DACO." This inscription notes some VCM heavy ends accumulated for disposal in Tank F-403. Fourth, the Hall Report reveals, in its description of the VCM unit, that "heavy end organic impurities [were] removed . . . [and] hauled away for separate disposal." Notably, the Hall Report indicates that other chemicals, namely ethylene dichloride and trichloroethylene heavy end wastes, were recycled for further use in the Deer Park Works. Thus, if the VCM heavy ends were truly handled exclusively onsite, the Hall Report would likely have mentioned this.

320. Fifth, large quantities of chloroform were disposed of at the Site, where they remain to this day. Occidental does not deny that its VCM heavy ends waste contained chloroform; moreover, the available documentary evidence substantiates that chloroform was present in Diamond Shamrock's wastes. Among the parties to this litigation, Occidental has attempted to link chloroform only to El Paso. The balance of the documentary evidence, sampling data, and even the testimony of Occidental's own expert witness, Zoch, indicates that chloroform was not a constituent of Tenneco's VCM heavy ends or, indeed, any other Tenneco waste stream. Likewise, Occidental has not pointed to any non-party entity that might be responsible for the large quantities

of chloroform present at the Turtle Bayou site. Thus, the strong relationship between chloroform and Diamond Shamrock's VCM heavy ends indicates that this waste stream was hauled offsite and dumped at the Turtle Bayou site.

321. Occidental does not deny that Diamond Shamrock's acetylene tank washings were hauled offsite by French. Adams, the chemist who worked at the acetylene plant, affirmed that waste from acetylene tank washings was periodically transported offsite. While Occidental contests the volumetric data relied upon by Dr. Newell, these concerns are incorporated into the court's uncertainty analysis. The January 1987 Smythe Report states that acetylene tank washings were hauled offsite. Additionally, the court notes that Kimmons recalled hauling from two "bolted tanks" located at the Deer Park Works, which could arguably describe the "sausage" and the "pumpkin," two tanks identified by Adams that were used to store accumulated waste from the acetylene unit.

322. Finally, Occidental claims that its sewer and sump wastes were invariably discharged into Patrick's Bayou and the Houston Ship Channel, meaning that they were never hauled offsite by French. The court disagrees.

323. Kimmons described hauling waste offsite from a sump. Occidental contends that, had Kimmons hauled waste from this sump to the Turtle Bayou site, the marker chemicals hexachlorobenzene ("HCB") and hexachlorobutadiene ("HCBD") would have been detected at the Site. Even were the court to disregard Kimmons's testimony that he hauled a load of waste from a sump at the Deer Park Works to the Turtle Bayou site, his experience hauling the waste still stands for the general proposition that French hauled wastes offsite from sumps at Occidental's facilities. Furthermore, the court remains unconvinced that the sump waste that Kimmons hauled

would have contained either HCB or HCBD, which were produced exclusively by the solvents plant. Although William Hutton ("Hutton") believed that Kimmons's description matched most closely with the main sump, to which wastes flowed from the solvents plant, there were other sumps at the facility, as well. Moreover, it is not clear that wastes from the solvents plant would always have been present in this sump.

324. Finally, the court notes that Occidental does not dispute Dr. Newell's French ledger analysis showing that French hauled at least 369,451 gallons of waste offsite from the Deer Park Works during the relevant period. Even Smythe, after repudiating his own process-based estimates during the Phase II proceedings, acknowledged that the French ledger is a valid source of information for gauging the volume of the Deer Park Works's offsite disposal. While denying that the waste streams in question were hauled off in any significant quantities, Occidental has not proposed any alternative waste streams that could account for the large volume of waste indisputably hauled offsite by French from the Deer Park Works.

325. For its minimum volume estimate, the court will employ the direct evidence against Occidental in the form of the testimony of Kimmons. Kimmons testified that he hauled two loads of waste from the Deer Park Works to the Turtle Bayou site. For a minimum estimate, it is appropriate to presume that each load contained only fifty barrels of waste. Thus, the court's minimum estimate for Occidental is 4,200 gallons.

326. The June 1987 Smythe Report is useful for forming the court's intermediate estimate. Although Occidental's witnesses, including Smythe, have offered testimony undermining the reliability of the report, it retains probative value as a line of evidence. Moreover, in rendering his report, Smythe had no incentive to inflate disposal volumes falsely: the report was produced

on behalf of Occidental in an effort to resolve issues of relative responsibility for the Highway 90 Site. Indeed, from a cynical perspective, his efforts could be construed as an attempt to produce an estimate equivalent to the minimum volume that would be acceptable to the other parties in the French Limited Task Group. Moreover, the court notes that the Smythe report's process-based hauling estimate is lower than the quantities revealed by the French ledger. Thus, it probably does not overestimate the aggregate hauling performed by French from the Deer Park Works, even if specific waste streams might have been overstated. Because the court has declined to engage in the Sisyphean task of breaking down each facility's waste volume into specific streams, Occidental's arguments pertaining to the quantities of each stream are irrelevant. Likewise, Plaintiffs and El Paso point to potential errors in Smythe's calculations that they argue illegitimately reduce the final estimates. In the end, the court will let the historical document speak for itself. The court finds that the document constitutes a viable line of evidence; any piecemeal attempt to recalculate the numbers contained therein would ultimately be futile and potentially undermine the probable accuracy of the estimate.

327. Table 3 of the June 1987 Smythe Report indicates that French hauled 63,000 gallons of acetylene tank washings and 76,800 gallons of VCM heavy ends in 1969, for a total of 139,800 gallons. For 1970, Table 3 shows that French hauled 63,000 gallons of acetylene tank washings, 14,000 gallons of VCM heavy ends, 52,000 gallons of "shutdown cleanup waters," and 144,000 gallons from "sumps, sewers, spills, cleanups, etc.," which aggregate to 273,000 gallons. Occidental claims that the 52,000 gallons of shutdown cleanup waters were hauled offsite after the relevant time period. Given Occidental's claim that the Deer Park Works ceased its VCM production in May 1970, however, this contention is uncertain. The 1969 total volume translates

to 69,900 gallons over the relevant portion of the calendar year; the 1970 total volume prorates to 227,500 gallons for the relevant period of that calendar year. Thus, according to the June 1987 Smythe report, French hauled 297,400 gallons over the course of the relevant period. Upon application of the 25% rule, the intermediate volume for Occidental is 74,350 gallons.

328. For its maximum volume estimate, the court will rely on the quantities listed in the French ledger, discounted by the 25% rule. Disposal charges from January 8, 1970, through September 14, 1970, and October 6, 1970, through October 21, 1970, amount to $1,120.50, which equates to 7,470 barrels, or 313,740 gallons, based on 15¢ per barrel. On September 17, 1970, disposal charges totaled $35.00, amounting to 100 barrels, or 4,200 gallons at 35¢ per barrel. Combined, these volumes equal 317,940 gallons.

329. Given the lack of available information for the preceding period, it is necessary to extrapolate backward for the period July 1969 through December 1969. Thus, the volume for French disposal for this period is 190,764 gallons. The probable accuracy of this calculation is supported by the relative consistency of disposal throughout the January through October 1970 time frame.

330. Applying this method, the aggregate volume of offsite hauling by French from Deer Park Works is 508,704 gallons. After applying the 25% rule, under this maximum estimate, French disposed a total of 127,176 gallons of hazardous waste from the Deer Park Works at the Turtle Bayou site.

331. Accordingly, the court's minimum volume estimate for Occidental is 4,200 gallons, its intermediate estimate is 74,350 gallons, and its maximum volume estimate is 127,176 gallons.

Findings of Fact as to PPG

332. PPG operated the Houston Coating and Resins Plant (the "Houston Plant") during the relevant period. The Houston Plant produced paints and resins as well as byproducts.

333. PPG generated wastes, including spent caustic cleaning solution, sodium hydroxide, latex sludge, paint and resin sludges, and recycled solvents, at its Houston Plant.

334. The court adopts Dr. Newell's analysis of the chemical constituents of PPG's wastes that were hauled to the Turtle Bayou site. The court finds that toluene was contained in some of PPG's paint wastes that were hauled to the Turtle Bayou site. PPG does not dispute that some of its liquid wastes that were hauled offsite contained toluene. Indeed, waste characterization data presented by PPG indicate that wastes similar to those disposed of by French contained toluene.

335. Plaintiffs and El Paso contend that the court should also find that xylene, styrene, and benzene were present in PPG's wastes that were hauled to the Turtle Bayou site. Xylene, however, is not a remedy driver chemical in this case, and it does not have any independent significance as a marker chemical. Thus, it is irrelevant whether xylene was contained within PPG's wastes.

336. The evidence establishes that PPG's styrene residue was a solid waste hauled offsite in drums. Drums were not disposed of at the Turtle Bayou site. Thus, the court will not assign any responsibility for styrene to PPG.

337. Whether benzene was contained in the wastes hauled offsite by French is a closer question. A substantial portion of PPG's paint products contained solvent additives of some variety. Erwin Frey ("Frey"), a long-time PPG employee who worked at the Houston Plant from

1966 until 1985, was not familiar with the composition of many of the solvents used in the paint formulations. There is no documentary evidence showing that any of these solvents contained benzene.

338. Plaintiffs and El Paso argue that PPG's paint waste contained benzene because it contained naphtha, mineral spirits, and toluene. Certain types of these substances contain benzene. Moreover, the court notes that it determined benzene to be a constituent of Lubrizol's wastes based on the presence of naphtha, as did Dr. Newell. PPG, however, has presented analytical sampling data and waste characterization data sheets that do not reveal the presence of benzene. All of the samples of PPG's paint waste that were tested for the presence of benzene resulted in non-detects. While these samples were taken in the 1980s, these paint wastes would generally have contained the same constituents as the wastes generated during the relevant period. The absence of benzene, as reported by the best available evidence, guides the court to the conclusion that benzene should not be attributed to PPG.

