Addendum
to
February 3, 2003 Facility Investigation Work Plan

El Paso Merchant Energy-Petroleum Company
Elementis Chromium, L.P. Site
Corpus Christi, Texas

June 2007

Prepared for:
El Paso Merchant Energy-Petroleum Company
Houston, TX

Prepared by:
URS Corporation
9400 Amberglen Boulevard
Austin, TX 78729

EPA Comments and Conditional Approval Letter dated April 11, 2007

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

April 11, 2007

Mr. B. Cord Harris
El Paso Corporation
1001 Louisiana Street
Houston, Texas 770021

Subject: EPA Comments and conditional approval of the El Paso Merchant Energy-Petroleum Company (formerly Coastal Refining & Marketing Inc.), Corpus Christi, Texas Facility Investigation Work Plan - Elementis Site, dated February 3, 2003

Dear Mr. Harris:

The Environmental Protection Agency (EPA) has completed a review of the above-referenced document and is providing technical comments. The comments include both general as well as key issues associated with the Facility Investigation (FI) Work Plan.

EPA approves the Facility Investigation Work Plan based on the conditions that EPA's comments are addressed and incorporated into the El Paso Facility Investigation – Elementis Site Work Plan.

Should you have any questions or need additional information, please contact me, at (214)665-8321.

Sincerely,

Sue Westbrook

Sue Westbrook
Project Manager

Enclosure

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EPA TECHNICAL REVIEW AND COMMENTS

FACILITY INVESTIGATION WORKPLAN -ELEMENTIS SITE

EL PASO CGP COMPANY &
EL PASO MERCHANT ENERGY-PETROLEUM COMPANY
(Formerly Coastal Refining & Marketing, Inc.)
Corpus Christi, Texas
EPA ID No. TXD008132268
U.S. EPA Docket No. RCRA-VI-7003-01-01

April 11, 2007

GENERAL COMMENTS
EPA comments and/or changes in *italicized print*

1. The U.S. EPA's National Exposure Research Laboratory evaluated the ROST™ technology in 1995. The details of EPA's study are published in an Innovative Technology Verification Report entitled, "The Rapid Optical Screening Tool (ROST™) Laser-Induced Fluorescence (LIF) System for Screening of Petroleum Hydrocarbons in Subsurface Soils," EPA/600/R-97/020. As stated in the section, Limits of the Technology, on page 13 of the report:

   "The ROST™ LIF system often uses 290 nm as the excitation wavelength. This wavelength is short enough to excite the fluorescence of all aromatic hydrocarbons with at least two conjugated aromatic rings. Aliphatic species and single-ring aromatics do not contribute to the ROST™ LIF signal from 290 nm."

   In addition, the report section, Limitations of the Technology, states on page 51:

   "The ROST™ LIF system is applicable only to fuels and wastes containing nonchlorinated multi-ring aromatic hydrocarbon molecules. The detection capabilities for ROST™ include, but are not limited to, jet fuel, gasoline, diesel, lubricating oils, coal tar, and creosote. Other compounds such as chlorinated hydrocarbons would require separate sensors."

   Based on the above information, there appear to be serious limitations to detecting the presence of the aliphatic (straight chain) compounds, chlorinated aliphatics, and single-ring aromatic compounds, which are included on the Skinner List. According to Fugro Geosciences, Inc., the owner of the ROST™ technology, the LIF system can be tuned across a range of wavelengths from 266-310 nm in order to capture the single-ring

aromatics, such as benzene, toluene, and ethylbenzene, but does not indicate that the LIF system can now detect aliphatics. This is an important issue that must be addressed since the aliphatics and single-ring aromatics may be present, yet not detected, if the ROST™ LIF sensor is tuned to the standard frequency of 290 nm.

The Work Plan should be revised to provide the field procedure that will be used to ensure the LIF system will be adjusted appropriately during a sounding to detect the presence of single- and multi-ring aromatic compounds. Also, clarify whether the LIF sensor can be tuned to detect aliphatic (straight chain) and chlorinated hydrocarbons on the Skinner List and, if so, ensure that the LIF tuning procedure addresses these compounds as well. Alternatively, use another screening technology (e.g., direct push technology with soil gas sampling) to detect the aliphatic and chlorinated hydrocarbons on the Skinner List.

2. *The Work Plan should be revised to consider any available analytical data for the seeps along the bluff line located east of the cofferdam. If no data are available, clarify this point and indicate that the seeps will be sampled during the FI. If seep data are available, revise the site conceptual model to integrate this data. Consider available analytical data in an effort to determine the source of the contaminants discharged from the seeps. If well data are available for the eastern Facility Area, integrate the data into the site conceptual model. If wells are not presently located in the eastern Facility Area, then revise the FI Work Plan to address the delineation of any phase-separated hydrocarbon source and dissolved phase plume, including the sampling of any existing wells in the eastern portion of the Facility Area and the installation of additional monitoring wells in the Facility Area.*

3. Product thickness measurements are available for several of the wells in the Facility Area.

   The thickness of product should be mapped during the FI to identify the areas with the greatest quantities of free product and to identify any trends in contaminant migration. Revise the FI Work Plan to include a spatial evaluation of the product thickness measurements. Include maps of the product thickness measurement to illustrate the current conditions in the Facility Area. These maps would serve as a basis for responding to the requirements of AOC Section VII.2.B.(i) for determining the thickness and lateral extent of the LNAPL plume, as well as identifying areas having data gaps.

4. Section 6.1 proposes benzene and toluene as indicator compounds for siting permanent groundwater monitoring wells. Section 6.5.8 states that the most recent version of Method 8021, in EPA SW-846, *Test Methods for Evaluating Solid Waste*, is proposed as the analytical method for benzene and toluene. This analytical method can be used to detect a minimum of 12 of the 16 volatile organics, including benzene and toluene, on the "Skinner List," Constituents of Concern for Wastes from Petroleum Processes, which serves as the basis for the Facility chemicals of concern (COCs). Since so many Facility

COCs can be detected using Method 8021, clarify why only benzene and toluene are proposed as indicator compounds. Also, provide justification for the use of benzene and toluene as indicator compounds for the aliphatics, semivolatile organics, and polynuclear aromatic hydrocarbons (PAHs) on the Skinner List.

If adequate justification is not provided, the FI Work Plan should be revised to include evaluation of additional, and possibly all, Facility COCs.

5. Section 4.1.1, Groundwater, discusses the use of the BIOSCREEN Model "to predict the natural attenuation of COCs as they migrate in groundwater." Facility preliminary remediation goals (PRGs) are established for the COCs in groundwater at the upgradient edge of the Interim Measure (IM) Area. The Facility PRGs were calculated by taking the log average of two sets of PRGs, with one set based on the shortest literature value for intrinsic bioremediation half-life and the second set based on the longest literature value for intrinsic bioremediation half-life. Section 4.1.1 assumes a 350-foot travel distance for the COCs across the IM Area to the point of groundwater discharge to surface water. The BIOSCREEN model was then used to calculate Facility groundwater attenuation action levels (AALs) per the Texas Risk Reduction Program (TRRP), for the COCs. The Facility groundwater AAL values and backup BIOSCREEN printouts are presented in Appendix B. Section 4.1.1 further states that once the FI is completed, the BIOSCREEN dilution attenuation factors (DAFs) will be adjusted to reflect site-specific transmissivity, porosity, and fraction of organic carbon (f_{oc}) for saturated zone soils. BIOSCREEN will then be used during the Corrective Measures Study (CMS) to re-calculate the final AALs for the dissolved-phase COC concentrations that will be used to implement corrective measures.

AOC Section VII.2.A.(iii) requires that Facility PRGs shall be established for identified Facility COCs. The Facility PRGs must be consistent with available protective, risk-based cleanup levels applicable to current and reasonably expected future land use scenarios and environmental exposure scenarios consistent with the conceptual site model (CSM). When federal or State PRG values do not exist, they must be developed in accordance with the EPA Human Health and Ecological Risk Assessment Guidance for Superfund (RAGS) and other appropriate EPA guidance. The federal PRG values may be referenced in RAGS Part B and the State PRG values are the TRRP Tier I protective concentration limits (PCLs). Based on the requirements of the AOC for establishing PRGs, literature values were inappropriately used in the BIOSCREEN model to calculate Facility groundwater PRGs, which were developed for the purpose of establishing Facility groundwater AALs along the upgradient boundary of the IM Area. If El Paso wishes to calculate PRGs using literature values for those COCs that do not have established federal or State PRGs, they should be based on ultra-conservative literature values and not on a log average of two sets of PRGs. In particular, a very conservative value for f_{oc} and little to no biodegradation are necessary to justify a conservative approach using only literature values. That said, however, El Paso will still be required

to collect site-specific data during the FI to calculate the final remediation goals (FRGs) that will be proposed to EPA Region 6 and used to select a corrective measure for the Facility. The FI should collect site-specific data for bulk density and f_{oc} to calculate the retardation factor associated with biodegradation. Revise the FI Work Plan to establish PRGs in accordance with AOC Section VII.2.A.(iii).

In addition, the FI Work Plan does not clearly explain the assumptions for applying the BIOSCREEN model to the IM Area, rather than the AOC-defined Facility area. The model is used to back-calculate the Facility groundwater PRGs (or TRRP AALs) (Table B-1) for the natural attenuation of COCs in groundwater as it leaves the Facility and crosses the IM Area to the ship channel. The assumptions of the model are not well-described in Section 4.0, although it appears that there are at least three. First, the model appears to assume that all COCs in the Facility area will flow across the upgradient boundary of the IM Area, since the model's source area is located along this boundary. Second, the model assumes that natural attenuation of the COCs will occur during their transport along the 350-foot pathway from the IM Area upgradient edge to the groundwater discharge to surface water along the ship channel. And third, the model does not recognize the existence of the current groundwater pump-and-treat activities in the IM Area and, therefore, assumes a simple flow pathway across the IM Area. In addition, this area has free phase and residual NAPL which acts as a continued source and inhibits biodegradation, thus the model is not applicable for the area.

The conditions assumed for the BIOSCREEN model are not a realistic representation of the actual environment of the IM Area. The IM Area does not capture all of the COCs flowing in the Facility area, as witnessed by the releases of hydrocarbons from the seeps and sediments to the east of the IM Area. . The model assumes that natural attenuation will occur until the groundwater is discharged to the surface water of the ship channel, however, the downgradient water's edge of the IM Area is partially bordered by a cofferdam that prevents groundwater from reaching the ship channel. Instead, the groundwater is removed from the IM Area through a series of recovery wells for the IM pump-and-treat system, which creates numerous cones of depression in the groundwater surface of the uppermost aquifer, resulting in a complicated flow pathway across the IM Area. The second page of the EPA *BIOSCREEN Natural Attenuation Decision Support System User's Manual* (Version 1.3, EPA/600/R-96/087, August 1996) states the model "assumes simple groundwater flow conditions" and "should not be applied where pumping systems create a complicated flow field."

Clarify the assumptions that serve as the basis for the BIOSCREEN model.

6. Section 4.1.2 discusses the establishment of AALs for soil Media ("Media" is defined in AOC Section VII.2.A.(i)). Again, as discussed for groundwater, the establishment of soil Media AALs, per TRRP requirements, does not satisfy the requirements for the establishment of soil PRGs. As with the discussion above regarding the establishment of

Facility groundwater PRGs, the Facility soil PRGs must also be established in accordance with the requirements of AOC Section VII.2.A.(iii) for identified Facility COCs.

The Facility soil PRGs must be consistent with available protective, risk-based cleanup levels applicable to current and reasonably expected future land use scenarios and environmental exposure scenarios consistent with the conceptual site model (CSM). When federal or State PRG values do not exist, they must be developed in accordance with the EPA Human Health and Ecological Risk Assessment Guidance for Superfund (RAGS) and other appropriate EPA guidance. Revise the FI Work Plan to establish PRGs in accordance with AOC Section VII.2.A.(iii).

7. Section 5.0, Application of the DQO Process, discusses FI activities that are presented in detail in other portions of the FI Work Plan. Where EPA Region 6 has commented upon FI activities, responses to comments may impact the FI plan presented in the Data Quality Objectives Process. For example, the determination of AALs does not satisfy the establishment of Facility PRGs and the DQO Process should be revised accordingly.

   Revise Section 5.0 and its associated figures and tables, as necessary, to accommodate revisions to the FI Work Plan that are made in response to EPA Region 6 comments.

8. The FI Work Plan references numerous acronyms that are defined in the text, but the definitions are difficult to locate within the document.