339. Plaintiffs and El Paso have not shown that a majority of formulations of mineral spirits or toluene contain benzene. PPG has demonstrated that some formulations, and perhaps most, do not. Meanwhile, only 2% to 3% of PPG's paint formulations contained naphtha. Thus, assuming *arguendo* that some of PPG's naphtha contained benzene, the court cannot conclude by a preponderance of the evidence that any load containing benzene was hauled to the Turtle Bayou site.

340. Plaintiffs and El Paso point out that sampling data beneath PPG's facility indicate the presence of benzene. The process that generated this benzene as a byproduct, however, is uncertain.

341. For its minimum volume estimate, the court looks to the testimony of Kimmons. Kimmons retained clear memories of one haul from the Houston Plant to the Turtle Bayou site because of an incident, described in more detail in the court's Phase I findings, in which PPG's waste came to coat the cab of Kimmons's vacuum truck with a layer of mauve paint. Kimmons vaguely recalled that he hauled waste from the Houston Plant to the Turtle Bayou site on several other occasions, but he could not remember those hauls specifically. He estimated that he hauled at least fifty barrels of waste on each occasion. Based on this testimony, the court concludes that Kimmons hauled at least three loads of waste from the Houston Plant to the Turtle Bayou site. Thus, the court's minimum estimate is 6,300 gallons.

342. For its intermediate estimate, the court will employ a French ledger analysis. According to Plaintiff's Exhibit 5317, French's Houston office charged PPG $1,339.00 for disposal services from December 19, 1969, through May 28, 1970. The court will not consider the charges related to French's Bay City, Texas office. No evidence in this case has linked French's Bay City operations with disposal at the Turtle Bayou site. Moreover, the disposal fees associated with this work were unusually small; thus, they may not represent typical waste hauling activity.

343. Curiously, given that the French ledger extends back to November 1, 1969, the first entry related to PPG is dated December 19, 1969, and the first entry with an associated disposal fee is dated January 17, 1970 (although the court notes that the Highway 90 and Miscellaneous/Other columns were not utilized before January 1970). PPG, however, states in its proposed findings that "French serviced the PPG Houston Plant during the relevant period in 1969 . . . ." Thus, there is some uncertainty whether the court should extrapolate volumes for the period from July through October 1969. From January 17 through May 28, 1970, the date of the

last haul attributable to the Houston office, the longest increment of time between entries associated with disposal fees is eighteen days, far less than the forty-eight days between the start of the French ledger and the first entry for PPG. Thus, at least for its French ledger analysis, the court concludes that the December 19 entry represents the inception of hauling by French from the Houston Plant and that extrapolation is inappropriate for determining the amount of waste that French hauled offsite.

344. Assuming a disposal fee of approximately 35¢ per barrel, French hauled 160,680 gallons offsite from the Houston Plant during the relevant period. After application of the 25% rule, the court's intermediate estimate for PPG is 40,170 gallons.

345. The court will fashion its maximum volume estimate using Dr. Newell's analysis of PPG's offsite disposal. For this estimate, the court will assume that French's offsite hauling from PPG began in July 1969; this supposition is appropriate for a maximum volume estimate where the surviving information conflicts. Moreover, the court disagrees with Zoch, who opined that, due to the nature of PPG's paint wastes, French would not have dumped its wastes at the Turtle Bayou site until the construction of the main waste pit. While the evidence reveals that Joiner took steps to conceal its presence at the Turtle Bayou site, French took no such precautions, at least before it was ordered by the TWQB to cease operations at the Site. This lack of subterfuge perhaps stems from the less stringent regulatory restrictions during the initial period of French's use of the Site.

346. Dr. Newell testified that the most credible estimate of French's offsite hauling of PPG's wastes is 15,000 gallons per month, which he premised upon statements made in a letter dated February 27, 1986, from Susan Kuis ("Kuis"), in-house counsel for PPG, to Larry

Thomas, an EPA employee (the "1986 Kuis letter"). In the letter, Kuis explains that French transported approximately 15,000 gallons of waste offsite from the Houston Plant from 1968 through October 1970. She explained that this estimate, which was a revision of an earlier estimate of 10,000 gallons per month, was based upon "employee recollection, [then current] waste generation, and plant production" as well as "further investigations and new information on the plant's disposal practices." For the full sixteen-month period from July 1969 through October 1970, this extrapolates to 240,000 gallons of waste hauled. After applying the 25% rule, the court's maximum volume for PPG is 60,000 gallons.

347. In using the 1986 Kuis letter as a data point, the court rejects, for its maximum estimate, evidence suggesting that French hauling from the Houston Plant may have begun in January 1970 and ended in May 1970. First, the French ledger falls far short of definitively establishing that French hauled no waste from the Houston Plant offsite at times outside these boundaries. Indeed, PPG's own admissions suggest otherwise and should be given some weight. Second, the precise meaning of the Bay City entries in the French ledger is unclear. PPG did not maintain a plant in Bay City, and the Houston Plant was the only PPG facility in the vicinity. Thus, it seems odd that the Bay City office, rather than the Houston office, would service the Houston Plant during this period. It is entirely possible that the entries were assigned to the Bay City office for some peculiar accounting or sales purpose. Muddying the waters still further, Frey testified that Eltex Chemical Company, under a waste broker contract with PPG, subcontracted with French to haul waste offsite from PPG's Houston Plant. It is unclear how hauling related to this subcontract would have been reflected in the French ledger. Thus, for a

maximum, it is appropriate to utilize the 1970 Kuis letter, which reflects PPG's representations to the EPA concerning its usage of French for offsite hauling purposes.

348. Thus, the court's minimum volume estimate for PPG is 6,300 gallons, its intermediate estimate is 40,170 gallons, and its maximum volume estimate is 60,000 gallons.

Findings of Fact as to Settled Parties and Non-Parties

349. Defendants argue that seven settled parties or non-parties should be assigned a share of the responsibility in the court's allocation. Among these entities, the A. K. Steel Corporation ("AK Steel"), formerly known as Armco, Inc. ("Armco"), Beazer East, Inc. ("Beazer"), formerly known as Koppers Company, Inc. ("Koppers"), E. I. DuPont de Nemours and Company ("DuPont"), Goodyear Tire & Rubber Company ("Goodyear"), Southline Metal Products Company ("Southline"), and United States Steel Corporation ("U.S. Steel") have settled their liability with Plaintiffs and El Paso. A seventh company, Marine Maintenance, was never named as a party to this suit.

Findings of Fact as to AK Steel

350. AK Steel operated several facilities in the Houston area during the relevant time period. AK Steel contracted with French for offsite disposal of its wastes from February 28, 1968, through July 16, 1971, from its Southwestern Steel Division facility ("Houston Works"), a fully integrated steel mill, and Stainless Steel Division facility ("Stainless Steel facility"). The vast majority of the waste came from the Houston Works. Thus, French hauled AK Steel's wastes for the entirety of the relevant period.

351. AK Steel has reached a settlement with Plaintiffs and El Paso in the amount of $925,000.00 to resolve its potential liability at the Turtle Bayou site.

352. AK Steel's facilities generated a number of different waste streams, portions of which were hauled offsite for disposal by French. Wastes hauled by French from the Houston Works included dilute acid and wash oil from the coke plant, hydraulic oil from the electric furnace, dilute acid from the structural mill, dilute acid and dilute cuprodine from the wire mill, and lubricating oil and degreasing liquid from miscellaneous sources. French hauled neutralized nitric-hydrofluoric acid offsite from the Stainless Steel facility.

353. The evidence is insufficient to link the Stainless Steel facility to the Turtle Bayou site. Moreover, the court lacks sufficient evidence concerning the constituency and volume of waste for National Supply Company's facility, a subsidiary of AK Steel, to tie it to the Turtle Bayou site. Thus, the court will not consider the wastes produced by these facilities in reaching its allocation.

354. The court adopts Dr. Newell's analysis of the chemical constituents of AK Steel's wastes. The court finds that French hauled wastes, generated by the Houston Works's coke plant, offsite. These wastes contained naphthalene, benzene, and toluene.

355. Kimmons testified that he hauled waste from an Armco facility to the Turtle Bayou site. Thomas recalled hauling Armco's waste to the Highway 90 site but not the Turtle Bayou site. The court finds that Armco's wastes were hauled to the Turtle Bayou site.

356. The court bases its minimum volume estimate on the testimony of Kimmons that he hauled a single load of acid sludge from an Armco facility to the Site. Thus, the minimum volume estimate is 2,100 gallons. This low minimum is particularly appropriate because Kimmons testified that the waste was ordinarily taken to the Highway 90 site, due to its utility as a cleaning product, or an Armco landfill.

357. For its intermediate volume estimate, the court looks to the 104(e) response letter from Bill Chadick ("Chadick") to Larry L. Thomas of the EPA (the "Chadick letter"). In an attachment to the Chadick letter, Armco reported that French hauled 2,421,300 gallons offsite from the Houston Works facility—representing an average of 69,180 gallons per month. This translates to 1,106,880 gallons of offsite disposal over the sixteen-month operation of the Turtle Bayou site by French. Application of the 25% rule leads to a intermediate volume estimate of 276,720 gallons.

358. For a maximum volume estimate, the court will utilize a French ledger analysis, which suggests that French charged Armco 15¢ per barrel prior to March 3, 1970, and 20¢ per barrel for the duration of the relevant period. Based on these disposal rates, French appears to have hauled approximately 829,920 gallons through October 1970, equal to 82,992 gallons per month. Extrapolating backward for the period from July 1969 through December 1969, French hauled approximately 1,327,872 gallons of waste. Applying the 25% rule, the maximum volume estimate for AK Steel is 331,968 gallons.

359. Thus, the court's minimum volume estimate for AK Steel is 2,100 gallons, its intermediate estimate is 276,720 gallons, and its maximum volume estimate is 331,968 gallons.