   Provide a list of acronyms specific to the FI Work Plan, preferably after the Table of Contents.

SPECIFIC COMMENTS

1.0 INTRODUCTION

This Workplan describes the technical approach that will be used to further investigate Media at the Facility. - - - the specific objectives of the investigation to be conducted at the Facility are to:

1. *Identify the Facility chemicals of concern (COC)* and characterize the potential pathways of COC migration;

2. Identify actual or potential receptors, including human and *ecological* environmental systems that are susceptible to Facility COC exposure at or from the Facility;

3. Install adequate wells and collect sufficient samples (*analytical data)* to determine the *horizontal and vertical extent of ground water* contamination to *decreasing concentrations to below the* appropriate Facility preliminary remediation goals

(PRGs); and in soil /media ("Media shall mean ground water and contaminated soils where the soil contamination is contributing to or is attributable to the existing ground water contamination) determine the extent of contamination to below the appropriate PRGs - - - - - - .

1. **Section 1.0, Introduction, page 1:** The opening paragraph presents an incomplete reference to the definition of "Facility," as discussed in AOC Section I, Jurisdiction. The second page of the AOC states:

> "In this Order the 'Facility' is defined as the area of contamination beyond the Coastal Refinery property boundary north, northeast and east of the Coastal Refinery East Plant-North [Valero Complex 8 North], and extending onto or under the portion of the Elementis Chromium property located East of Cantwell Lane and the Inner Harbor Ship Channel. <u>The definition of Facility will be expanded to include areas west of Cantwell Lane in the IM Area (as defined below) should investigation indicate that contamination is contiguous extending west of Cantwell Lane in the IM Area.</u> The Facility does not include any portion of the Inner Harbor Ship Channel and notwithstanding anything in this Order to the contrary, this Order does not require Respondent to fully delineate or to remediate contamination in the Inner Harbor Ship Channel."

In *particular, the underlined portion of the above definition of "Facility" provides for the potential expansion of the area addressed under the FI. Revise the discussion in Section 1.0 to fully address the definition of "Facility," including its potential expansion to include appropriate portions of the IM Area.*

2. **Section 1.0, Introduction, pages 1-2:** The Introduction references the specific FI objectives prescribed under AOC Sections VII.2.A(i) and VII.2.B, but does not recognize the FI Work Plan requirements found at AOC Section VII.2.A(ii) and (iii).

Revise Section 1.0 to address all of the requirements of AOC Section VII.2.A and verify that these requirements are addressed by the FI Work Plan.

3. **Section 3.0, Characterization of Contaminant Source and Environmental Setting Based on Existing Data, pages 5-7:** The third paragraph on page 6 indicates that the vertical extent of Facility chemicals of concern (COCs) has not been defined in the Facility Area, as defined in the AOC. This paragraph then indicates that monitoring well DMW-03 is screened in the second transmissive zone and is located at Valero Complex 8 North, approximately 80 feet west of the Facility Area at Elementis. Groundwater sampled from Well DMW-03 is positive for *o*, *m*, and *p*-cresols, which is documented in Table 3-4. The presence of cresols may indicate the presence of a dense non-aqueous phase liquid (DNAPL) in the second transmissive zone.

Revise Section 3.0 to discuss the significance of the presence of the o, m, and p-cresols in the second transmissive unit, particularly to the FI at the Facility Area at Elementis and the delineation of the lateral and vertical extent of COCs in the upper transmissive zone and the second transmissive zone.

4. **Section 4.0, Facility Preliminary Remediation Goals, page 8:** The last paragraph on this page states that "the significant exposure pathways include the potential transport of LNAPL and COCs in groundwater to surface water and the potential migration of soil vapor containing volatile Facility COCs derived from LNAPL, soil, or groundwater to indoor and outdoor air at the Facility." Based upon this discussion, it appears that the direct releases of non-aqueous phase liquid (NAPL) to surface water and to sediment are considered to be incomplete pathways. As documented in a separate Administrative Order on Consent (reference US EPA Docket No. RCRA-VI-7003-01-02, Section V.7) between EPA Region 6 and Elementis Chromium, L.P., the U.S. Fish & Wildlife Service (USFWS) observed hydrocarbons, including benzene and cumene seeping from the bluff into the Inner Harbor Ship Channel on or about February 9, 2000. The USFWS also observed several seeps along the bluff, located up to 100 feet east of the cofferdam, discharging oily waste into the surface water on March 2, 2000. Also, oily liquid bubbled from below the surface of the water, which released a sheen on the water surface. The USFWS believed "the release to surface water constituted a potential endangerment to shorebirds." Based on these documented releases of NAPL to surface water and to sediment, these pathways are complete.

   Revise the conceptual site model to document these pathways as complete and evaluate them for significance.

5. **Section 4.0, Facility Preliminary Remediation Goals, page 8:** The second paragraph on page 8 states that "The CSM was developed in conjunction with the PRG Report and is presented in Figure 4-1. There have been no changes made to the CSM, as no additional data have been gathered since the submittal of the PRG report." The last paragraph on page 12 of the PRG Report stated "Non-Aqueous Phase Liquid (NAPL) is the primary source, which has migrated on to the facility in the subsurface. The NAPL in turn is the source of COCs in other environmental media, specifically surface soil, soil vapor, groundwater and surface water.

   As discussed during the November 19, 2002 meeting with El Paso and in subsequent written comments, EPA recommended that the Conceptual Site Model (CSM) identify all individual sources of contamination in order to aid in determining potential cumulative and overall risk of exposures to receptors. That is, the sources of the NAPL in environmental media should be identified, e.g., specific Solid Waste Management Units or Areas of Concern. Also, the type of NAPL,(i.e., diesel, gasoline, benzene, etc) and constituents of concern in the NAPL. The FI Report and the CSM Diagram Figure 4-1 should be revised to include these changes.

6. **Figure 4-1, Schematic Conceptual Site Model:** The Conceptual Site Model (CSM) indicates that both exposure pathway ID Numbers 3 and 9 address the ingestion of potentially contaminated surface water. Pathway No. 9 indicates that the ingestion of surface water by both human and ecological receptors is a potentially complete pathway. However, pathway ID Number 3 indicates that only ecological receptors will ingest surface water. It is not clear why human receptors are not considered for pathway No. 3.

   Revise the FI Report to address this discrepancy.

7. **Section 4.1.1, Groundwater, page 10:** The first paragraph references AOC Sections VII.A.(iv) and VII.D, however, these citations appear to be in error. Clarify the AOC citations and revise Section 4.1.1 accordingly.

8. **Section 4.1.1, Groundwater, pages 10 - 11:** The first paragraph in this section states that "Within the IM Area, the groundwater PRGs are those set in the PRG report for the groundwater/surface water interface." A review of the information presented in Table 4-1of the PRG Report revealed a number of discrepancies which required clarification and correction. The identified discrepancies are outlined in the following paragraphs.

   The footnotes to Table 4-1 of the PRG Report indicated that the source of many of the values presented in the Table is the "Texas Commission for Environmental Quality Surface Water Quality Criteria obtained from Tables 1 and 3 of the TCEQ 200a Texas Surface Water Quality Standards." However, based upon a review of the values presented and per discussions with facility representatives during the March 26, 2003 conference call, the sources of the values used included not only Texas Administrative Code (T.A.C.) Chapter 307, Tables 1 and 3 (Aquatic Life and Human Health protection criteria) dated August 17, 2000 but also, risk-based exposure limits (RBELs) from Chapter 350, the Texas Risk Reduction Rule dated August 13, 2002 .

   The table must be revised to clearly indicate the specific source of the values presented. In addition, there appears to be a 0 missing from the date of the reference (i.e., 200 versus 2000). The footnote must be revised to correct this typographical error.

   Furthermore, the footnote to Table 4-1 also indicated that the human health criteria were based on the ingestion of saltwater fish from an incidental fishery. The TCEQ standards state that the numerical criteria applicable to an incidental fishery are 10 times the human health criteria listed in columns B and C of Section 307.6, Table 3. Chapter 307.6(d)(5) indicates that all designated segments listed in Appendix A of §307.10 are considered to have sustainable fisheries. Appendix A of Chapter 307 identifies the Corpus Christi Inner Harbor Ship Channel as designated Stream Segment Number 2484 of the Nueces River Basin. Per personal communication with Mr. Jim Davenport of the TCEQ Water Quality Standards Division, the Inner Harbor Ship Channel is considered to be a sustainable

saltwater fishery rather than an incidental fishery. As such, it is not appropriate to multiply the human health criteria by a factor of 10 in the development of IM PRGs.

The IM PRGs presented in Table 4-1 and Appendix E of the PRG Report which are based on the human health pathway will need to be reviewed and corrected to reflect a value for a sustainable saltwater fishery.

The surface water PRG for benzene is listed as 1.09E-01 mg/L and the source identified for this value is the aquatic toxicity criteria from Table 1 of the TCEQ SWQS. The TCEQ SWQS do not include a saltwater chronic criteria value for the protection of aquatic life for benzene, but do include a human health value of 70.8 micrograms per liter (μg/L) for benzene. The value of 1.09E-01 mg/L appears to be taken from Chapter 350 of the Texas Risk Reduction Rule. As documented in the Administrative Order on Consent (reference US EPA Docket No. RCRA-VI-7003-01-01, Section VII.1.A.(i)) between EPA Region 6 and El Paso CPG Company, for the purposes of the Interim Measures Investigation, the Texas SWQS (30 Tex. Administrative Code Chapter 307) shall be used as IM PRGs and the IM PRG concentration for each COC shall be equal to its respective Texas SWQS value, or a comparably derived value for COCs without a standard, for aquatic life and human health protection (saltwater chronic criteria). Given the fact that benzene does have a human health criteria (70.8 μg/L) listed in Table 3 of the Texas SWQS, this value should be selected as the IM PRG for benzene. This issue also applies to the IM PRGs selected for chloroform and tetrachloroethylene.

Revise Table 4-1 and Appendix E of the PRG Report to address this issue.

In addition, Table 4-1 uses milligrams per liter (mg/L) as the unit of measure whereas the EQ surface water criteria (Chapter 307, Tables 1 and 3) and the calculations presented in Appendices C, D and E of the PRG Report are presented in μg/L. The conversion between mg/L and μg/L appears to have also resulted in some errors.

Review Table 4-1 of the PRG Report to ensure the accuracy of the information presented and to correct the listed sources and any conversion errors.

The information presented in the Facility Investigation Workplan must be reviewed in light of the above-mentioned comments and revised as applicable.

9. **Section 4.2, Chemicals of Concern, page 13:** The first paragraph in this section states that "If a chemical is not detected at concentrations greater than or equal to its risk-based level or MDL (whichever is higher) during the IM Area Investigation and the Facility Investigation, then that chemical will be dropped from further consideration and will not be considered to be a COC." If the method detection limit (MDL) is higher than the risk-based level, then it is possible that concentrations which exceed risk-based levels may be present in media. Therefore, it is inappropriate to eliminate a chemical from further

consideration based upon a comparison to an elevated MDL.

Revise the workplan to state that if the MDL for a chemical is greater than its risk-based level it will be retained for further consideration.

10. **Section 4.2, Chemicals of Concern, page 15:** The first full paragraph on page 15 states that Table 4-1 presents soil saturation limits, however, it actually presents groundwater facility attenuation action levels (AALs).

    Clarify whether the reference should be for Table 4-7, Potential COC Soil Saturation Limits.

11. **Section 5.0, Application of the DQO Process, page 17:** The third paragraph indicates that data quality objectives (DQOs) refer to the degree of accuracy and precision of a measurement. In accordance with EPA *Guidance on Quality Assurance Project Plans*, EPA QA/G-5, EPA/600/R-02/009, December 2002, accuracy and precision are performance and acceptance criteria, or data quality indicators, in this context for measurement quality objectives. Other principle data quality indicators include bias, representativeness, completeness, comparability, and sensitivity.

    Revise Section 5.0 to clarify how these seven data quality indicators support the DQO Process for the FI Work Plan. Also, an older version of EPA QA/G-5 is listed in Section 11.0, References, as entry number 35. Update Section 5.0 and Appendix A, Quality Assurance Project Plan, of the FI Work Plan as necessary to address any new requirements of the December 2002 revision of EPA QA/G-5.

12. **Section 6.1, ROST and Temporary Well Sampling, pages 22-23:** Section 6.1 indicates that LNAPL samples collected from five wells will be used to calibrate the Rapid Optical Screening Technology (ROST) to site-specific product samples to enhance the effectiveness of this technique. Section 3.0 indicates that there are three plumes of differing composition in the Facility Area at Elementis. Previous investigations indicate that a benzene plume is present in the central portion of the Facility, a gas-oil range hydrocarbon plume is present in the northern portion, and a gasoline-naphtha plume is present in the southwestern portion.

    Revise the Work Plan to clarify whether at least one LNAPL sample is collected from each of the plumes to calibrate the ROST.

13. **Section 6.1, ROST and Temporary Well Sampling, pages 23-24:** The last paragraph on page 23 continues onto page 24 and discusses the data quality objectives for definition of the LNAPL plume. The vertical thickness will be determined to less than 0.01 foot, which will be the "non-detect" value as measured by an oil/water interface probe, in accordance with AOC Section VII.2.B.(i). The lateral extent of the LNAPL plume will

be determined to "a horizontal distance of less than or equal to 200 feet" from the actual edge of the plume, however, this is an unacceptable distance. The discussion attempts to justify the degree of imprecision in establishing lateral extent of the plume by referring to three geologic cross-sections, presented as Figures 2-2 through 2-4. The degree of lateral stratigraphic variability shown in the cross-sections does not justify the imprecision in the determination of the lateral extent of the plume. Considering that direct-push technology will be used on-site, it should be relatively easy to "fine-tune" the location of the edge of the plume, which could easily be located to within 25 feet of the actual plume edge.

Revise Section 6.1 and any other portions of the FI Work Plan to reduce the "200 feet" of lateral imprecision to a distance that is appropriate to the proposed use of direct-push technology.

14. **Section 6.1, ROST and Temporary Well Sampling, page 26:** The third paragraph states: "If a well screened at the base of the uppermost transmissive zone displays COCs at concentrations in excess of applicable groundwater PRGs, then a well screened in the second transmissive zone (i.e., the transmissive zone underlying the uppermost transmissive zone) will be installed." Clarify whether this is the only condition under which a well will be installed in the second transmissive zone. For example, Table 3-4 indicates that cresols were detected in a second transmissive zone well (DMW-03) on the Valero Complex 8 North, approximately 80 feet from the Facility Area. This begs the question as to whether or not cresol is also present in the second transmissive zone in the nearby Facility Area, however, there does not appear to be a decision point that leads to further investigation.

Revise the FI Work Plan, as necessary, to expand the criteria for installing a monitoring well in the second transmissive zone.

15. **Section 6.5.8, Collection and Analysis of Groundwater Samples, page 42:** The third full paragraph on page 42 indicates that readings will be measured with a flow cell for temperature, conductivity, pH, dissolved oxygen, oxidation-reduction potential (ORP), and turbidity. This paragraph goes on to list the stabilization criteria for all of the above parameters, except temperature.

Revise the Work Plan to provide the stabilization criterion for temperature.

16. **Section 6.5.11, Decontamination, Small-Scale Equipment, pages 50-51:** The decontamination procedure for small-scale equipment does not include a hexane or isopropanol rinse following the potable water rinse. Given that the levels of contamination are expected to be quite high in many of the wells, it will be important to follow procedures that will ensure equipment is thoroughly decontaminated between sampling points.
Revise the FI Work Plan to include a hexane or isopropanol rinse after the potable water

rinse in the decontamination procedures presented on page 50.

Also, the discussion of Small-Scale Equipment does not discuss how the flow cell will be decontaminated after its use at each well.

Provide the decontamination method that will be used for the flow cell.

17. **Section 7.2, Additional QA/QC Procedures Specified in the AOC, page 57:** The first paragraph on page 57 states: "As part of their QA/QC program, STL, ETI, and SPL [i.e., Severn Trent Laboratory, Exploration Technologies, Inc., and Southern Petroleum Laboratory, respectively] will perform analysis of a reasonable number of known samples provided by EPA to demonstrate the quality of the analytical data."

AOC Section XIII is apparently the basis for this requirement, however, it should be modified to state that this testing will be performed upon the request of EPA and will not serve as the sole criterion in determining the quality of the analytical data generated by STL, ETI, and SPL.

The RFI QAPP provides the overall quality requirements for blanks, duplicates, and duplicate spike samples that will be analyzed to verify the ongoing quality of the data produced from samples collected during the FI.

Revise Section 7.2 accordingly.

18. **Section 9.0, Schedule for Activities, page 71:** Section 9.0 presents a two-sentence discussion regarding the schedule for the FI Work Plan.

The schedule must address the time frame for activities and milestones for the FI activities, not just the total time to accomplish the FI. Provide a detailed schedule for the completion of the activities proposed by the FI Work Plan.

19. **Figure 4-1, Schematic Conceptual Site Model:** The Conceptual Site Model (CSM) indicates that ingestion of fish by human receptors is a significant exposure pathway. However, it is not clear why ingestion of fish by ecological receptors such as shore birds is not considered a complete exposure pathway.

Revise the work plan to provide information which justifies the elimination of this potentially complete pathway. Alternatively, revise the CSM to include this pathway. This comment also applies to Figure 4-2.

20. **Table 3-1, Cumulative LNAPL Thickness and Groundwater Elevation Data:** Prior to the second quarter of 2000 (00-Q2), the measurements of "depth to groundwater" appear to be measurements of "depth to LNAPL" for monitoring wells MW-U11, MW-U12, and

MW-U13. Table 3-1 presents data values for "depth to groundwater" prior to 00-Q2 that are similar to the "depth to LNAPL" data values beginning in 00-Q2. Also, the pre-00-Q2 data provide no differentiation between LNAPL and groundwater surfaces, while the data collected beginning in 00-Q2 clearly indicates over 4 feet of LNAPL thickness in these three wells.

Verify whether the pre-00-Q2 "depth to groundwater" values should be considered as measurements to the top surface of the LNAPL on the groundwater. Also, make the calculations to determine potentiometric surface elevation based on the specific gravity of the LNAPL involved. Revise Table 3-1 as necessary..

El Paso Merchant Energy-Petroleum Company
Response to EPA Comments
June 2007

RESPONSE TO EPA'S TECHNICAL REVIEW AND COMMENTS

FACILITY INVESTIGATION WORK PLAN
ELEMENTIS SITE - CORPUS CHRISTI, TEXAS

EL PASO MERCHANT ENERGY-PETROLEUM COMPANY
EPA ID NO. TXD008132268
U.S. EPA Docket No. RCRA-VI-7003-01-01

April 11, 2007

Below are El Paso's responses to the Environmental Protection Agency's (EPA's) April 11, 2007 comments on the Facility Investigation (FI) Work Plan dated February 3, 2003.

General Comments

1. *The U.S. EPA's National Exposure Research Laboratory evaluated the ROST™ technology in 1995. The details of EPA's study are published in an Innovative Technology Verification Report entitled, "The Rapid Optical Screening Tool (ROST™) Laser-Induced Fluorescence (LIF) System for Screening of Petroleum Hydrocarbons in Subsurface Soils, "EPA/600-R-97/020. As stated in the section, Limits of the Technology, on page 13 of the report:*

   "The ROST™ LIF system often uses 290 nm as the excitation wavelength. This wavelength is short enough to excite the fluorescence of all aromatic hydrocarbons with at least two conjugated aromatic rings. Aliphatic species and single-ring aromatics do not contribute to the ROST™ LIF signal from 290 nm."

   In addition, the report section, Limitations of the Technology, states on page 51:

   "The ROST™ LIF system is applicable only to fuels and wastes containing nonchlorinated multi-ring aromatic hydrocarbon molecules. The detection capabilities for ROST™ include, but are not limited to, jet fuel, gasoline, diesel, lubricating oils, coal tar, and creosote. Other compounds such as chlorinated hydrocarbons would require separate sensors."

   Based on the above information, there appear to be serious limitations to detecting the presence of the aliphatic (straight chain) compounds, chlorinated aliphatics, and single-ring aromatic compounds, which are included on the Skinner List. According to Fugro Geosciences, Inc., the owner of the ROST™ technology, the LIF system can be tuned across a range of wavelengths from 266-310 nm in order to capture the single-ring aromatics, such as benzene, toluene, and ethylbenzene, but does not indicate that the LIF system can now detect aliphatics. This is an important issue that must be addressed since the aliphatics and single-ring aromatics may be present, yet not detected, if the ROST™ LIF sensor is tuned to the standard frequency of 290 nm.

The Work Plan should be revised to provide the field procedure that will be used to ensure the LIF system will be adjusted appropriately during a sounding to detect the presence of single- and multi-ring aromatic compounds. Also, clarify whether the LIF sensor can be tuned to detect aliphatic (straight chain) and chlorinated hydrocarbons on the Skinner List and, if so, ensure that the LIF tuning procedure addresses these compounds as well. Alternatively, use another screening technology (e.g., direct push technology with soil gas sampling) to detect the aliphatic and chlorinated hydrocarbons on the Skinner List.

Response: El Paso addressed (October 24, 2005) this issue in response to EPA's comment on the Interim Measures (IM) Investigation Work Plan. Since then, El Paso has performed a number of ROST and cone-penetration test (CPT) borings for screening-level evaluation of the occurrence of light non-aqueous phase liquid (LNAPL) at the Facility. The fieldwork has progressed beyond the screening-level phase with the installation and sampling of permanent monitoring wells at the Facility. Groundwater samples have been analyzed for chemicals of concern (COCs) in accordance with the IM Investigation Work Plan, finalized in 2006.

With regard to the ROST technology, El Paso discussed this issue with the CPT/ROST manager of Fugro Geosciences (Dennis Stauffer). Starting in 1999 the ROST sensor can also monitor and record data for 340, 390, 440, and 490 nanometer wavelengths, resulting in the ability to detect the presence of even more compounds than when the technology was evaluated by the EPA in 1995.

Section 6.1 (page 23) of the FI Investigation Work Plan states "ROST probes will be completed as a screening process to preliminarily define the lateral extent of LNAPL at the Facility." As documented by the EPA in 1995, the application of ROST technology is limited when applied as a quantitative tool for analysis of chemical concentrations, particularly for co-mingled COCs. However the qualitative application of the CPT/ROST technology is acknowledged by the EPA in the 1995 Innovative Technology Evaluation Report for stratigraphy and as an indicator of relative percent hydrocarbon/chemical presence, based on a standard. El Paso has used CPT for stratigraphy and ROST technology as an indicator for whether or not there is a relative percent, based on a standard, of hydrocarbon/chemical present in the soil column, which can therefore offer an indication of the presence of phase separated compounds. Therefore, El Paso has used the ROST technology as a qualitative screening of the phase separated plume boundary location so that permanent piezometers and monitoring wells may be more effectively located and constructed for direct measurement of LNAPL to delineate the free phase plume. The use of the ROST technology is not intended for delineation of COCs.

2. *The Work Plan should be revised to consider any available analytical data for the seeps along the bluff line located east of the cofferdam. If no data are available, clarify this point and indicate that the seeps will be sampled during the FI. If seep data are available, revise the site conceptual model to integrate this data. Consider available analytical data in an effort to determine the source of the contaminants discharged from the seeps. If well data are available for the eastern Facility Area, integrate the data into the site conceptual model. If wells are not presently located in the eastern Facility Area, then revise the FI Work Plan to address the delineation of any phase-separated*

hydrocarbon source and dissolved phase plume, including the sampling of any existing wells in the eastern portion of the Facility Area and the installation of additional monitoring wells in the Facility Area.

Response: El Paso has previously addressed this issue in response to EPA's comments on the draft IM Investigation Work Plan and draft Preliminary Remediation Goal (PRG) Report. As stated in the Administrative Order on Consent (AOC) Section V.20, the Texas Natural Resource Conservation Commission (TNRCC) (now the Texas Commission on Environmental Quality or TCEQ) collected a sample of oily liquid seeping from Elementis Chromium, L.P. (Elementis) into the Corpus Christi Inner Harbor (CCIH) in February 2000. The laboratory report describes the sampled media as "Org. Waste." Analytical data from three samples are documented in Exhibit 15 of the AOC. Additional seepage incidents in 2002 and 2004 did not yield any samples of liquid that could be analyzed. Analytical data from a sample collected at a seepage incident observed in February 2007, west of the cofferdam area will be provided in the next Quarterly Report to EPA, and is provided as Attachment A.