Findings of Fact as to Beazer

360. Koppers, now known as Beazer, operated a facility known as the Houston Tar plant ("Houston Tar") during the relevant time period. Houston Tar produced light creosote oil, refined chemical oil, and pitch. Koppers also owned and operated the Houston Forest Products plant ("Forest Products plant") in Houston. The Forest Products plant treated lumber with creosote, pentachlorophenol, and chromatid copper arsenate.

361. Beazer has reached a settlement with Plaintiffs and El Paso in the amount of $562,000.00 to resolve its potential liability at the Turtle Bayou site.

362. The court adopts Dr. Newell's analysis of Beazer's waste chemistry. Beazer's wastes contained the remedy driver chemicals benzene, toluene, and naphthalene. Waste containing these chemicals—specifically, coal tar and coal tar pitch—was hauled to the Turtle Bayou site.

363. For a minimum volume estimate, the court will utilize the French ledger. The French ledger contains four entries pertaining to Beazer, only two of which relate to hauls occurring during the relevant period. These two entries represent 8,400 gallons of disposal. Following application of the 25% rule, the minimum estimate for Beazer's contribution to the Turtle Bayou site is 2,100 gallons.

364. For a maximum volume estimate, the court will rely upon the testimony of Kimmons. During his February 11, 2003, deposition, Kimmons testified that he hauled sludge from Houston Tar (although Kimmons did not recall the name of the facility, his description of the location matches this facility) to the Turtle Bayou site. Plaintiffs, El Paso, and Defendants differ in their characterizations of this testimony. Plaintiffs and El Paso argue that Kimmons's testimony refers to only one load, while Defendants assert that Kimmons's statements imply multiple trips. For a maximum estimate, the court will assume that Kimmons hauled two 100-barrel loads from Houston Tar to the Turtle Bayou site, representing 8,400 gallons of waste. This maximum estimate accounts for all of the entries in the French ledger for Beazer.

365. Accordingly, the court's minimum estimate for Beazer's contribution to the Turtle Bayou site is 2,100 gallons, and its maximum volume estimate is 8,400 gallons.

Findings of Fact as to DuPont

366. During the relevant period, DuPont owned and operated a plant located in La Porte, Texas.

367. DuPont has reached a settlement with Plaintiffs and El Paso in the amount of $1,600,000.00 to resolve its potential liability at the Turtle Bayou site.

368. The court adopts Dr. Newell's analysis of the chemical constituents of DuPont's wastes. The court finds that the remedy driver toluene was associated with the wastes that French hauled offsite from DuPont.

369. At deposition, Kimmons testified that he hauled one or two loads of DuPont's waste to the Turtle Bayou site. He also confirmed that DuPont was a major French customer, recollecting that he dealt with substantial amounts of its wastes while working at the Highway 90 site. During the Rule 63 hearing, however, Kimmons could no longer remember hauling waste from DuPont to the Turtle Bayou site. He stated that "the DuPont stuff went to the [Highway 90 site]."

370. Other French truck drivers, including Thomas and Thornton, recalled hauling waste offsite from DuPont's facility. Neither, however, could specifically recollect hauling DuPont's wastes to the Turtle Bayou site.

371. The court concludes that Kimmons's testimony is sufficient to link the DuPont facility to the Turtle Bayou site. At deposition, Kimmons indicated that he hauled some of DuPont's wastes to the Turtle Bayou site. Thus, it seems probable that Kimmons had a specific recollection of disposing of DuPont's wastes at the Turtle Bayou site during his deposition. By the time of the Rule 63 hearing, nearly three years later, his memory may have faded. This probability

is buttressed by the fact that DuPont was a major French customer, utilizing French's services for hundreds of thousands of gallons of disposal. The court finds that DuPont's wastes were disposed of at the Turtle Bayou site.

372. For its minimum volume estimate, the court will utilize the testimony of Kimmons. For the minimum estimate, it is appropriate to assume that Kimmons disposed of only one fifty-barrel load of DuPont's waste at the Turtle Bayou site. Thus, the minimum estimate for DuPont is 2,100 gallons.

373. For its maximum volume estimate, the court will rely upon Defendants' French ledger analysis. No entry for DuPont contains a disposal fee in the Highway 90 or Miscellaneous/Other columns until June 27, 1970. Thus, the court infers that French's offsite hauling from DuPont's facility began at this time. During this period, French hauled approximately 451,732 gallons offsite from DuPont's facility. Thus, following application of the 25% rule, the maximum estimate for DuPont's contribution to the Site is 112,933 gallons.

374. Accordingly, the court's minimum volume estimate for DuPont is 2,100 gallons, and its maximum volume estimate is 112,933 gallons.

Findings of Fact as to Goodyear

375. Goodyear operated the Houston Chemical Plant during the relevant time period. Goodyear's facility produced synthetic rubber and anti-zonates.

376. Goodyear has reached a settlement with Plaintiffs and El Paso in the amount of $1,600,000.00 to resolve its potential liability at the Turtle Bayou site.

377. Kimmons and Rowland testified that they hauled waste from the Houston Chemical Plant to the Turtle Bayou site while working for French. The court finds that Kimmons and Rowland dumped Goodyear's wastes at the Turtle Bayou site.

378. Dr. Newell assigned the remedy driver toluene to Goodyear on the basis of a letter dated September 13, 1973, from C. F. Kelly, the general foreman at the Houston Chemical Plant, to Rowland, then a supervisor at Joiner. Although this letter concerned Joiner's hauling activity, the court infers that French hauled similar wastes. French hauled large volumes of Goodyear's wastes during the relevant period—it is unlikely that any individual waste stream that was hauled offsite would have been omitted from the scope of French's hauling.

379. The court will not, however, presume that Joiner hauled any waste from the Houston Chemical Plant to the Turtle Bayou site, without specific evidence establishing such a link.

380. Neither Kimmons nor Rowland elucidated how many loads he hauled from the Houston Chemical Plant to the Turtle Bayou site. Given this lack of specificity, the court will not use the direct evidence testimony to fashion a minimum estimate.

381. For the minimum volume estimate, the court will rely on the French ledger. An analysis of the French ledger reveals that French hauled approximately 19,684 gallons offsite from Goodyear's facilities per month, equivalent to 314,944 gallons over the relevant period. Application of the 25% rule yields a minimum volume estimate of 78,736 gallons.

382. The French ledger possibly includes hauls linked to Goodyear's Beaumont facility. There is, however, no meaningful way to distinguish between the entries. Thus, they have been treated the same for purposes of this analysis. Additionally, the court notes that it is at least possible that French disposed of Goodyear's wastes at the Turtle Bayou site regardless of the

location of the facility. The location of the Turtle Bayou site is, after all, not very far from Beaumont.

383. For its maximum disposal volume, the court will rely on Dr. Newell's analysis of Goodyear's 104(e) response to the EPA. According to this document, although it does not specify the range of dates, French hauled a maximum of 500,000 gallons offsite from Goodyear's facilities. Thus, following application of the 25% rule, the maximum volume attributable to Goodyear is 125,000 gallons.

384. Accordingly, the court's minimum volume estimate for Goodyear is 78,736 gallons, and its maximum volume estimate is 125,000 gallons.

Findings of Fact as to Marine Maintenance

385. Marine Maintenance operated a tank, barge, and ship cleaning facility during the relevant period.

386. Marine Maintenance has not been sued by either Plaintiffs or El Paso in connection with the Turtle Bayou site.

387. French performed waste hauling services for Marine Maintenance, as evidenced by the testimony of Kimmons and Rowland and the French ledger.

388. No record evidence, however, substantiates that Marine Maintenance's wastes contained a remedy driver chemical. In their proposed findings, Defendants do not identify any remedy driver that may have been a constituent of Marine Maintenance's wastes.

389. Thus, the court will not consider Marine Maintenance's wastes in rendering an allocation in this case.

Findings of Fact as to Southline

390. Southline manufactured steel products at a facility in Houston during the relevant period.

391. Southline has reached a settlement in the amount of $250,000.00 with Plaintiffs and El Paso to resolve its potential liability at the Turtle Bayou site.

392. At deposition, Kimmons testified that he hauled from a drum plant to the Turtle Bayou site. He specifically stated on two occasions, however, that he was not "positive" Southline was the correct company. At the Rule 63 hearing, Kimmons merely confirmed his earlier deposition testimony regarding Southline in response to a single cursory question. He offered no new information regarding the identity of the drum company from which he hauled. The court notes, however, that Kimmons's geographic description of the area matches the location of the Southline facility.

393. Nevertheless, Southline is not listed in the French ledger. Moreover, Southline indicated in its discovery responses that it did not send any waste offsite for disposal prior to 1976.

394. Dr. Newell excluded Southline from his allocation because of insufficient information related to its waste chemistry. There is no evidence that remedy driver chemicals were constituents of Southline's wastes. In their proposed findings, Defendants do not name any remedy driver chemicals that might have been present in Southline's wastes.

395. Considering both the relatively weak linkage between Southline's facility and the Turtle Bayou site and the lack of evidence of remedy driver chemicals in its wastes, the court will not include any volume of waste from Southline in rendering the allocation.

Findings of Fact as to U.S. Steel

396. U.S. Steel operated its Texas Works Plant ("Texas Works"), located in Houston during the relevant period.

397. U.S. Steel has reached a settlement in the amount of $900,000.00 with Plaintiffs and El Paso to resolve its potential liability at the Turtle Bayou site.

398. Texas Works included an electric furnace, a plate mill, and a pipe mill. It manufactured slab steel, plate steel, and submerged arc-welded pipe as its finished products.

399. Rogers, a Joiner driver, testified that he hauled five or six loads of red waste oil and a load of "slag" from Texas Works to the Turtle Bayou site. He hauled the slag for the purpose of filling a hole in the road at the Turtle Bayou site to prevent trucks from getting stuck at the Site. The court notes that the fact that this problem required corrective action by Rogers reinforces the notion that Joiner disposed of significant quantities of waste at the Site.

400. Gonzales, another Joiner truck driver, hauled slag waste from a U.S. Steel facility to the Turtle Bayou site.

401. A trip ticket dated June 28, 1973, indicates the disposal of "waste oil" at a location described as "yard secret." This peculiar notation is strongly suggestive of dumping at the Turtle Bayou site.

402. The court finds that Joiner disposed of waste from U.S. Steel at the Turtle Bayou site.

403. Most of the trip tickets associated with U.S. Steel concern trash. Solid wastes, however, were not typically dumped at the Turtle Bayou site.

404. Zoch testified that naphthalene was contained in the U.S. Steel waste that was disposed of at the Turtle Bayou site. Zoch, however, attributed naphthalene to Texas Works based on the purported presence of a creosote plant. There is no evidence, however, that Texas Works contained a creosote plant. Indeed, U.S. Steel's discovery responses demonstrate otherwise. Creosote was manufactured at a separate U.S. Steel facility in Houston, the U.S. Steel Chemical plant, which has not been linked to the Turtle Bayou site. Thus, the court cannot conclude that naphthalene was a constituent of U.S. Steel's wastes that were hauled to the Turtle Bayou site.

405. Dr. Newell assigned no volume to U.S. Steel because of the lack of evidence concerning the composition of U.S. Steel's wastes. The court finds that there is no evidence that any of U.S. Steel's wastes contained remedy driver chemicals. Accordingly, the court will not consider the contributions of U.S. Steel in determining the proper allocation in this case.

Findings of Fact as to Site Divisibility

406. It is not feasible to apportion costs based on the divisibility of the Site, either geographically or chemically.

407. The court finds that the Turtle Bayou site itself is geographically divisible—each operable unit is distinct. It does not follow, however, that specific costs can be assigned to each portion of the Site.

408. Dr. Metzger testified that there is no "meaningful way to correlate certain costs that were incurred to either geographic areas of the site or individual chemical compounds."

409. Dr. Newell determined portions of the site to be geographically distinct. In his analysis, Dr. Newell set forth the percentage of remedial costs associated with each portion of the Site. He did not, however, tie particular parties' wastes to specific areas of the Site.

Moreover, his conclusions regarding the geographic costs were related to his remedy-driver analysis, rather than a review of costs actually incurred at the Turtle Bayou site. Thus, his opinion did not encompass the investigatory work that was performed across the entire Site as a whole.

410. Chris Villarreal ("Villarreal"), the EPA's remedial project manager for the Turtle Bayou site, testified that neither the EPA nor its contractors tracked costs associated with the Turtle Bayou site geographically. Since 2004, the EPA's oversight contractor, Tetratech, has not tracked costs associated with the portions of the Site remediated by Plaintiffs and El Paso, respectively.

411. Chevron and Occidental argue that El Paso should not be able to obtain contribution from them because the evidence suggests that their wastes were dumped only in the main waste pit, an area remediated by Plaintiffs. The court disagrees.

412. The direct evidence against Chevron and Occidental consists primarily of the testimony of Kimmons. Kimmons testified that he never dumped waste at any segment of the Turtle Bayou site other than the main waste pit. Kimmons, however, was not the only French driver to handle Chevron's and Occidental's wastes. Given the scope of hauling, as detailed above, it is probable that at least one load of both Chevron's and Occidental's wastes was disposed of in an area remediated by El Paso.

413. Occidental argues that any waste containing chloroform at the Deer Park Works would also have contained carbon tetrachloride. Zoch testified that the only locations at the Site showing detection of both chloroform and carbon tetrachloride were the Main Waste Area and the Office Trailer Area—neither of which is being remediated by El Paso. Yet, the documentary evidence cited by Occidental for this proposition, an April 7, 1971, letter from A. J. Haverland,

an employee in Diamond Shamrock's purchasing department, to Sheridan Disposal, Inc., expressly states that "[t]he percent of carbon [tetrachloride] could go up or down. In the event of a higher percent of carbon [tetrachloride], the chloroform would go down or vise-versa [sic]." Thus, there was apparently an inverse relationship between chloroform and carbon tetrachloride in Diamond Shamrock's VCM heavy ends. Neither the testimony of Hutton nor the documentary evidence suggests that the chloroform in Diamond Shamrock's wastes would have necessarily been associated with carbon tetrachloride.

414. Assuming *arguendo* that Chevron's and Diamond Shamrock's wastes could be isolated to a particular segment of the Site, El Paso has still reimbursed the EPA for past costs bearing a relationship to those segments of the Site. Thus, it would not be equitable or appropriate to deny El Paso contribution from Chevron and Occidental.

415. At the very least, the evidence is not sufficiently conclusive for the court to isolate a particular company's waste to specific portions of the Site.

Cooperation and Care

416. Plaintiffs are entitled to a 15% discount for their role in remediating the Turtle Bayou site. Similarly, El Paso is entitled to a 3% reduction in its equitable share for its role in protecting human health and the environment. Plaintiffs' reduction is greater due to their much earlier settlement, significantly greater role in remediation of the Site, and continuous, good-faith cooperation with the government even prior to settlement.

417. This discount is not provided for the specific purpose of rewarding any philanthropic motives on the part of Plaintiffs or El Paso. Thus, Defendants' argument that Plaintiffs and El Paso are not deserving of a discount for cooperation because their decisions to

settle were strategic—the result of an objective assessment of the evidence—misses the mark. The Turtle Bayou site posed, and continues to pose, a risk to human health and the environment. Because of the efforts of Plaintiffs and El Paso, that threat has been reduced and will continue to be monitored and contained. Moreover, policy considerations favor rewarding parties who cooperate with the government, whatever their motives. Potential benefits in the allocation of responsibility should be an incentive that the government can use to encourage and facilitate settlement in CERCLA actions to achieve its aim of protecting the public from hazardous waste.

418. Although, by necessity, the percentage of costs assigned to each defendant increases as the result of the court's application of the cooperation and care factors, the court finds that increasing any specific defendant's proportionate share as a result of its lack of cooperation is inappropriate in this case. No specific defendant, except perhaps Exxon, behaved sufficiently egregiously to merit an increase for such conduct. Exxon refused to cooperate with the EPA during the initial investigation of the Turtle Bayou site.

419. The court, however, has previously found that Exxon exercised more care concerning its wastes than any other defendant. Exxon's greater, albeit fruitless, attention to the disposal of its wastes counterbalances its arguable failure to cooperate with the EPA. Thus, the court will not adjust either factor in relation to Exxon's responsibility for the costs associated with the Turtle Bayou site.

Findings of Fact as to Allocation

420. Based on volume and waste chemistry alone, each party is responsible for the following percentage of costs for the Site as a whole:

Party	Percentage of Responsibility
Plaintiffs	48.35%
El Paso	13.42%
Bayer	0.05%
Chevron	0.67%
Exxon	1.22%
Lubrizol	12.45%
Occidental	15.51%
PPG	0.07%
Settled Parties	8.26%

421. Plaintiffs have not sued Chevron and Occidental. Therefore, Plaintiffs may not recover any costs from Chevron or Occidental.

422. In order to apply the care and cooperation discounts separately to Plaintiffs' and El Paso's different claims, the court must reallocate 15% from Plaintiffs to Defendants, El Paso, and the settled parties based upon each party's proportional percentage of pre-discount responsibility. Similarly, the court must apportion the 3% reduction to El Paso to Defendants, Plaintiffs, and the settled parties based upon each party's proportional percentage of pre-discount responsibility. Reallocating these discounts among all the other parties according to their pre-discount proportionate share is consistent with the proportionate share approach utilized by this court. Mathematically, this will result in two distinct final monetary liability schedules—one identifying the amounts owed to Plaintiffs after application of the 15% discount and the other detailing the amounts owed to El Paso after application of the 3% discount.

Afer taking into account the cooperation and care factors, each party is responsible for the following percentage of Plaintiffs' and El Paso's claims, rounded to the nearest hundredths:

Party	Percentage of Responsibility for Plaintiffs' Claims	Percentage of Responsibility for El Paso's Claims
Plaintiffs	33.35%	50.04%
El Paso	17.82%	10.42%
Bayer	0.06%	0.05%
Chevron	0.85%	0.69%
Exxon	1.54%	1.26%
Lubrizol	15.92%	12.88%
Occidental	19.12%	15.96%
PPG	0.09%	0.07%
Settled Parties	11.25%	8.63%

423. Thus, based on these percentages, the following defendants currently owe the sums listed below to Plaintiffs and El Paso, for their past costs and expenses of $29,540,529.00 and $3,851,043.65, respectively, incurred in connection with remediation of the Site:

Defendant	Amount Owed to Plaintiffs	Amount Owed to El Paso
Bayer	$17,724.32	$1,925.52
Chevron	N/A	$26,572.20
Exxon	$454,924.15	$48,523.15
Lubrizol	$4,702,852.22	$496,014.42
Occidental	N/A	$614,626.57
PPG	$26,586.48	$2,695.73

424. Any finding of fact more properly characterized as a conclusion of law is hereby adopted as such. Any conclusion of law more properly characterized as a finding of fact is hereby adopted as such.

B. Conclusions of Law

Liability Under 42 U.S.C. § 9607 and § 9613

1. Plaintiffs and El Paso have brought suit against Bayer, Exxon, Lubrizol, and PPG pursuant to 42 U.S.C. § 9607 and § 9613. El Paso asserts additional claims against Chevron and Occidental pursuant to § 9607 and § 9613.