El Paso has modified the Conceptual Site Model (CSM) to include potential exposure pathways related to the historical seep area and potential dissolved phase component of the source of contamination. The revised CSM integrating the above referenced data was previously provided to EPA as part of the revised IM Investigation Workplan and the PRG Report. The modified CSM is provided as Attachment B.

Since the submittal of the FI Work Plan to the EPA in February 2003, El Paso has installed temporary (WG-series) and permanent monitoring wells at the eastern side of the Facility. The logs of boreholes and available gauging and analytical data have been provided to EPA in prior quarterly reports. El Paso will summarize this information and include the detailed laboratory analytical reports in the FI Report.

3. Product thickness measurements are available for several of the wells in the Facility Area.

The thickness of product should be mapped during the FI to identify the areas with the greatest quantities of free product and to identify any trends in contaminant migration. Revise the FI Work Plan to include a spatial evaluation of the product thickness measurements. Include maps of the product thickness measurement to illustrate the current conditions in the Facility Area. These maps would serve as a basis for responding to the requirements of AOC Section VII.2.B (i) for determining the thickness and lateral extent of the LNAPL plume, as well as identifying areas having data gaps.

Response: El Paso has gauged some existing Facility monitoring wells principally in the IM area, as part of the semi-annual Agreed Final Judgment (AFJ) Groundwater Monitoring Program that principally includes gauging and monitoring wells west of Cantwell Lane with Valero. Maps of the product thicknesses measured in wells have been prepared for this report, which is provided to the EPA. El Paso will continue to perform gauging as additional wells in the FI area are completed and will include the results of the gauging in the FI Report.

4. *Section 6.1 proposes benzene and toluene as indicator compounds for siting permanent groundwater monitoring wells. Section 6.5.8 states that the most recent version of Method 8021, in EPA SW-846, Test Methods for Evaluating Solid Waste, is proposed as the analytical method for benzene and toluene. This analytical method can be used to detect a minimum of 12 of the 16 volatile organics, including benzene and toluene, on the "Skinner List," Constituents of Concern for Wastes from Petroleum Processes, which serves as the basis for the Facility chemicals of concern (COCs). Since so many Facility COCs can be detected using Method 8021, clarify why only benzene and toluene are proposed as indicator compounds. Also, provide justification for the use of benzene and toluene as indicator compounds for the aliphatics, semivolatile organics, and polynuclear aromatic hydrocarbons (PAHs) on the Skinner List.*

   If adequate justification is not provided, the FI Work Plan should be revised to include evaluation of additional, and possibly all, Facility COCs.

Response: As explained in Section 6.1 of the FI Work Plan, preliminary sampling of existing wells and temporary sampling points for only benzene and toluene does not replace delineation sampling of monitoring wells for the complete list of AOC IM COCs. A phased installation of permanent step-out monitoring wells sampled for AOC IM COCs has been used to delineate COCs to PRGs. Therefore, delineation of the free phase plume has been based on direct measurements of LNAPL in piezometers, and delineation of COCs has been based on the analysis of groundwater samples (from monitoring wells) for AOC IM COCs. The following procedure has been used in the FI study:

1. CPT/ROST pushes have been used, and benzene and toluene samples have been collected from temporary sampling points, to identify locations of permanent sampling points (monitoring wells).
2. Piezometers have been installed where LNAPL is not expected, and monitoring wells have been installed for groundwater sampling.
3. Piezometer measurements have been used to delineate LNAPL extent and samples from monitoring wells will be analyzed to delineate COCs.
4. Where piezometers have encountered LNAPL, additional step-out piezometer(s) have been installed.
5. Where any COC concentration is greater than the respective PRG within the FI Area, at least one additional step-out monitoring well has been installed within the FI Area for further COC analysis.

5. *Section 4.1.1, Groundwater, discusses the use of the BIOSCREEN Model "to predict the natural attenuation of COCs as they migrate in groundwater." Facility preliminary remediation goals (PRGs) are established for the COCs in groundwater at the upgradient edge of the Interim Measure (IM) Area. The Facility PRGs were calculated by taking the log average of two sets or PRGs, with one set based on the shortest literature value for intrinsic bioremediation half-life and the second set based on the longest literature value for intrinsic bioremediation half-life. Section 4.1.1 assumes a 350-foot travel distance for the COCs across the IM Area to the point of groundwater discharge to surface water. The BIOSCREEN model was the used to calculate Facility groundwater attenuation*

action levels (AALs) per the Texas Risk Reduction Program (TRRP), for the COCs. The Facility groundwater AAL values and backup BIOSCREEN printouts are presented in Appendix B. Section 4.1.1 further states that once the FI is completed, the BIOSCREEN dilution factors (DAFs) will be adjusted to reflect site-specific transmissivity, porosity, and fraction of organic carbon (f_{oc}) for saturated zone soils. BIOSCREEN will then be used during the Corrective Measures Study (CMS) to re-calculate the final AALs for the dissolved-phase COC concentrations that will be used to implement corrective measures.

AOC Section VII.2.A (iii) requires that Facility PRGs shall be established for identified Facility COCs. The Facility PRGs must be consistent with available protective risk-based cleanup levels applicable to current and reasonably expected future land use scenarios and environmental exposure scenarios consistent with the conceptual site model (CSM). When federal or State PRG values do not exist, they must be developed in accordance with the EPA Human Health and Ecological Risk Assessment Guidance for Superfund (RAGS) and other appropriate EDPA guidance. The federal PRG values may be referenced in RAGS Part B and the State PRG values are the TRRP Tier 1 protective concentration limits (PCLs). Based on the requirements of the AOC for establishing PRGs, literature values were inappropriately used in the BIOSCREEN model to calculate Facility groundwater PRGs, which were developed for the purpose of establishing Facility groundwater AALs along the upgradient boundary of the IM Area. If El Paso wishes to calculate PRGs using literature values for those COCs that do not have established federal or State PRGs, they should be based on ultra-conservative literature values and not on a log average of two sets of PRGs. In particular, a very conservative value for f_{oc} and little to no biodegradation are necessary to justify a conservative approach using only literature values. That said, however, El Paso will still be required to collect site-specific data during the FI to calculate the final remediation goals (FRGs) that will be proposed to EPA Region 6 and used to select a corrective measure for the Facility. The FI should collect site-specific data for bulk density and f_{oc} to calculate the retardation factor associated with biodegradation. Revise the FI Work Plan to establish PRGs in accordance with AOC Section VII.2A.(iii).

In addition, the FI Work Plan does not clearly explain the assumptions for applying the BIOSCREEN model to the IM Area, rather than the AOC-defined Facility area. The model issued to back-calculate the Facility groundwater PRGs (or TRRP AALs) (Table B-1) for the natural attenuation of COCs in groundwater as it leaves the Facility and crosses the IM Area to the ship channel. The assumptions of the model are not well-described in Section 4.0, although it appears that there are at least three. First, the model appears to assume that all COCs in the Facility area will flow across the upgradient boundary of the IM Area, since the model's source area is located along this boundary. Second, the model assumes that natural attenuation of the COCs will occur during their transport along the 350-foot pathway from the IM Area upgradient edge to the groundwater discharge to surface water along the ship channel. And third, the model does not recognize the existence of the current groundwater pump-and-treat activities in the IM Area and, therefore, assumes a simple flow pathway across the IM Area. In addition, this area has free phase and residual NAPL which acts as a continued source and inhibits biodegradation, thus the model is not applicable for the area.

The conditions assumed for the BIOSCREEN model are not a realistic representation of the actual environment of the IM Area. The IM Area does not capture all of the COCs flowing in the Facility area, as witnessed by the releases of hydrocarbons from the seeps and sediments of the east of the IM Area. The model assumes that natural attenuation will occur until the groundwater is discharged to the surface water of the ship channel, however, the downgradient water's edge of the IM Area is partially bordered by a cofferdam that prevents groundwater from reaching the ship channel. Instead, the groundwater is removed from the IM Area through a series of recovery wells for the IM pump-and-treat system, which creates numerous cones of depression in the groundwater surface of the uppermost aquifer, resulting in a complicated flow pathway across the IM Area. The second page of the EPA BIOSCREEN Natural Attenuation Decision Support System User's Manual (Version 1.3, EPA/600/R-96/087, August 1996) states the model "assumes simple groundwater flow conditions" and "should not be applied where pumping systems create a complicated flow field."

Clarify the assumptions that serve as the basis for the BIOSCREEN model.

Response: El Paso has reconsidered the use of the BIOSCREEN model for the development of Facility PRGs, and has decided instead to adopt the IM PRGs for the FI. Therefore, the BIOSCREEN model is not necessary for the development of PRGs and this discussion will be deleted from the revised FI Work Plan. As presented in our October 24, 2005 response to comments on the PRG Report and IM Investigation Work Plan, El Paso revised the PRG values and documentation listed in Table 4-1 of the PRG Report. A copy of this table is provided as Attachment C. The following changes were made to the table:

a. Human health Texas Surface Water quality Standard (TSWQS) values were changed from an incidental to a sustainable fishery. Texas Administrative Code (TAC) Chapter 307.6(d)(5) indicates that all designated segments listed in Appendix A for § 307.10 are considered to have sustainable fisheries. Appendix A of Chapter 307 identified the CCIH Ship Channel as a designated Stream Segment Number 2484 of the Nueces River basin.
b. For chemicals without a human health TSWQS, the Risk Based Exposure Levels (RBELs), if available, were selected. The RBELs used were taken from the TCEQ "Human Health Surface Water RBELs" table updated 5/19/05.
c. For chemicals without human health TSWQS or RBELs, the values were calculated using the most recent toxicological criteria recommended by TCEQ (Toxicity Factors – Table for TRRP Rule) updated March 31, 2004.
d. For chemicals without an ecological TSWQS, the RBELs, if available, were selected. The RBELs used were taken from the TCEQ "Aquatic Life Surface Water RBELs" Table updated April 2002.

6. *Section 4.1.2 discusses the establishment of AALs for soil Media ("Media' is defined in AOC Section VII.2.A.(i)). Again, as discussed for groundwater, the establishment of soil Media AALs per TRRP requirements does not satisfy the requirements for the establishment of soil PRGs. As with the discussion above regarding the establishment of*

Facility groundwater PRGs, the Facility soil PRGs must also be established in accordance with the requirements of AOC Section VII.2A.(iii) for identified Facility COCs.

The Facility soil PRGs must be consistent with available protective, risk-based cleanup levels applicable to current and reasonably expected future land use scenarios and environmental exposure scenarios consistent with the conceptual site model (CSM). When federal or State PRG values do not exist, they must be developed in accordance with the EPA Human Health and Ecological Risk Assessment Guidance for Superfund (RAGS) and other appropriate EPA guidance. Revise the FI Work Plan to establish PRGs in accordance with AOC Section VII.2.A.(iii).

Response: AOC Section VII. 2 states that "the FI/CMS shall address groundwater contamination (including LNAPL contamination). The FI/CMS shall also address contamination in the soils where the soil contamination is contributing to or is attributable to the groundwater contamination." Because the focus of the AOC is on groundwater contamination, and soil contamination attributable to or contributing to groundwater contamination, El Paso will address soil contamination in the FI Report by using the ROST data to identify intervals areas of the soil profile affected by LNAPL, and will compare analytical data of soil samples affected by the discharge of contaminated groundwater and LNAPL (such as the seep zones) with PRGs (Attachment C).

7. *Section 5.0, Application of the DQO Process, discusses FI activities that are presented in detail in other portions of the FI Work Plan. Where EPA Region 6 has commented upon FI activities, responses to comments may impact the FI plan presented in the Data Quality Objectives Process. For example, the determination of AALs does not satisfy the establishment of Facility PRGs and the DQO Process should be revised accordingly.*

   Revise Section 5.0 and its associated figures and tables, as necessary, to accommodate revisions to the FI Work Plan that are made in response to EPA Region 6 comments.

Response: El Paso will address the modifications to the Data Quality Objectives (DQO) process that result from the EPA comments in the FI Report.

8. *The FI Work Plan references numerous acronyms that are defined in the text, but the definitions are difficult to locate within the document.*

   Provide a list of acronyms specific to the FI Work Plan, preferably after the Table of Contents.

Response: El Paso has provided an acronym list in the revised IM Investigation Work Plan (August 2006) and will include an acronym list in the FI Report. The acronym list is provided as Attachment D.

SPECIFIC COMMENTS

1.0 INTRODUCTION

This Workplan describes the technical approach that will be used to further investigate Media at the Facility. - - - the specific objectives of the investigation to be conducted at the Facility are to:

1. *Identify the Facility chemicals of concern (COC) and characterize the potential pathways of COC migration;*

2. *Identify actual or potential receptors, including human and ecological environmental systems that are susceptible to Facility COC exposure at or from the Facility;*

3. *Install adequate wells and collect sufficient samples (analytical data) to determine the horizontal and vertical extent of ground water contamination to decreasing concentrations to below the appropriate Facility preliminary remediation goals (PRG); and in soil/media ("Media shall mean ground water and contaminated soils where the soil contamination is contributing to or is attributable to the existing ground water contamination) determine the extent of contamination to below the appropriate PRGs - - - - -.*

1. ***Section 1.0, Introduction, page 1:*** *The opening paragraph presents an incomplete reference to the definition of "Facility," as discussed in AOC Section I, Jurisdiction. The second page of the AOC states:*

> *"In this Order the 'Facility' is defined as the area of contamination beyond the Coastal Refinery property boundary north, northeast and east of the Coastal Refinery property boundary north, northeast and east of the Coastal Refinery East Plant-North (Valero Complex 8 North), and extending onto or under the portion of the Elementis Chromium property located East of Cantwell Land and the Inner Harbor Ship Channel. <u>The definition of Facility will be expanded to include areas west of Cantwell Lane in the IM Area (as defined below) should investigation indicate that contamination is contiguous extending west of Cantwell Lane in the IM Area</u>. The Facility does not include any portion of the Inner harbor Ship Channel and notwithstanding anything in the Order to the contrary, this Order does not require Respondent to fully delineate or to remediate contamination in the Inner Harbor Ship Channel.*

In particular, the underlined portion of the above definition of "Facility" provides for the potential expansion of the area addressed under the FI. Revise the discussion in Section 1.0 to fully address the definition of "Facility," including its potential expansion to include appropriate portions of the IM Area.

Response: El Paso will provide a corrected definition of "Facility" in the FI Report as provided in the PRG Report (August 2006). This definition is included as Attachment E.

2. ***Section 1.0, Introduction, pages 1-2:*** *The introduction references the specific FI objectives prescribed under AOC Sections VII.2.A(i) and VII.2.B, but does not recognize the FI Work Plan requirements found at AOC Section VII.2.A(ii) and (iii).*

   Revise Section 1.0 to address all for the requirements of AOC Section VII.2.A and verify that these requirements are addressed by the FI Work Plan.

Response: El Paso is addressing the requirements found at AOC Section VII.2.A (ii) and (iii) related to the establishment of Facility COCs and the development of Facility PRGs. These requirements will also be discussed and addressed in the FI Report.

3. ***Section 3.0 Characterization of Contaminant Source and Environmental Setting Based on Existing Data, pages 5-7:*** *The third paragraph on page 6 indicates that the vertical extent of Facility chemicals of concern (COCs) has not been defined in the Facility Area, as defined in the AOC. This paragraph then indicates that monitoring well DMW-03 is screened in the second transmissive zone and is located at Valero Complex 8 North, approximately 80 feet west of the Facility Area at Elementis. Groundwater sampled from Well DMW-03 is positive for o, m, and p-cresols, which is documented in Table 3-4. The presence of cresols may indicate the presence of a dense non-aqueous phase liquid (DNAPL) in the second transmissive zone.*

   Revise Section 3.0 to discuss the significance of the presence of they o. m, and p-cresols in the second transmissive unit, particular to the FI at the Facility Area at Elementis and the delineation of the lateral and vertical extent of COCs in the upper transmissive zone and the second transmissive zone.

Response: El Paso has conducted the FI program in accordance with the investigation strategy as presented in the FI Workplan and discussed this issue on several occasions with the EPA. The strategy and the technical approach that El Paso has followed are consistent with the AOC language to evaluate LNAPL and groundwater contamination. Specifically, the use of ROST and decisions made to screen the monitoring wells to intercept LNAPL have been made to ensure that the LNAPL plume and associated groundwater contamination have been delineated. In addition, El Paso is conducting groundwater sampling and analysis efforts at monitoring wells for the comprehensive suite of IM COCs, which include analytes (e.g., chlorinated hydrocarbons) that could be indicative of DNAPL. The FI has not been specifically designed or conducted to evaluate the possibility of DNAPL contamination.

El Paso is aware that the results of chemical analyses of a sample collected in 1999 from well DMW-03 at the Valero Complex 8 North show low levels of cresols. However, recent (2006) analytical data from this well have not revealed detectable levels of these compounds. Independent of evaluating these data, El Paso has adhered to the FI Work Plan strategy and installed monitoring wells in both the lower portion of the 1st Water Bearing Zone (WBZ) and the 2nd WBZ. Groundwater samples have been collected from these wells and analyzed for the IM COCs. El Paso continues to perform the FI to evaluate the lateral and vertical extent of COCs. The FI Report will provide a comprehensive evaluation of the nature and extent (lateral

and vertical) of COCs based on the FI sampling program and, as necessary, relevant data from adjacent areas.

4. ***Section 4.0, Facility Preliminary Remediation Goals, page 8:*** *The last paragraph on this page states that "the significant exposure pathways include the potential transport of LNAPL and COCs in groundwater to surface water and the potential migration of soil vapor containing volatile Facility COCs derived from LNAPL, soil or groundwater to indoor and outdoor air at the Facility." Based upon this discussion, it appears that the direct releases of non-aqueous phase liquid (NAPL) to surface water and to sediment are considered to be incomplete pathways. As documented in a separate Administrative Order on Consent (reference US EPA Docket No. RCRA-VI-7003-01-01, Section V.7) between EPA Region 6 and Elementis Chromium, L.P., the U.S. Fish & Wildlife Service (USFWS) observed hydrocarbons, including benzene and cumene seeping from the bluff into the Inner Harbor Ship Channel on or about February 9, 2000. The USFWS also observed several seeps along the bluff, located up to 100 feet east of the cofferdam, discharging oily waste into the surface water on March 2, 2000. Also, oily liquid bubbled from below the surface of the water, which released sheen on the water surfaces. The USFWS believed "the release to surface water constituted a potential endangerment to shorebirds." Based on these documented releases of NAPL to surface water and to sediment, these pathways are complete.*

   Revise the conceptual site model to document these pathways as complete and evaluate them for significance.

Response: El Paso revised the CSM in recognition of these findings and incorporated the revised CSM in the final IM Investigation Workplan. The revised CSM is provided as Attachment B and will be included in the FI Report.

5. ***Section 4.0, Facility Preliminary Remediation Goals, page 8:*** *The second paragraph on page 8 states that "The CSM was developed in conjunction with the PRG Report and is presented in Figure 4-1. There have been no changes made to the CSM, as no additional data have been gathered since the submittal of the PRG report." The last paragraph on page 12 of the PRG Report stated "Non Aqueous Phase Liquid (NAPL) is the primary source, which has migrated on to the facility in the subsurface. The NAPL in turn is the source of COCs in other environmental media, specifically surface soil, soil vapor, groundwater, and surface water.*

   As discussed during the November 19, 2002 meeting with El Paso and in subsequent written comments, EPA recommended that the Conceptual Site Model (CSM) identify all individual sources of contamination in order to aid in determining potential cumulative and overall risk of exposures to receptors. That is, the sources of the NAPL in environmental media should be identified, e.g., specific Solid Waste Management Units or Areas of Concern. Also, the type of NAPL, (i.e., diesel, gasoline, benzene, etc.) and constituents of concern in the NAPL. The FI Report and the CSM Diagram Figure 4-1 should be revised to include these changes.

Response: El Paso will address the composition and characteristics of the LNAPL in the FI Report and will include the revised CSM diagram (provided as Attachment B) in the FI Report. Samples of LNAPL have been collected from monitoring wells and analyzed, ROST logs have been evaluated for the depth intervals of LNAPL occurrence, and core samples are being collected for detailed petrophysical analysis to support the CMS effort and identification and evaluation of site remedies. However, El Paso recognizes that because of the long and complex history of the site and surrounding industrial areas, the changing product refining and storage history at the site, and the time available for lateral transport of LNAPL in the subsurface makes it unlikely that the sources of non-aqueous phase liquid (NAPL) (e.g., specific Solid Waste Management Units or Areas of Concern) will be identified.

6. ***Figure 4-1, Schematic Conceptual Site Model:*** *The Conceptual Site Model (CSM) indicates that both exposure pathway ID Numbers 3 and 9 address the ingestion of potentially contaminated surface water. Pathway No. 9 indicates that the ingestion of surface water by both human and ecological receptors is a potentially complete pathway. However, pathway ID Number 3 indicates that only ecological receptors will ingest surface water. It is not clear why human receptors are not considered for pathway No. 3.*

Revise the FI Report to address this discrepancy.

Response: El Paso has revised the CSM and included it in the revised IM Investigation Work Plan. This revised CSM is provided as Attachment B and will be included in the FI Report.

7. ***Section 4.1.1, Groundwater, page 10:*** *The first paragraph references AOC Sections VII.A.(iv) and VII.D., however, these citations appear to be in error. Clarify the AOC citations and revise Section 4.1.1 accordingly.*

Response: El Paso will clarify the AOC citations and will provide the corrected language in the FI Report.

8. ***Section 4.1.1, Groundwater, pages 10 – 11:*** *The first paragraph in this section states that "Within the IM Area, the groundwater PRGs are those set in the PRG report for the groundwater/surface interface." A review of the information presented in Table 4-1 of the PRG Report revealed a number of discrepancies, which required clarification and correction. The identified discrepancies are outlined in the following paragraphs.*

The footnotes to Table 4-1 of the PRG Report indicated that the source of many of the values presented in the Table is the "Texas Commission for Environmental Quality Surface Water Quality Criteria obtained from Tables 1 and 3 of the TCEQ 200a Texas Surface Water Quality Standards." However, based upon a review of the values presented and per discussions with facility representatives during the March 26, 2003 conference call, the sources of the values used included not only Texas Administrative Code (T.A.C.) Chapter 307, Tables 1 and e (Aquatic Life and Human Health protection criteria) dated August 17, 2000 but also, risk-based exposure limits (RBELS) from Chapter 350, the Texas Risk Reduction Rule dated August 13, 2002.

The table must be revised to clearly indicate the specific source of the values presented. In addition, there appears to be a 0 missing from the date of the reference (i.e., 200 versus 2000). The footnote must be revised to correct this typographical error.

Furthermore, the footnote to Table 4-1 also indicated that the human health criteria were based on the ingestion of saltwater fish from an incidental fishery. The TCEQ standards state that the numerical criteria applicable to an incidental fishery are 10 times the human health criteria listed in columns B and C of Section 307.6, Table 3. Chapter 307.6(d)(5) indicates that all designated segments listed in Appendix A of §307.10 are considered to have sustainable fisheries. Appendix A of Chapter 307 identifies the Corpus Christi Inner Harbor Ship Channel as designated Stream Segment Number 2484 of the Nueces River Basin. Per personal communications with Mr. Jim Davenport of the TCEQ Water Quality Standards Division, the Inner Harbor Ship Channel is considered to be a sustainable saltwater fishery rather than an incidental fishery. As such, it is not appropriate to multiply the human health criteria by a factor of 10 in the development of IM PRGs.

The IM PRGs presented in Table 4-1 and Appendix E of the PRG Report, which are based on the human health pathway, will need to be reviewed and corrected to reflect a value for a sustainable saltwater fishery.

The surface water PRG for benzene is listed as 1.09E-01 mg/L and the source identified for this value is the aquatic toxicity criteria from Table 1 of the TCEQ SWQS. The TCEQ SWQS do not include a saltwater chronic criteria value for the protection of aquatic life for benzene, but do include a human health value of 70.8 micrograms per liter (µg/L) for benzene. The value of 1.09E-01 mg/L appears to be taken from Chapter 350 of the Texas Risk Reduction Rule. As documented in the Administrative Order on Consent (reference US EPA Docket No. RCRA-VI-7003-01-01, Section VII.1.A.(i)) between EPA Region 6 and El Paso CPG Company, for the purposes of the Interim Measures Investigation, the Texas SWOS (30 Tex. Administrative Code Chapter 307) shall be used as IM PRGs and the IM PRG concentration for each COC shall be equal to its respective Texas SWQS value, or a comparably derived value for COCs without a standard, for aquatic life and human health protection (saltwater chronic criteria). Given the fact that benzene does have a human health criteria (70.8 µg/L) listed in Table 3 of the Texas SWQS, this value should be selected as the IM PRG for benzene. This issue also applied to the IM PRGs selected for chloroform and tetrachloroethylene.