2. Section 9607, the CERCLA provision that sets forth the parameters of cost recovery actions, provides in relevant part that:

> (3) any person who by contract, agreement, or otherwise arranged for disposal or treatment, or arranged with a transporter for disposal or treatment, of hazardous substances owned or possessed by such person, by any other party or entity, at any facility or incineration vessel owned or operated by another party or entity and containing hazardous substances . . .
>
> (4) . . . shall be liable for
>
> (A) all costs of removal or remedial action incurred by the United States Government or a State or an Indian tribe not inconsistent with the national contingency plan; [and]
>
> (B) any other necessary costs of response incurred by any other person consistent with the national contingency plan . . . .

42 U.S.C. § 9607(a).

3. Meanwhile, § 9613(f)(1), which establishes a specific action for contribution under CERCLA, states that:

> Any person may seek contribution from any other person who is liable or potentially liable under section 9607(a) of this title, during or following any civil action under section 9606 of this title or under section 9607(a) of this title. Such claims shall be

> brought in accordance with this section and the Federal Rules of Civil Procedure and shall be governed by Federal law. In resolving contribution claims, the court may allocate response costs among liable parties using such equitable factors as the court determines are appropriate. Nothing in this subsection shall diminish the right of any person to bring an action for contribution in the absence of a civil action under section 9606 of this title or section 9607 of this title.

42 U.S.C. § 9613(f)(1).

4. Sections 9607(a) and 9613(f) differ in at least two meaningful ways. First, § 9607 permits parties to recover 100% of their expenditures. *See Atlantic Research Corp. v. United States*, 459 F.3d 827, 834-35 (8th Cir. 2006), *aff'd*, ___ U.S. ___, ___, 127 S. Ct. 2331 (2007); *United Techs. Corp. v. Browning-Ferris Indus., Inc.*, 33 F.3d 96, 100 (1st Cir. 1994), *cert. denied*, 513 U.S. 1183 (1995). Thus, a defendant facing claims under § 9607 must file counterclaims pursuant to § 9613(f) in order to avoid paying more than its fair share of costs. *See Atlantic Research Corp.*, 459 F.3d at 3 (citing *Consolidated Edison Co. v. UGI Utils., Inc.*, 423 F.3d 90, 100 n.9 (2d Cir. 2005), *cert. denied*, 127 S. Ct. 2995 (2007); *Redwing Carriers, Inc. v. Saraland Apartments*, 94 F.3d 1489, 1495 (11th Cir. 1996)). This effectively shifts the burden of proof to the counterclaiming defendant, who must establish the plaintiff's proportional share under § 9613. *See Elementis Chromium L.P. v. Coastal States Petroleum Co.*, 450 F.3d 607, 613 (5th Cir. 2006). Second, liability under § 9607 is joint and several. *See United States v. Burlington N. & Santa Fe Ry. Co.*, 479 F.3d 1113, 1126 (9th Cir. 2007); *Metropolitan Water Reclamation Dist. v. North Am. Galvanizing & Coatings, Inc.*, 473 F.3d 824, 827-28 (7th Cir. 2007); *New Mexico v. General Elec. Co.*, 467 F.3d 1223, 1234 (10th Cir. 2006); *Syms v. Olin Corp.*, 408 F.3d 95, 106 n.8 (2d Cir. 2005); *Morrison Enters. v. McShares, Inc.*, 302 F.3d 1127, 1132-33 (10th Cir. 2002); *OHM Remediation Servs. v. Evans Cooperage Co., Inc.*, 116 F.3d 1574, 1578-79 (5th Cir. 1997); *see also Atlantic Research Corp.*, 127 S. Ct. at 2339 n.7 (assuming without deciding

that liability under § 9607 is joint and several). Conversely, courts impose only several liability under § 9613. *Elementis Chromium L.P.*, 450 F.3d at 613; *Metropolitan Water Reclamation Dist.*, 473 F.3d at 828; *Western Props. Serv. Corp. v. Shell Oil Co.*, 358 F.3d 678, 689 (9th Cir. 2004); *United States v. Davis*, 261 F.3d 1, 29 (1st Cir. 2001).

5. In its Phase I conclusions of law, the court held that Plaintiffs and El Paso were precluded from seeking relief via a cost recovery action under § 9607. Plaintiffs and El Paso argue that the court should reexamine this holding in light of the United States Supreme Court's recent decision in *Atlantic Research*. The court disagrees.

6. In *Atlantic Research*, the Supreme Court decided that potentially responsible parties ("PRPs") who are ineligible to file an action for contribution under § 9613 may bring suit under § 9607 to recover costs incurred in the process of voluntarily remediating a site. 127 S. Ct. at 2336, 2339. The Court specifically reserved the question of whether a PRP that "sustain[s] expenses pursuant to a consent decree" may institute a § 9607 cost recovery action. *Id.* at 2338 n.6. The court reasoned that, "[i]n such a case, the PRP does not incur costs voluntarily but does not reimburse the costs of another party." *Id.* The Court explicitly refused to "decide whether these compelled costs of response are recoverable under [§ 9613(f), § 9607(a)], or both." *Id.*

7. Plaintiffs and El Paso assert, however, that the Supreme Court's heavy reliance on the plain language of CERCLA should guide this court to the conclusion that all PRPs who incur costs cleaning up a site, not just volunteers, may bring cost-recovery actions under § 9607(a). *See id.* at 2336-37 (stating that "the plain language [of the statute] authorizes cost-recovery actions by any private party, including PRPs"); *see also Cooper Indus., Inc. v. Aviall Servs., Inc.*, 543 U.S. 157, 165-66 (2004). They point out that, by its express terms, § 9607

permits the recovery of "any other necessary costs of response incurred by any other person." 42 U.S.C. § 9607(a)(4)(B). Plaintiffs and El Paso infer that, as parties that have incurred necessary response costs, the plain language of § 9607(a) permits their suit.

8. These arguments, although not without some persuasive force, are not dispositive. First, *Atlantic Research*, by its own terms, falls short of establishing a general rule that all parties who incur costs remediating a superfund site may file an action under § 9607(a). *See* 127 S. Ct. at 2338 n.6. As explained above, the Supreme Court deliberately reserved the very question presented by this case: whether a PRP that remediates a superfund site pursuant to a judicial settlement with the United States is eligible to seek relief under § 9607(a). Plaintiffs and El Paso suggest that the court should attribute the Supreme Court's abstention from deciding this issue to judicial minimalism and a reticence to consider matters not directly presented for review. Thus, they urge that the court simply regard the broad language describing the scope of § 9607(a)(4)(B) in parts of *Atlantic Research* as controlling. This contention is belied by the structure and text of the opinion. If the Supreme Court had considered "volunteers," who engage in remedial activity without coercion by the government, to be identically situated to parties, like Plaintiffs and El Paso, who incur the vast majority of their response costs after agreeing to do so in a consent decree with the government, the Court would not have needed to create a footnote distinguishing the two groups. The existence of the distinction in the text of *Atlantic Research* implies that it is, at least potentially, meaningful.

9. Second, the Supreme Court has repeatedly emphasized that § 9607(a) and § 9613(f) provide "'"similar and somewhat overlapping"'" but "'clearly distinct'" remedies. *Id.*

at 2337, 2338 n.6 (quoting *Cooper Indus.*, 543 U.S. at 582 n.3 (quoting *Key Tronic Corp. v. United States*, 511 U.S. 809, 816 (1994))).

> "Section [9613(f)] authorizes a contribution action to PRPs with common liability stemming from an action instituted under [§ 9606 or § 9607(a)]. And [§ 9607(a)] permits cost recovery (as distinct from contribution) by a private party that has itself incurred cleanup costs. Hence, a PRP that pays money to satisfy a settlement agreement or a court judgment may pursue [§ 9613(f)] contribution."

Id. at 2338. By contrast, "[w]hen a party pays to satisfy a settlement agreement or a court judgment, it does not incur its own costs of response. Rather, it reimburses other parties for costs that those parties incurred." *Id.* Here, of course, Plaintiffs and El Paso have directly engaged in remediation of the Turtle Bayou site. Nevertheless, they have done so only to resolve claims for cost recovery in litigation brought against them by the United States.

10. Moreover, Plaintiffs and El Paso ignore the interplay between *Atlantic Research* and *Cooper Industries*. In *Cooper Industries*, the Supreme Court held that PRPs who voluntarily remediate environmental contamination may not seek contribution under § 9613(f). 543 U.S. at 165-66. Section 9613(f) permits parties to file claims for contribution only "during or following" actions brought against them pursuant to § 9606 or § 9607(a). 42 U.S.C. § 9613; *Cooper Indus.*, 543 U.S. at 165-66. Thus, volunteer PRPs are not permitted to sue for contribution under § 9613(f) because the requisite condition precedent never occurs. *See id.* at 165-67. In almost all jurisdictions, moreover, volunteer PRPs were likewise prohibited from recovering under § 9607(a) prior to the Supreme Court's decision in *Atlantic Research*. *See E.I. DuPont De Nemours & Co. v. United States*, 460 F.3d 515 (3d Cir. 2006); *Elementis Chromium L.P.*, 450 F.3d at 613; *Dico, Inc. v. Amoco Oil Co.*, 340 F.3d 525, 530 (8th Cir. 2003); *Blasland, Bouck, & Lee, Inc. v. City of N. Miami*, 283 F.3d 1286, 1302 (11th Cir. 2002); *Axel Johnson, Inc. v.*

Carroll Carolina Oil Co., 191 F.3d 409, 415 (4th Cir. 1999) (citing *Pneumo Abex Corp. v. High Point, Thomasville & Denton R.R.*, 142 F.3d 769, 776 (4th Cir.), *cert. denied*, 525 U.S. 963 (1998)); *Bedford Affiliates v. Sills*, 156 F.3d 416, 423-24 (2d Cir. 1998); *Centerior Serv. Co. v. Acme Scrap Iron & Metal Corp.*, 153 F.3d 344, 351-54 (6th Cir. 1998); *Sun Co. v. Browning-Ferris, Inc.*, 124 F.3d 1187, 1191-92 (10th Cir. 1997), *cert. denied*, 522 U.S. 1113 (1998); *Pinal Creek Group v. Newmont Mining Corp.*, 118 F.3d 1298, 1301-02 (9th Cir. 1997), *cert. denied*, 524 U.S. 937 (1998); *New Castle County v. Halliburton NUS Corp.*, 111 F.3d 1116, 1121-24 (3d Cir. 1997); *Redwing Carriers, Inc.*, 94 F.3d at 1496 & n.7; *United Tech. Corp*, 33 F.3d at 98. As recently as 2006, the Fifth Circuit held that "'[w]hen one party sues another liable party under CERCLA, the action is not a cost recovery action under [§ 9607(a)]," but rather a claim for contribution pursuant to § 9613(a). *Elementis Chromium L.P.*, 450 F.3d at 613.