Revise Table 4-1 and Appendix E of the PRG Report to address this issue.

In addition, Table 4-1 uses milligrams per liter (mg/L) as the unit of measure whereas the EQ surface water criteria (Chapter 307, Tables 1 and 3) and the calculations presented in Appendices C, D, and E of the PRG Report are presented in µg/L. The conversion between mg/L and µg/L appears to have also resulted in some errors.

Review Table 4-1 of the PRG Report to ensure the accuracy of the information presented and to correct the listed sources and any conversion errors.

The information presented in the Facility Investigation Workplan must be reviewed in light of the above-mentioned comments and revised as applicable.

Response: El Paso has revised the referenced text and tables that were in the IM Investigation Workplan and has submitted the revised document to the EPA in August 2006. Table 4-1 is provided in Attachment C. EPA has approved the IM Investigation Workplan with this revised discussion, and El Paso will incorporate it in the FI Report.

9. ***Section 4.2, Chemicals of Concern, page 13:*** *The first paragraph in this section states that "If a chemical is not detected at concentrations greater than or equal to its risk-based level or MDL (whichever is higher) during the IM Area Investigation and the Facility Investigation, then that chemical will be dropped from further consideration and will not be considered to be a COC." If the method detection limit (MDL) is higher than the risk-based level, then it is possible that concentrations, which exceed risk-based levels, may be present in media. Therefore, it is inappropriate to eliminate a chemical from further consideration based upon a comparison to an elevated MDL.*

Revise the work plan to state that if the MDL for a chemical is greater than its risk-based level it will be retained for further consideration.

Response: El Paso has evaluated the COC list in the AOC and discussed this in a letter to EPA dated January 8, 2007. Based on conversations with the laboratory, El Paso has confirmed that four COCs (bis(chloromethyl)ether, ethyleneimine, ethylene oxide, and methanethiol) cannot be analyzed by any commercial laboratory in groundwater using standard methods. We also noted that these compounds do not appear on the EPA Region 5 Skinner List, presumably for this reason. In the letter, El Paso requested EPA remove these four compounds from the COC list. El Paso will continue to analyze for all other analytes on the COC list and will evaluate them in accordance with the AOC and FI Workplan (and IM Investigation Workplan) procedures.

10. ***Section 4.2, Chemicals of Concern, page 15:*** *The first full paragraph on page 15 states that Table 4-1 presents soil saturation limits, however, it actually presents groundwater facility attenuation action levels (AALs).*

Clarify whether the reference should be for Table 4-7, Potential COC Soil Saturation Limits.

Response: El Paso has adopted the IM PRGs for the FI work and will discuss this issue in the FI Report.

11. ***Section 5.0, Application of the DQO Process, page 17:*** *The third paragraph indicates that data quality objectives (DQOs) refer to the degree of accuracy and precision of a measurement. In accordance with EPA Guidance on Quality Assurance Project Plans, EQP QA/G-5, EPA/600/R-01/009, December 2002, accuracy and precision are performance and acceptance criteria, or data quality indicators, in this context for*

measurement quality objectives. Other principle data quality indicators include bias, representativeness, completeness, comparability, and sensitivity.

Revise Section 5.0 to clarify how these seven data quality indicators support the DQO Process for the FI Work Plan. Also, an older version of EPA QA/G-5 is listed in Section 11.0, References, as entry number 35. Update Section 5.0 and Appendix A, Quality Assurance Project Plan, of the FI Work Plan as necessary to address any new requirements of the December 2002 revision of EPA QA/G-5.

Response: El Paso will update and expand the discussion of data quality indicators (DQIs) in the FI Report per the following text that is included in the Elementis Sampling and Analysis Plan:

Project Quality Objectives and Elements of Quality Control

Project quality objectives (PQOs) specify the data type, quality, quantity, and uses needed to make decisions and are the basis for designing data collection activities. PQOs are developed for site-specific applications and become incorporated into the overall project decision-making process.

Specific measurement performance criteria for the DQIs (precision, accuracy, representativeness, completeness, comparability, and sensitivity [PARCCS]) are developed in the planning phase and become essential elements in the assessment of overall data quality. The goals of these indicators (field and laboratory) are incorporated into the overall PQOs. Evaluation of the data against well-defined measurement performance criteria facilitates the process of data qualification and/or necessary corrective actions.

Data Types

The two general types of data are screening data and definitive data.

Screening data are analytical data that are of sufficient quality to support an intermediate or preliminary decision but must eventually be supported by definitive data before the project is complete. Screening data are often generated by rapid methods of analysis with less rigorous sample preparation, calibration, and/or quality control (QC) requirements. Sample preparation steps may be restricted to simple procedures such as dilution with a solvent, instead of elaborate extraction/digestion and cleanup. Screening data may provide analyte identification and quantitation, although the quantitation may be relatively imprecise. Physical test methods (e.g., dissolved oxygen (DO) measurements, temperature, pH, moisture content, turbidity, conductance, etc.) have been designated by definition as screening methods.

Definitive data are analytical data that are suitable for final decision-making. Often, they are generated using rigorous analytical methods such as approved EPA SW-846 reference methods. Definitive data are not restricted in their use unless quality problems require data qualification.

Data Quality Indicators

Measurement performance criteria should be determined for each matrix, analytical group, concentration level, and analyte, as appropriate. The criteria should relate to the DQIsPARCCS parameters. The DQIs are discussed in the following subsections. Measurement performance criteria for precision, accuracy, and sensitivity for each method and matrix are identified in this section.

Precision

Precision refers to the reproducibility of measurements. It is strictly defined as the degree of mutual agreement among independent measurements as the result of repeated application of the same process under similar or prescribed conditions. Precision reflects random error and may be affected by systematic error. It also reflects variation imposed by a given matrix.

Laboratory precision is measured by the variability associated with duplicate (two) or replicate (more than two) analyses. One type of sample that can be used to assess laboratory precision is the laboratory control sample (LCS). Multiple LCS analyses over the duration of the project can be used to evaluate the overall laboratory precision for the project. In this case, the comparison is not between a sample and a duplicate sample analyzed in the same batch; rather the comparison is between LCSs analyzed in multiple batches.

Total precision is the measurement of the variability associated with the entire sampling and analytical process. It is determined by analysis of duplicate or replicate (split) field samples and measures variability introduced by both the laboratory and field operations. Field duplicate samples and matrix duplicate spiked samples shall be analyzed to assess field and laboratory precision. The precision is evaluated using the relative percent difference (RPD) between the duplicate sample results. The formula for the calculation of precision is provided in Table 1 as RPD. For replicate analyses, the relative standard deviation (RSD) is determined and used as the measure of precision. The formula for the calculation of RSD is provided in Table 1.

The required level of precision should be identified in the PQOs. Precision values are listed in the accuracy and precision tables.

Table 1 Statistical Calculations

Statistic	Symbol	Formula	Definition	Uses
Mean	$\overline{X}$	$\frac{\left(\sum_{i=1}^{n} x_i\right)}{n}$	Measure of central tendency	Used to determine average value of measurements
Standard Deviation	s	$\left(\frac{\Sigma(x_i-\overline{X})^2}{(n-1)}\right)^{½}$	Measure of relative scatter of the data	Used in calculating variation of measurements
Relative Standard Deviation	RSD	$(S/\overline{X}) \times 100$	Relative standard deviation, adjusts for magnitude of observations	Used to assess precision for replicate results
Percent Difference	%D	$\frac{x_1 - x_2}{x_2} \times 100$	Measure of the difference of two observations	Used to assess accuracy
Relative Percent Difference	RPD	$\left\lvert\frac{(\ 1 \quad 2}{(\ 1 \quad 2)/}\right\rvert$	Measure of variability that adjusts for the magnitude of observations	Used to assess total and analytical precision of duplicate measurements
Percent Recovery	%R	$\left(\frac{X_{meas}}{X_{true}}\right) \times 100$	Recovery of spiked compound in clean matrix	Used to assess accuracy
Percent Recovery	%R	$\frac{\left(\text{value of spiked sample} - \text{value of unspiked sample}\right)}{\text{Value of added spike}} \times 100$	Recovery of spiked compound in sample matrix	Used to assess matrix effects and total precision
Correlation Coefficient	r	see SW8000B section 7.5.3		Evaluation of “goodness of fit” of a regression line
Coefficient of Determination	COD	see SW8000B section 7.5.3		Evaluation of “goodness of fit” of a polynomial equation

x = Observation (concentration) n = Number of observations
For %D, x_1 = Calculated concentration or calibration factor (CF) or response factor (RF) and x_2 = Theoretical concentration or CF or RF.

Accuracy

Accuracy is of the degree of agreement between an observed value and a "true" value (correctness) and includes a combination of the random error (precision) and systematic error (bias) components that result from the sampling and analytical procedures. It therefore reflects the total error associated with a measurement. A measurement is considered accurate when the reported value agrees with the true value or known concentration of the spike or standard within acceptable limits Analytical accuracy is measured by comparing the percent recovery (%R) of analytes spiked into an LCS to a control limit (CL). For volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs), surrogate compound recoveries are also used to assess accuracy and method performance for each sample analyzed. Analysis of proficiency testing (PT) samples may also be used to provide additional information for assessing the accuracy of the analytical data being produced.

The formula for calculation of accuracy is included in Table 1 as %R from pure and sample matrices. Accuracy requirements are listed.

Representativeness

Representativeness is a qualitative term, which refers to the degree in which data accurately and precisely depict the characteristics of a population, whether referring to the distribution of contaminant within a sample, a sample within a matrix, or the distribution of a contaminant at a site. Representativeness is determined by appropriate program design, with consideration of elements such as proper well locations, drilling and installation procedures, and sampling locations. Objectives for representativeness are defined for each sampling and analysis task and are a function of the investigative objectives. Assessment of representativeness shall be achieved through use of the standard field, sampling, and analytical procedures.

Completeness

Completeness is a measure of the amount of valid data obtained compared with the amount that was expected to be obtained under correct, normal conditions. It is calculated for the aggregation of data for each analyte measured for any particular sampling event or other defined set of samples (e.g., by site) as set out in the PQOs. Valid data is data that is usable in the context of the project goals. Completeness is calculated for each method and matrix. The number of valid results divided by the number of possible individual analyte results, expressed as a percentage, determines the completeness of the data set. For completeness requirements, valid results are all results not qualified with an R-flag after a usability assessment has been performed. Completeness should not be determined only on the basis of laboratory data qualifiers. The goal for completeness is 95% for aqueous samples. The prime contractor must evaluate completeness with respect to project goals to determine its impact on the decision-making process.

The formula for calculation of completeness is presented below:

$$\% \text{ completeness} = \frac{\text{number of valid (i.e., non-R flagged) results}}{\text{number of possible results}}$$

Comparability

Comparability is a qualitative indicator of the confidence with which one data set can be compared to another data set. The objective for this quality assurance/quality control (QA/QC) program is to produce data with the greatest possible degree of comparability. The number of matrices that are sampled and the range of field conditions encountered are considered in determining comparability. Comparability is achieved by using standard methods for sampling and analysis, reporting data in standard units, normalizing results to standard conditions, and using standard and comprehensive reporting formats. Complete field documentation using standardized data collection forms shall support the assessment of comparability. Analysis of PT samples and reports from audits shall also be used to provide additional information for assessing the comparability of analytical data produced among subcontracting laboratories. Historical comparability shall be achieved through consistent use of methods and documentation procedures throughout the project. Assessment of comparability is primarily subjective and results should be interpreted by experienced environmental professionals with a clear knowledge of the PQOs and project decisions. Assessment should include a discussion of the level of uncertainty associated with the comparability of the specific data set and the potential consequences of using non-comparable data.

Sensitivity

Sensitivity is the ability of an analytical method or instrument to discriminate between measurement responses representing different concentrations. It is important to be able to detect the target analytes at the levels of interest. The required PCLs are presented in Table 2. Sensitivity requirements include the establishment of various limits such as calibration requirements, instrument detection limits (IDLs), MDLs, and project-specific reporting limits (RLs). Both the IDLs and MDLs are normally based on an interference-free matrix (i.e. reagent water), which do not take into account matrix effects and may not be achievable for environmental samples.

Table 2. Critical Protective Concentration Limits

COCs	Critical PCLs
VOCs (µg/L)	
1,2-Dichloroethane	5.0
1,4-Dioxane	83 [a]
Benzene	5.0
Carbon disulfide	2,400
Chloroform	240
Ethylbenzene	700
Methyl-t-butyl ether (MTBE)	240
Methyl ethyl ketone (MEK) (2-Butanone)	1,500

Table 2. Critical Protective Concentration Limits (Continued)

COCs	Critical PCLs
VOCs (µg/L) (Continued)	
m,p-Xylene	10,000
o-Xylene	10,000
Toluene	10,000
SVOCs (µg/L)	
1-Methylnaphthalene	1,700
bis(2-Ethylhexyl) phthalate	6.0 [a]
Diethyl phthalate	20,000
Naphthalene	490
2,4-Dimethylphenol	490
2-Methylphenol	1,200
3- & 4-Methylphenol	120
Phenol	7,300
Thiophenol	0.240 [a]
Metals (mg/L)	
Arsenic	0.010
Barium	2.0
Chromium	0.10
Lead	0.015
Nickel	0.490

[a] Method quantitation limits are greater than the residential PCLs.

12. ***Section 6.1, ROST and Temporary Well Sampling, pages 22-23:*** *Section 6.1 indicates that LNAPL samples collected from five wells will be used to calibrate the Rapid Optical Screening Technology (ROST) to site-specific product samples to enhance the effectiveness of this technique. Section 3.0 indicates that there are three plumes of differing composition in the Facility Area at Elementis. Previous investigations indicate that a benzene plume is present in the central portion of the Facility, a gas-oil range hydrocarbon plume is present in the northern portion, and a gasoline-naptha plume is present in the southwestern portion.*

    Revise the Work Plan to clarify whether at least one LNAPL sample is collected from each of the plumes to calibrate the ROST.

Response: El Paso has collected and analyzed LNAPL samples from monitoring wells for the purpose of calibrating the ROST equipment and characterizing the composition of the LNAPL. Attachment F provides a summary of the LNAPL sample results. El Paso will clarify the location of LNAPL samples in the FI Report, which will also discuss these results and their significance.

13. ***Section 6.1, ROST and Temporary Well Sampling, pages 23-24:*** *The last paragraph on page 23 continues onto page 24 and discusses the data quality objectives for definition on the LNAPL plume. The vertical thickness will be determined to less than 0.01 foot, which will be the "non-detect" value as measured by an oil/water interface probe, in*

accordance with AOC Section VII.2.B.(i). The lateral extent of the LNAPL plume will be determined to "a horizontal distance of less than or equal to 200 feet" from the actual edge of the plume, however, this is an unacceptable distance. The discussion attempts to justify the degree of imprecision in establishing lateral extent of the plume by referring to three geologic cross-sections, presented as Figures 2-2 through 2-4. The degree of lateral stratigraphic variability shown in the cross-sections does not justify the imprecision in the determination of the lateral extent of the plume. Considering the direct-push technology will be used on-site, it should be relatively easy to "fine-tune" the location of the edge of the plume, which could easily be located to within 25 feet of the actual plume edge.

Revise Section 6.1 and any other portions of the FI Work Plan to reduce the "200 feet" of lateral imprecision to a distance that is appropriate to the proposed use of direct-push technology.

Response: El Paso conducted scores of ROST and CPT pushes and installed temporary piezometers and permanent monitoring wells across the IM Area and Facility. This work has resulted in the definition of the LNAPL plume limit with a much better precision than 200 feet – potentially in the range of 25 feet - in much of this investigation area. However, El Paso would need to install hundreds of ROSTs and/or monitoring wells throughout the Facility to achieve the 25-foot precision of the LNAPL plume limit requested by EPA. El Paso will continue to estimate the limit of the LNAPL plume conservatively, that is, will maximize the extent of the plume limit in areas of limited data (>50 feet between data points). El Paso will discuss the LNAPL plume limit and the relative precision of the estimated limit in the FI Report.

14. Section 6.1, ROST and Temporary Well Sampling, page 26: *The third paragraph states: "If a well screened at the base of the uppermost transmissive zone displays COCs at concentrations in excess of applicable groundwater PRGs, then a well screened in the second transmissive zone (i.e., the transmissive zone underlying the uppermost transmissive zone) will be installed." Clarify whether this is the only condition under which a well will be installed in the second transmissive zone. For example, Table 3-4 indicates that cresols were detected in a second transmissive zone well (DMW-03) on the Valero Complex 8 North, approximately 80 feet from the Facility Area. This begs the question as to whether or not cresol is also present in the second transmissive zone in the nearby Facility Area, however, there does not appear to be a decision point that leads to further investigation.*

Revise the FI Work Plan, as necessary, to expand the criteria for installing a monitoring well in the second transmissive zone.

Response: Cresols (and other potential indicators of DNAPL) are included in the COC list that El Paso uses for the IM and FI groundwater analytical program. Therefore, the decisions that lead to the installation of deeper wells (either the lower portion of the 1st WBZ or the 2nd WBZ) have been based on evaluation of all COCs, not just those indicative of petroleum hydrocarbon contamination. This decision approach will be documented in the FI Report.

15. ***Section 6.5.8, Collection and Analysis of Groundwater Samples, page 42:*** *The third full paragraph on page 42 indicates that a readings will be measured with a flow cell for temperature, conductivity, pH, dissolved oxygen, oxidation-reduction potential (ORP), and turbidity. This paragraph goes on to list the stabilization criteria for all of the above parameters, except temperature.*

Revise the Work Plan to provide the stabilization criterion for temperature.

Response: El Paso has provided this information to EPA in the revised IM Investigation Work Plan and will discuss the stabilization criterion for temperature in the FI Report. The FI Report will incorporate the following information in the discussion of stabilization criterion:

> The Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures (EPA/540/S-95/504 – 1996) state, "The water quality indicator parameters monitored can include pH, redox potential, conductivity, DO, and turbidity." Temperature is not identified as a potential indicator parameter in this document, in part due to the fact that the fluctuation in temperature is often due to ambient air temperature, intensity of the sun, and the ambient temperature of the actual flow through cell. Sufficient data to determine the stabilization of water quality is provided by monitoring conductivity, pH, DO, ORP, and turbidity. Temperature will be recorded during purging activities, but is not proposed to be a determining factor in groundwater stabilization.

16. ***Section 6.5.11, Decontamination, Small-Scale Equipment, pages 50-51:*** *The decontamination procedure for small-scale equipment does not include a hexane or isopropanol rinse following the potable water rinse. Given that the levels of contamination are expected to be quite high in many of the wells, it will be important to follow procedures that will ensure equipment is thoroughly decontaminated between sampling points.*

Revise the FI Work Plan to include a hexane or isopropanol rinse after the potable water rinse in the decontamination procedures presented on page 50.

Also, the discussion of Small-Scale Equipment does not discuss how the flow cell will be decontaminated after its use at each well.

Provide the decontamination method that will be used for the flow cell.

Response: El Paso has provided this information to EPA in the revised IM Investigation Work Plan and will include a discussion of the decontamination procedures for the flow cell in the FI Report. The FI Report will incorporate the following information in the discussion of decontamination procedures:

> All non-dedicated groundwater monitoring and sampling equipment (e.g., interface probe, submersible pumps, flow-through cell, etc.) will be thoroughly decontaminated prior to use at each well. The decontamination procedure can be modified if justified by supplemental information obtained as the field program evolves. The decontamination

procedure is a seven-step process that consists of water rinses and a final air rinse. Each step should last a minimum of 30 seconds. The decontamination process is as follows:

1) 15-20 gallons potable water rinse;
2) Potable water and Alconox® (or other phosphate-free detergent) rinse;
3) 10-15 gallons potable water rinse;
4) Isopropanol alcohol (IPA) rinse;
5) Potable water rinse;
6) American Society for Testing and Materials (ASTM) Type II reagent grade (laboratory) water rinse; and
7) Circulate air through the pump for 30 seconds and allow pump to air dry.

Care will be taken to prevent the clean sampling equipment from coming into contact with potentially contaminating substances such as oil, engine exhaust, corroded surfaces, and dirt. All fluids generated during the decontamination process will be managed accordingly.

17. ***Section 7.2, Additional QA/QC Procedures Specified in the AOC, page 57:*** *The first paragraph on page 57 states: "As part of their QA/QC program, STL, ETI, and SPL (i.e., Severn Trent Laboratory, Exploration Technologies, Inc., and Southern Petroleum Laboratory, respectively] will perform analysis of a reasonable number of known samples provided by EPA to demonstrate the quality of the analytical data."*

AOC Section XIII is apparently the basis for this requirement, however, it should be modified to state that this testing will be performed upon the request of EPA and will not serve as the sole criterion in determining the quality of the analytical data generated by STL, ETI, and SPL.

Revise Section 7.2 accordingly.

Response: El Paso agrees with EPA's comment and will provide clarification of this issue in the FI Report.

18. ***Section 9.0, Schedule for Activities, page 71:*** *Section 9.0 presents a two-sentence discussion regarding the schedule for the FI Work Plan.*

The schedule must address the time frame for activities and milestones for the FI activities, not just the total time to accomplish the FI. Provide a detailed schedule for the completion of the activities proposed by the FI Work Plan.

Response: Much of the fieldwork for the FI has been accomplished since the submittal of the FI Work Plan in February 2003. With the receipt of the conditional approval of the FI Work Plan, El Paso will adhere to the schedule of activities presented in the AOC. In addition, El Paso has provided EPA with an updated schedule in April 2007, and will provide additional details of the fieldwork schedule and other milestones as part of the quarterly reports and as significant schedule changes are anticipated.

19. ***Figure 4-1, Schematic Conceptual Site Model:*** *The Conceptual Site Model (CSM) indicates that ingestion of fish by human receptors is a significant exposure pathway. However, it is not clear why ingestion of fish by ecological receptors such as shore birds is not considered a complete exposure pathway.*

Revise the work plan to provide information, which justifies the elimination of this potentially complete pathway. Alternatively, revise the CSM to include this pathway. This comment also applies to Figure 4-2.

Response: El Paso has revised the CSM as part of the revised IM Investigation Workplan submitted to EPA in August 2006. The revised CSM (Attachment B) for the FI will be included in the FI Report.

20 ***Table 3-1, Cumulative LNAPL Thickness and Groundwater Elevation Data:*** *Prior to the second quarter of 2000 (00-Q2), the measurements of "depth to groundwater" appear to be measurements of "depth to LNAPL" for monitoring wells MW-U11, MW-U12, and MW-U13. Table 3-1 presents data values for "depth to groundwater" prior to 00-Q2 that are similar to the "depth to LNAPL" data values beginning in 00-Q2. Also, the pre-00-Q2 data provide no differentiation between LNAPL and groundwater surfaces, while the data collected beginning in 00-Q2 clearly indicates over 4 feet of LNAPL thickness in these three wells.*

Verify whether the pre-00-Q2 "depth to groundwater" values should be considered as measurements to the top surface of the LNAPL on the groundwater. Also, make the calculations to determine potentiometric surface elevation based on the specific gravity of the LNAPL involved. Revise Table 3-1 as necessary.

Response: El Paso will clarify and correct this information in the FI Report.