11. Thus, following *Cooper Industries*, the most deserving PRPs—those who voluntarily remediated superfund sites absent litigation with the government—were denied the remedies provided by both § 9607 and § 9613. *See Syms*, 408 F.3d at 106 n.8 (noting the "perverse incentive" for PRPs to wait for suit prior to incurring response costs after *Cooper Industries*). In response, several circuit courts reconsidered and reversed their former holdings that volunteer PRPs had no rights under § 9607(a). *See Metropolitan Water Reclamation Dist.*, 473 F.3d at 834-35; *Atlantic Research Corp.*, 459 F.3d at 834-35; *Consolidated Edison Co.*, 423 F.3d at 97. Each of these courts predicated its holding, however, on the PRP's voluntary cleanup activity in the absence of an enforcement action brought by the government and the PRP's inability to seek contribution under § 9613(f). *See Metropolitan Water Reclamation Dist.*, 473 F.3d at 836 (refusing to revisit its pre-*Cooper Industries* decision requiring parties subject to an enforcement

action to bring suit under § 9613(f)); *Atlantic Research Corp.*, 459 F.3d at 836-37 (explaining that "liable parties which have been subject to [§ 9607 or § 9613] enforcement actions are still required to use [§ 9613]" to pursue a remedy); *Consolidated Edison Co.*, 423 F.3d at 100-02 (refusing to revisit prior holding barring recovery under § 9607 to parties who do not incur response costs voluntarily).

12. Seen in this light, *Atlantic Research* may represent nothing more than the extension of § 9607(a) to a category of PRPs otherwise unable to obtain relief, closing the gap in CERCLA's remedial scheme that was created by *Cooper Industries*. Plaintiffs and El Paso, however, have resolved their liability with the United States and, thus, are entitled to seek relief pursuant to § 9613(f)(1) and (2). The Supreme Court, by explicitly declining to include such PRPs in the scope of its decision in *Atlantic Research*, has suggested that non-volunteer PRPs do not stand on the same footing as volunteers and may not be entitled to seek recovery under § 9607(a).

13. The Fifth Circuit has never distinguished between those parties who voluntarily incur the costs of response and those who expend funds only after a government enforcement action is brought. Nevertheless, given its former position that no PRPs could recover under § 9607(a), the court has never before been confronted with the need to consider such a dichotomy. In *Atlantic Research*, the Supreme Court overruled prior Fifth Circuit precedent to the extent that it prohibited volunteer PRPs from pursuing cost recovery remedies under § 9607(a). *See* 127 S. Ct. at 2336, 2339. This holding, however, left intact Fifth Circuit authority to the extent it concerned PRPs who have been the subject of an enforcement action by the government. *Id.* at 2338 n.6. Thus, the court remains bound by existing Fifth Circuit precedent requiring non-volunteer PRPs to seek contribution pursuant to § 9613. *See Elementis Chromium L.P.*, 450 F.3d

at 613; *Amoco Oil Co. v. Borden, Inc.*, 889 F.2d 664, 672 (5th Cir. 1989). This conclusion is reinforced by the similar holdings of all three courts of appeal that have addressed the matter following *Cooper Industries*, correctly anticipating the outcome of the Supreme Court's decision in *Atlantic Research*. *See Metropolitan Water Reclamation Dist.*, 473 F.3d at 836; *Atlantic Research Corp.*, 459 F.3d at 836-37; *Consolidated Edison Co.*, 423 F.3d at 100-02.

14. Next, Plaintiffs point out that they incurred response costs prior to the filing of *Lang*, the formal enforcement action initiated by the United States in 1994. Plaintiffs argue that, whatever the status of the costs they incurred after the inception of *Lang*, the pre-*Lang* expenses were voluntary and are recoverable under § 9607 because they are precluded from recovering contribution for these costs under § 9613(f). First, it is not at all clear that these purportedly voluntary costs of response are unrelated to the ultimate judicial resolution of Plaintiffs' liability. The court is unconvinced that Plaintiffs were truly volunteers; to the contrary, they were already targets of an EPA investigation and incurred response costs in anticipation of the ultimate consent decree that they reached with the United States. Moreover, Plaintiffs have not presented any evidence delineating the costs that were incurred prior to *Lang*. Thus, even assuming *arguendo* that such costs are eligible for recovery under § 9607(a), the court is bereft of the information necessary to segregate a limited cost-recovery claim from Plaintiffs' much more significant contribution claim.

15. Plaintiffs are also mistaken in their interpretation of the case law, as they conflate the question of when a PRP may file a suit under § 9613(f) with the issue of what costs a PRP may recover should a contribution action prove viable. In *Cooper Industries*, the Supreme Court did not prohibit PRPs who were sued under § 9606 or § 9607 from recovering costs incurred

prior to the initiation of the suit. Rather, the Court held that PRPs may only seek contribution for costs during or following an enforcement action. Nothing in *Cooper Industries* or *Atlantic Research*, however, prevents PRPs eligible to seek relief under § 9613(f) from obtaining contribution for costs incurred before the filing of the enforcement action. Thus, the costs that Plaintiffs expended prior to *Lang* may be recovered under § 9613(f) and, consequently, do not fall into the former gap in CERCLA's coverage addressed by the Supreme Court in *Atlantic Research*.

16. Finally, the court notes that permitting non-volunteer PRPs to pursue claims under § 9607(a) could yield inequitable results. Parties who resolve their liability with the government under § 9606 or § 9607(a) receive contribution protection against claims brought by other PRPs "regarding matters addressed in the settlement." 42 U.S.C. § 9613(f)(2). Where such parties sue other PRPs pursuant to § 9613(f)(1), the court may consider the settling plaintiffs' own proportionate liability for the costs of response as an equitable factor. *See* 42 U.S.C. § 9613(f)(1); *New Mexico*, 467 F.3d at 1234; *Atlantic Research Corp.*, 459 F.3d at 835; *Consolidated Edison Co.*, 423 F.3d at 100 n.9; *Redwing Carriers, Inc.*, 94 F.3d at 1495. If, however, settling PRPs were permitted to utilize § 9607(a), they would be allowed to recover 100% of their costs without any vulnerability to counterclaims under § 9613(f)(1). *See Metropolitan Water Reclamation Dist.*, 473 F.3d at 836-37. The court's holding in this case avoids such potential unfairness.

17. Accordingly, the court holds that Plaintiffs and El Paso are precluded from seeking relief under § 9607(a). These claims are dismissed with prejudice.

Contribution Under § 9613

18. A contribution action under § 9613(f)(1) "'refers to an action by a responsible party to recover from another responsible party that portion of its costs that are in excess of its pro

rata share of the aggregate response costs . . . .'" *OHM Remediation Servs.*, 116 F.3d at 1582 (quoting *United Techs. Corp.*, 33 F.3d at 103); *accord Metropolitan Water Reclamation Dist.*, 473 F.3d at 827-28.

19. "[T]he party bringing an action for contribution [bears] 'the burden of proving the defendant is a responsible party under [§ 9607(a)] of CERCLA and also the burden of proving the defendant's equitable share of costs.'" *Elementis Chromium L.P.*, 450 F.3d at 612 (quoting *Centerior Serv. Co.*, 153 F.3d at 348 (citing *Minyard Enters., Inc. v. Southeastern Chem. & Solvents Co.*, 184 F.3d 373, 385 (4th Cir. 1999))); *accord Kalamazoo River Study Group v. Rockwell Int'l Corp.*, 355 F.3d 574, 589-90 (6th Cir. 2004); *Goodrich Corp. v. Town of Middlebury*, 311 F.3d 154, 168 (2d Cir. 2002), *cert. denied*, 539 U.S. 937 (2003). A plaintiff need not, however, prove its case with "mathematical precision . . . or scientific certainty." *Kalamazoo River Study Group*, 355 F.3d at 590 (quoting *Kalamazoo River Study Group v. Eaton Corp.*, 258 F. Supp. 2d 736, 740 (W.D. Mich. 2002)); *accord In re Bell Petroleum Servs.*, 3 F.3d 889, 903 (5th Cir. 1993); *United States v. R.W. Meyer, Inc.*, 932 F.2d 568, 573-74 (6th Cir. 1991). Moreover, a plaintiff may meet its burden of proof through the use of both direct and circumstantial evidence. *See Crofton Ventures Ltd. P'ship v. G & H P'ship*, 258 F.3d 292, 296-99 (4th Cir. 2001); *Davis*, 261 F.3d at 51; *Franklin County Convention Facilities Auth. v. American Premier Underwriters, Inc.*, 240 F.3d 534, 547 (6th Cir. 2001); *Tosco Corp. v. Koch Indus., Inc.*, 216 F.3d 886, 892-93 (10th Cir. 2000); *see also Geraghty & Miller, Inc.*, 234 F.3d 917, 928-29 (5th Cir. 2000), *cert. denied*, 533 U.S. 950 (2001).

20. Indeed, a claim may be established entirely through circumstantial evidence. *See Tosco Corp.*, 216 F.3d at 892 (noting that requiring direct evidence relating to disposal that

occurred in the distant past is inappropriate). CERCLA does not "'cast the plaintiff in the impossible role of tracing chemical waste to particular sources in particular amounts, a task that is often technologically infeasible due to the fluctuating quantity and varied nature of the pollution at a site over the course of many years.'" *Davis*, 261 F.3d at 36 (quoting *Acushnet Co. v. Mohasco Corp.*, 191 F.3d 69, 76 (1st Cir. 1999)). Nevertheless, the plaintiff must present "sufficient evidence from which a reasonable and rational approximation of each defendant's individual contribution to the contamination can be made." *In re Bell Petroleum Servs.*, 3 F.3d at 903.

21. A district court's findings of fact in an action for contribution under § 9613(f)(1), including the ultimate allocation made by the court, are reviewed only for clear error. *Elementis Chromium L.P.*, 450 F.3d at 613. In arriving at an equitable allocation under § 9613(f)(1), "the court may allocate response costs among the liable parties using such equitable factors as the court determines are appropriate." 42 U.S.C. § 9613(f)(1). A court has broad discretion to utilize whatever factors it deems appropriate. *American Cyanamid Co. v. Capuano*, 381 F.3d 6, 19 (1st Cir. 2004); *Kalamazoo River Study Group*, 355 F.3d at 589; *United States v. Consolidation Coal Co.*, 345 F.3d 409, 413-14 (6th Cir. 2003); *Franklin County Convention Facilities Auth.*, 240 F.3d at 549.

22. "[B]y using the term 'equitable factors' Congress intended to invoke the tradition of equity under which the court must construct a flexible decree balancing all the equities in the light of the totality of the circumstances." *R.W. Meyer, Inc.*, 932 F.2d at 572. Flexibility is required so that "[t]he parties actually performing the cleanup can look for reimbursement from other [PRPs] without fear that their contribution actions will be bogged down by the impossibility

of making meticulous factual determinations as to the causal contribution of each party." *Id.* at 573-74.

23. A court may consider factors such as those listed in the unsuccessful amendment proposed to CERCLA by former Vice President Al Gore (the "Gore factors"). *See Burlington N. & Santa Fe Ry. Co.*, 479 F.3d at 1130 n.24; *Kalamazoo River Study Group*, 355 F.3d at 583, 590; *Consolidation Coal Co.*, 345 F.3d at 413-14 & n.1; *United States v. Hercules, Inc.*, 247 F.3d 706, 718 (8th Cir.), *cert. denied* 515 U.S. 1158 (2001); *Acushnet Co.*, 191 F.3d at 81; *Centerior Serv. Co.*, 153 F.3d at 354; *In re Bell Petroleum Servs.*, 3 F.3d at 901. The Gore factors include:

> "(i) the ability of the parties to demonstrate that their contribution to a discharge[,] release or disposal of a hazardous waste can be distinguished;
> (ii) the amount of the hazardous waste involved;
> (iii) the degree of toxicity of the hazardous waste involved;
> (iv) the degree of involvement by the parties in the generation, transportation, treatment, storage, or disposal of the hazardous waste;
> (v) the degree of care exercised by the parties with respect to the hazardous waste concerned, taking into account the characteristics of such hazardous waste; and
> (vi) the degree of cooperation by the parties with Federal, State, or local officials to prevent any harm to the public health or the environment."

Id. at 899-900 (quoting *United States v. A & F Materials Co.*, 578 F. Supp. 1249, 1256 (S.D. Ill. 1984)).

24. The Gore factors, however, are neither mandatory nor exhaustive. *See Consolidation Coal Co.*, 345 F.3d at 413-14; *see also Burlington N. & Santa Fe Ry.*, 479 F.3d at 1130 & n.24; *Hercules, Inc.*, 247 F.3d at 718; *United States v. Colorado & E. R.R.*, 50 F.3d 1530, 1536 (10th Cir. 1995). Moreover, "'in any given case, a court may consider several factors, a few factors, or only one determining factor . . . depending on the totality of the circumstances presented

to the court.'" *Consolidation Coal Co.*, 345 F.3d at 413-14 (quoting *Environmental Transp. Sys., Inc. v. ENSCO, Inc.*, 969 F.2d 503, 509 (7th Cir. 1991)).

25. The Fifth Circuit, however, has emphasized that volume should be considered as a factor wherever practicable. *See In re Bell Petroleum Servs.*, 3 F.3d at 904. "[A]ssumptions [that] are well-founded and reasonable, and not inconsistent with the facts as established by other competent evidence, . . . may be sufficiently reliable to support a conclusion that a reasonable basis for apportionment exists." *Id.* at 904. Indeed, a district court commits error by failing to consider volume as a factor even where there are viable, "competing theories of apportionment" and "the records . . . are incomplete." *Id.*

26. In this case, the court concludes that the equitable factors appropriate to form an allocation in this case are volume, relative toxicity, cooperation with the government, and the degree of care exercised in handling the hazardous waste. The rationale for the use of these factors is more fully explicated in the findings of fact concerning each factor.

27. The court has endeavored to use volume and relative toxicity as the foundation for its allocation methodology. These two factors are most significant because they form the primary basis for the costs incurred by the EPA, Plaintiffs, and El Paso—the waste itself constitutes the threat to human health and the environment.

28. Cooperation with the government is also important because use of this factor promotes beneficial activity and encourages the future cleanup of superfund sites. In this specific case, Plaintiffs are deserving of a discount for their cooperation with the government because of their lengthy, substantial participation in the cleanup process at the Turtle Bayou site. El Paso is likewise deserving of a discount because it has, albeit somewhat belatedly, taken steps to protect

human health and the environment. These actions should be rewarded. Meanwhile, Exxon behaved recalcitrantly and uncooperatively in its dealings with the EPA. This court has refrained from penalizing (at least directly) parties who merely insisted that their liability be proven at trial. By refusing to respond to the EPA's reasonable requests, however, Exxon's conduct warrants an increase in its relative culpability.

29. Finally, degree of care is an appropriate factor for consideration because the evidence suggests that Exxon engaged in waste management techniques superior to those used by any other party. This higher level of care distinguishes Exxon in a meaningful respect from the remaining parties, who demonstrated very little concern regarding the ultimate disposal of their wastes. Exxon, of course, was not ultimately successful in ensuring that its wastes were properly disposed. Nevertheless, this failure is accounted for by the volume and relative toxicity factors. Thus, its better efforts and intentions justify giving a downward adjustment to Exxon. This factor offsets Exxon's lack of cooperation discussed above.

30. As previously determined and discussed more fully within the court's Phase I conclusions of law, Defendants Bayer, Exxon, Lubrizol, and PPG are liable as responsible persons under § 9607 and owe contribution to Plaintiffs and El Paso pursuant to § 9613. Furthermore, Third-Party Defendants Chevron and Occidental are liable as responsible persons under § 9607 and owe contribution to El Paso pursuant to § 9613.

31. Plaintiffs and El Paso stipulated to their liability at the Turtle Bayou site during Phase I. Moreover, the court's findings of fact, based on the evidence adduced during both phases of the trial, independently establish that Plaintiffs and El Paso are covered persons as that term is defined by § 9607(a)(3).

32. As covered persons, Plaintiffs and El Paso are subject to the court's equitable allocation of response costs under § 9613 despite the contribution protection afforded them by the United States. *See* 42 U.S.C. § 9613; *New Mexico*, 467 F.3d at 1234; *Atlantic Research Corp.*, 459 F.3d at 835; *Consolidated Edison Co.*, 423 F.3d at 100 n.9; *Redwing Carriers, Inc.*, 94 F.3d at 1495; *see generally OHM Remediation Servs.*, 116 F.3d at 1582.

Conclusions of Law as to the Orphan Share

33. Orphan shares are defined as "those shares of the waste responsibility which are attributable to [PRPs] who are either insolvent or cannot be located or identified." *Sun Co., Inc. v. Browning-Ferris, Inc.*, 124 F.3d 1187, 1193 n.4 (10th Cir. 1997), *cert. denied*, 522 U.S. 1113 (1998) (citations omitted). Plaintiffs and El Paso bear the burden of proving the existence and extent of any purported orphan shares. *See Boeing Co. v. North W. Steel Rolling Mills, Inc.*, No. 97-35973, 2004 WL 540706, at *3 (9th Cir. Mar. 17, 2004); *United States v. Davis*, 31 F. Supp. 2d 45, 64 (D.R.I. 1998), *aff'd*, 261 F.3d 1 (1st Cir. 2001); *United States v. Atlas Minerals & Chems., Inc.*, Civ. A. No. 91-5118, 1995 WL 510304, at *84 (E.D. Pa. Aug. 22, 1995). Once established, however, any orphan shares are allocated among all of the responsible parties in accordance with whatever equitable factors the court deems appropriate. *See Boeing Co.*, 2004 WL 540706, at *3 (citing *Pinal Creek*, 118 F.3d at 1303); *Morrison Enters.*, 302 F.3d at 1135; *Centerior Serv. Co.*, 153 F.3d at 354 n.12 (citing *Sun Co., Inc.*, 124 F.3d at 1193; *Action Mfg. Co. v. Simon Wrecking Co.*, 428 F. Supp. 2d 288, 294, 328-29 (E.D. Pa. 2006).

34. The parties have stipulated and the court finds that French, Joiner, Smith, and Lang are either insolvent, deceased, or cannot be located or identified and, as such, any shares attributable to these parties qualify as orphan shares. The court finds, however, that Plaintiffs and

El Paso have failed to identify any other orphan shares at the Turtle Bayou site. While it is possible that other, identified or unidentified entities are responsible for some of the waste at the Turtle Bayou site, Plaintiffs and El Paso have not adduced sufficient evidence from which the court could fashion an allocation including these parties. Moreover, Plaintiffs and El Paso have not shown that some of these entities could not be identified with due diligence. The court notes, for example, that many documented customers of French and Joiner were never sued in this matter.

35. The court rejects El Paso's contention that Plaintiffs' share of liability is an orphan share in relation to El Paso. It is true that El Paso is unable to collect any recovery from Plaintiffs due to the contribution protection obtained by Plaintiffs in their 1998 Consent Decree with the EPA. *See* 42 U.S.C. § 9613(f)(2). Nevertheless, El Paso made an informed decision to settle with Plaintiffs, which provided El Paso certain benefits but also exposed it to various risks. If El Paso had not settled with Plaintiffs, it would have been subject to the same equitable allocation of costs under § 9613(f)(1) as the Defendants. El Paso, however, chose to resolve its liability to Plaintiffs and the United States. If El Paso believes that the settlement agreement does not adequately reflect its proportionate share of liability vis-a-vis Plaintiffs, then El Paso should have refrained from entering into the agreement and taken its chances at trial. The court will not now relieve El Paso of the burdens of its agreement after El Paso has accepted the benefits of settlement.

Conclusions of Law as to Settlements

36. A district court has broad discretion whether to employ a proportionate share or a *pro tanto* approach to accounting for settlements in a private-party contribution action under 42 U.S.C. § 9613. *See American Cynamid Co. v. Capuano*, 381 F.3d 6, 20-21 (1st Cir. 2004); *see also* 42 U.S.C. § 9613(f)(1) (requiring courts to "allocate response costs among liable parties

using such equitable factors as the court determines are appropriate"); *but see Azko Nobel Coatings, Inc. v. Aigner Corp.*, 197 F.3d 302, 308 (7th Cir. 1999) (adopting the *pro tanto* approach as the exclusive method of accounting for settlements in CERCLA contribution actions). The proportionate share approach is generally recognized as more likely to ensure a fair and equitable allocation of damages among the parties. See *McDermott, Inc. v. AmClyde*, 511 U.S. 202, 212-15 (1994) (mandating application of the proportionate share approach over the *pro tanto* method in the admiralty context in the interests of equity and fairness to non-settling parties); *American Cynamid Co.*, 381 F.3d at 20 (stating that the proportionate share approach "[ensures], in theory, that damages are apportioned equitably among the liable parties"); *accord New York v. Solvent Chem. Co.*, 214 F.R.D. 106, 110 (W.D.N.Y. 2003); *Pneumo Abex Corp.*, 936 F. Supp. at 1273; *Barton Solvents, Inc. v. Southwest Petro-Chem, Inc.*, 834 F. Supp. 342, 348 (D. Kan. 1993); *United States v. SCA Servs. of Ind., Inc.*, 827 F. Supp. 526, 536 (N.D. Ind. 1993); *Comerica Bank-Detroit v. Allen Indus., Inc.*, 769 F. Supp. 1408, 1414 (E.D. Mich. 1991); *Allied Corp. v. ACME Solvent Reclaiming, Inc.*, 771 F. Supp. 219, 223 (N.D. Ill. 1990); *United States v. Western Processing Co.*, 756 F. Supp. 1424, 1432-33 (W.D. Wash. 1990); *Lyncott Corp. v. Chemical Waste Mgmt., Inc.*, 690 F. Supp. 1409, 1418 (E.D. Pa. 1988); *United States v. Conservation Chem. Co.*, 628 F. Supp. 391, 401-02 (W.D. Mo. 1985), *modified by* 681 F. Supp. 1394 (W.D. Mo. 1988); *see generally Elementis Chromium L.P.*, 450 F.3d at 613 (holding that a "liable party is entitled to recover only 'proportional shares of judgment from other tort-feasors'") (quoting *OHM Remediation Servs.*, 116 F.3d at 1582).

37. The necessity of holding fairness hearings to confirm settlements vitiates the perceived advantages of judicial economy of the *pro tanto* approach. Moreover, the nature of the

settlement between Plaintiffs and El Paso is not conducive to a dollar-for-dollar reduction.

38. Furthermore, the Supreme Court has already discounted the arguments in favor of a *pro tanto* approach in the admiralty context, and the court sees no reason why a CERCLA allocation should be treated differently. *See McDermott, Inc.*, 511 U.S. at 214-15. As the Court noted, "[t]he additional incentive to settlement provided by the *pro tanto* rule comes at too high a price in fairness." *Id.* at 215. In the absence of any meaningful distinction, the court is inclined to follow the reasoning of the Supreme Court in an analogous context.

39. Accordingly, for reasons elaborated more fully in the court's December 7, 2006, order concerning this issue, the court chooses to employ the proportionate share method of addressing settlements in its allocation. Thus, the court's equitable allocation of costs includes the contributions of Plaintiffs, El Paso, Defendants, and the settled parties for which adequate evidence was introduced to connect them to the Turtle Bayou site.

Conclusions of Law as to Past Costs

40. The parties have entered into a stipulation regarding past costs that the court will utilize to form the basis of its allocation of past costs. The court will award past costs consistent with the parties' stipulation. Consequently, if there are any "past" costs that were not included in the stipulation amounts, those costs will be handled as future costs, *i.e.*, they must be presented to Defendants for review and objection per the court's rulings below. Costs that Plaintiffs and El Paso have incurred subsequently, of course, are subject to the declaratory judgment regarding future costs.

41. As previously found by the court, Plaintiffs have incurred $29,540,529.00 cleaning up the Turtle Bayou site, and El Paso has expended $3,851,043.65 in remedial costs.

Thus, in accordance with the contribution percentages detailed in the findings of fact, each Defendant shall pay to Plaintiffs as its proportionate share of Plaintiffs' past costs the following sums: Bayer, $17,724.32; Exxon, $454,924.15; Lubrizol, $4,702,852.22; PPG, $26,586.48. Meanwhile, each Defendant shall pay to El Paso the following sums: Bayer, $1,925.52; Chevron, $26,572.20; Exxon, $48,523.15; Lubrizol, $496,014.42; Occidental, $614,626.57; PPG, $2,695.73.

42. Plaintiffs are entitled to post-judgment interest calculated as of the "date of the entry of judgment . . . ." 28 U.S.C. § 1961(a). This has been interpreted to mean "from whenever judgment was first ascertained in a meaningful way." *Goodrich Corp. v. Town of Middlebury*, 311 F.3d 154, 178 (2d Cir. 2002), *cert. denied*, 539 U.S. 937 (2003). Post-judgment interest is designed to compensate plaintiffs for the delay they suffer from the time damages are reduced to an enforceable judgment to the time defendants pay the judgment. *See Kaiser Aluminum & Chem. Corp v. Bonjorno*, 494 U.S. 827, 835-36 (1990). The rate is governed by federal statute. *See* 28 U.S.C. § 1961(a) (setting post-judgment interest rate "equal to the weekly average 1-year constant maturity Treasury yield, as published by the Board of Governors of the Federal Reserve System, for the calendar week preceding [ ] the date of the judgment"). In this case, the court's judgment on past response costs and expenses was ascertained in a meaningful way in its Memorandum and Order signed December 3, 2007. Accordingly, Plaintiffs and El Paso are entitled to post-judgment interest at the rate of 3.25% from December 3, 2007, until paid.

43. Pursuant to the parties' agreement in their Corrected Joint Final Pre-Trial Order for Phase Two Allocation Trial (#1154), the court will defer any ruling regarding prejudgment interest until a later date.

44. The amount of court costs cannot be accurately determined based upon the evidence presented at this time; thus, an award of costs will be determined at a later date upon proper application to the court for such amounts.

Conclusions of Law as to Future Costs

45. The parties agree that Plaintiffs and El Paso are entitled to a declaratory judgment establishing the percentage of future costs that will be owed by Defendants. Moreover, in any action filed pursuant to § 9613(f)(1), "the court shall enter a declaratory judgment on liability for response costs or damages that will be binding on any subsequent action or actions to recover further response costs or damages." 42 U.S.C. § 9613(g)(2); *accord American Cynamid Co.*, 381 F.3d at 14; *Davis*, 261 F.3d at 46.

46. Plaintiffs and El Paso may submit a cost package to be allocated pursuant to these findings of fact and conclusions of law as often as every six months, though they may choose to do so less frequently without prejudice. Defendants will have twenty-one days from the filing of the cost package in which to file any objections to the costs with the court. If no objections are timely filed or an extension of time is not granted, each Defendant shall submit payment to Plaintiffs and El Paso for its proportionate share of the costs in accordance with these findings of fact and conclusions of law within thirty days of the filing of the cost package. If objections are lodged regarding a severable portion of the costs, each Defendant shall pay its proportionate share of undisputed costs within thirty days of the filing of the cost package. Following an objection made by any Defendant, the parties shall meet and confer in an attempt to resolve the matter without judicial intervention. The court will rule on any objections that the parties are unable to

resolve amicably. Such a ruling may be based entirely upon the submissions of the parties; alternatively, the court may order that a hearing be held.

47. Any conclusion of law more properly characterized as a finding of fact is hereby adopted as such. Any finding of fact more properly characterized as a conclusion of law is hereby adopted as such.

II. Summary

For the foregoing reasons, Defendants Bayer, Exxon, Lubrizol, and PPG shall pay Plaintiffs and El Paso their equitable shares of the costs as set forth in these findings of fact and conclusions of law. Defendants Chevron and Occidental shall compensate El Paso for their equitable shares of El Paso's costs as set forth in these findings of fact and conclusions of law. The court retains jurisdiction to enforce the declaratory judgment issued herein. Any relief not expressly granted, aside from a future award of court costs and prejudgment interest, is DENIED.

SIGNED at Beaumont, Texas, this 3rd day of December, 2007.

Marcia A. Crone

MARCIA A. CRONE
UNITED STATES DISTRICT JUDGE