Attachment A

Seep and LNAPL Data

Attachment A: Seep and LNAPL Data

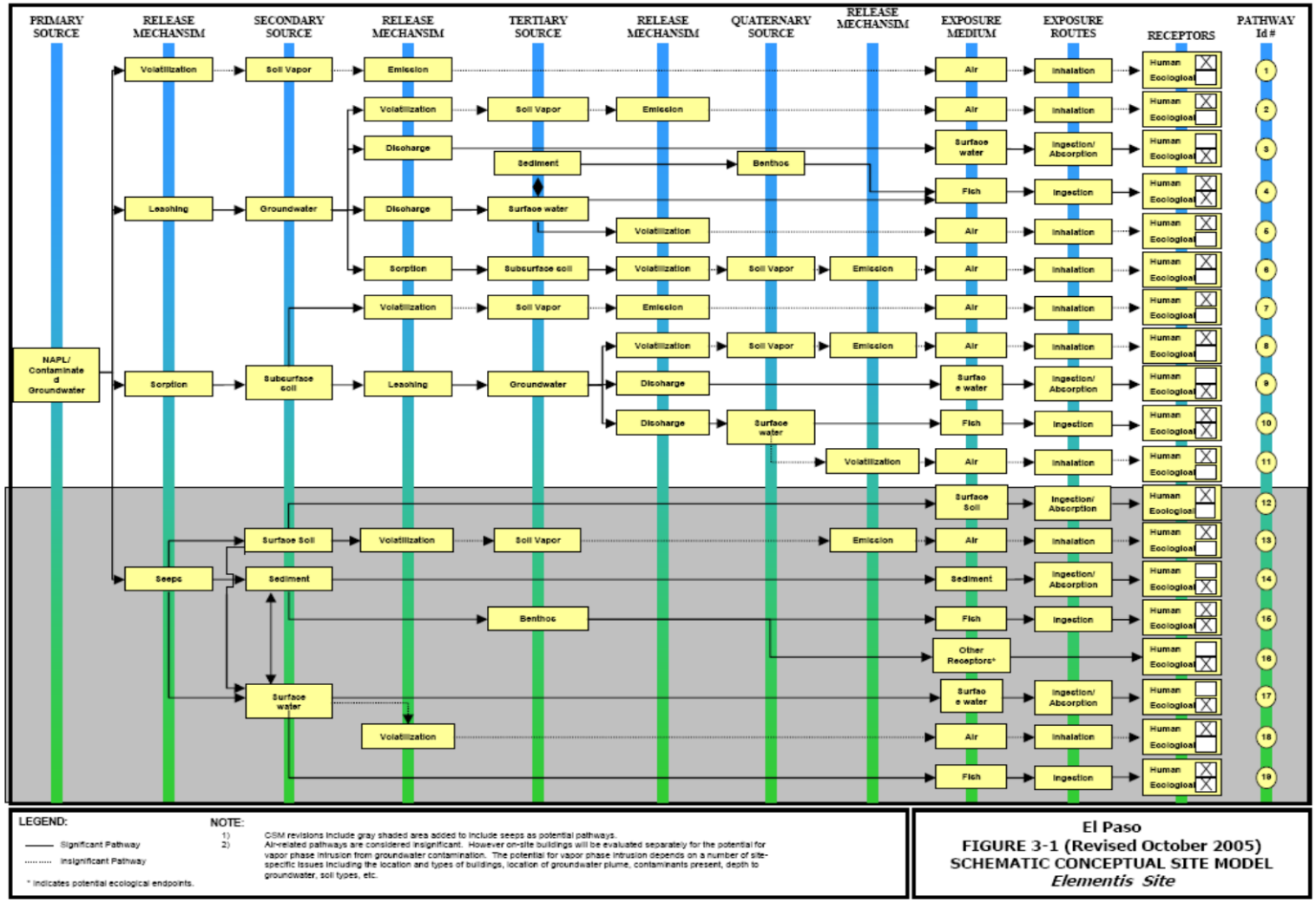
Field Identification: Sample Identification: Date Sampled:	R4 Seep 07020109-001 2/8/2007	Pipeline Leak 07020109-002 2/8/2007	SUMP#1 07020247-001 2/16/2007	SUMP#2 07020247-002 2/16/2007	1 Oil 560-3445-1 2/9/2007	BLUFFWELL#1 0702174-001 2/13/2007	P-8 164924-001 12/5/2006	EPZ-3 164924-002 12/5/2006	EPZ-12 07020246-01 2/15/2007	Diesel TPHWG	Motor Oil TPHWG	SR-WG-01-010 560-3653-1 2/27/2007	SR-WG-02-010 560-3653-2 2/27/2007	SR-SO-01-010 560-3654-1 2/27/2007	SR-SO-02-010 560-3654-2 2/27/2007	SR-SO-03-010 560-3654-3 2/27/2007
Paraffin, wt%	81.702	73.29	76.435	81.702	0.55	13.739	4.67	1.847	20.208	DNA	DNA	NA	NA	NA	NA	NA
Isoparaffin, wt%	0.107	5.451	4.8	4.25	2.66	5.86	20.08	9.64	13.777	DNA	DNA	NA	NA	NA	NA	NA
Naphthenics, wt%	ND	2.378	2.255	1.912	2.9	2.636	13.35	6.76	6.169	DNA	DNA	NA	NA	NA	NA	NA
Aromatics, wt%	0.522	5.134	5.765	7.148	7.69	75.404	61.63	79.79	48.138	DNA	DNA	NA	NA	NA	NA	NA
Olefins, wt%	ND	1.41	9.623	1.031	ND	0.775	0.18	0.07	11.073	DNA	DNA	NA	NA	NA	NA	NA
Unknowns, wt%	15.695	9.951	1.12	2.417	86.21	1.586	0.09	1.9	0.636	DNA	DNA	NA	NA	NA	NA	NA
2,2,4-Trimethylpentane, wt%	ND	0.048	0.176	0.057	0.02	0.409	0.65	0.47	0.629		DNA	NA	NA	NA	NA	NA
Oxygenates, wt%	ND	ND	ND	ND	ND	ND	ND	ND	ND	DNA	DNA	NA	NA	NA	NA	NA
n-Hexane, wt%	ND	ND	0.021	ND	ND	0.216	0.44	0.21	0.337	DNA	DNA	NA	NA	NA	NA	NA
Benzene, wt%	ND	ND	0.114	0.141	ND	71.418	55.05	77.75	39.468	0.029	0.096	NA	NA	NA	NA	NA
Ethylbenzene, wt%	ND	ND	0.243	ND	0.2	0.218	0.55	0.13	0.645	0.068	DNA	NA	NA	NA	NA	NA
Toluene, wt%	ND	ND	0.066	ND	0.01	0.384	ND	0.62	0.16	0.18	0.22	NA	NA	NA	NA	NA
Xylenes, wt%	ND	0.092	0.108	0.02	0.01	0.362	1.56	0.39	0.509	0.5	0.34	NA	NA	NA	NA	NA
Specific Gravity @60F	NA	NA	0.9094	0.9055	NA	0.8605	0.8431	0.8594	0.845	DNA	DNA	NA	NA	NA	NA	NA
API Gravity@60F	NA	NA	24.08	24.75	NA	32.94	NA	NA	35.94	DNA	DNA	NA	NA	NA	NA	NA
Carbon range	C10 - C26+	C7 - C26+	C6 - C25	C6 - C26+	C9- C24+	C4 - C24	C6 - C11	C6 - C11	C1 - C24	DNA	DNA	NA	NA	NA	NA	NA
Major range	C14 - C19	C11 - C17	C7 - C19	C10 - C19	C24+	C6	C6	C6	C6 - C10	DNA	DNA	NA	NA	NA	NA	NA
Naphthalene, wt%	ND	0.107	ND	ND	0.5	0.046	ND	ND	0.139	DNA	0.059	NA	NA	NA	NA	NA
2-Methylnaphthalene, wt%	ND	0.338	0.178	0.469	0.75	0.033	ND	ND	0.119	DNA	DNA	NA	NA	NA	NA	NA
1-Methylnaphthalene, wt%	0.403	1.034	0.334	0.791	0.74	0.083	ND	ND	0.278	DNA	0.003	NA	NA	NA	NA	NA
Heptadecane, wt%	0.807	0.451	0.82	1.144	0.39	1.324	ND	ND	0.231	2.2	0.047	NA	NA	NA	NA	NA
Pristane, wt%	11.864	7.221	0.523	1.955	0.37	0.925	ND	ND	0.497	0.6	0.02	NA	NA	NA	NA	NA
Octadecane, wt%	0.692	0.49	0.154	0.811	0.41	1.047	ND	ND	0.136	1.6	0.051	NA	NA	NA	NA	NA
Phytane, wt%	3.831	2.73	0.598	0.462	0.24	0.661	ND	ND	0.139	0.5	0.027	NA	NA	NA	NA	NA
C6 - C12	NA	NA	NA	NA	< 10000	NA	NA	NA	NA	DNA	DNA	240	< 240	9700	< 5000	15000
>C12 - C28	6900	28000	770000	780000	65000	290000	NA	NA	480000	DNA	DNA	2400	1200	65000	53000	36000
>C28 - C35	NA	NA	NA	NA	< 10000	NA	NA	NA	NA	DNA	DNA	< 230	< 240	< 5000	< 5000	< 5000
C6 - C35	NA	NA	NA	NA	65000	NA	NA	NA	NA	DNA	DNA	2640	1200	74700	53000	51000
C17/Pristane	0.07	0.06	1.57	0.59	1.05	1.43	DNA	DNA	0.46	3.67	2.35	NA	NA	NA	NA	NA
C18/Phytane	0.18	0.18	0.26	1.76	1.71	1.58	DNA	DNA	0.98	3.20	1.89	NA	NA	NA	NA	NA
Pristane/Phytane	3.10	2.65	0.87	4.23	1.54	1.40	DNA	DNA	3.58	1.20	0.74	NA	NA	NA	NA	NA

DNA - Data not available.
NA - Not analyzed.
ND - Not detected.

Attachment B

Revised Schematic Conceptual Site Model
(source: PRG Report, August 2006)

Attachment B: Revised Schematic Conceptual Site Model (source: PRG Report, August 2006)



LEGEND:

—— Significant Pathway

····· Insignificant Pathway

* Indicates potential ecological endpoints.

NOTE:

1) CSM revisions include gray shaded area added to include seeps as potential pathways.

2) Air-related pathways are considered insignificant. However on-site buildings will be evaluated separately for the potential for vapor phase intrusion from groundwater contamination. The potential for vapor phase intrusion depends on a number of site-specific issues including the location and types of buildings, location of groundwater plume, contaminants present, depth to groundwater, soil types, etc.

El Paso

FIGURE 3-1 (Revised October 2005)

SCHEMATIC CONCEPTUAL SITE MODEL

Elementis Site

Attachment C

Table 4-1 of the PRG Report

Attachment C: Table 4-1 of the PRG Report

Table 4-1
Preliminary Remediation Goals (PRGs) for Interim Measures Area

Analyte	Cas.No.	Surface Water PRG (µg/L)	Critical Pathway	Source
Acetonitrile	75-05-8	2.00E+04	Aquatic	Calculation[a]
Acrolein	107-02-8	5.00E+00	Aquatic	RBEL
Acrylonitrile	107-13-1	7.30E+00	Human Health	TSWQS
Aniline	62-53-3	1.47E+03	Aquatic	Calculation[a]
Benz(a)anthracene[e]	56-55-3	5.40E-01	Human Health	TSWQS
Benz(c)acridine	225-51-4	2.22E-03	Human Health	Calculation[a,b]
Benzene	71-43-2	7.08E+01	Human Health	TSWQS
Benzenethiol	108-98-5	2.23E+00	Human Health	Calculation[a]
Benzidine	92-87-5	2.32E-03	Human Health	TSWQS
Benzo(a)pyrene	50-32-8	5.40E-01	Human Health	TSWQS
Benzo(b)fluoranthene	205-99-2	1.80E-01	Human Health	RBEL
Benzo(j)fluoranthene	205-82-3	5.40E-01	Human Health	TSWQS[c]
Benzyl chloride	100-44-7	1.09E+01	Human Health	Calculation[a]
Bis(2-chloroethyl)ether	111-44-4	5.30E+00	Human Health	RBEL
Bis(2-chloroisopropyl)ether	108-60-1	6.50E+04	Human Health	RBEL
Bis(2-ethylhexyl)ester	103-23-1	9.29E-02	Human Health	Calculation[a]
Bis(2-ethylhexyl)phthalate	117-81-7	2.20E+01	Human Health	RBEL
Bis(chloromethyl)ether	542-88-1	1.29E-02	Human Health	TSWQS
Butyl benzyl phthalate	85-68-7	1.47E+02	Aquatic	RBEL
Carbon disulfide	75-15-0	3.25E+03	Aquatic	Calculation[a]
Chlorobenzene	108-90-7	1.05E+02	Aquatic	RBEL
Chloroform	67-66-3	8.61E+02	Human Health	TSWQS
Chloro-m-cresol, p-	59-50-7	6.45E+02	Human Health	Calculation[a]
Chloromethane	74-87-3	3.15E+03	Human Health	Calculation[a]
Chloronaphthalene, 2-	91-58-7	1.16E+02	Aquatic	Calculation[a]
Chlorophenol, 2-	95-57-8	1.50E+02	Human Health	RBEL
Chrysene	218-01-9	5.40E+00	Human Health	TSWQS
Cresols	1319-77-4	1.08E+03	Aquatic	Calculation[a]
Crotonaldehyde	4170-30-3	5.24E+01	Human Health	Calculation[a]
Cyanide	57-12-5	5.60E+00	Aquatic	TSWQS
Dibenz(a,h)acridine	226-36-8	2.22E-03	Human Health	Calculationa
Dibenz(a,h)anthracene	53-70-3	1.80E-01	Human Health	RBEL
Dibenz(a,j)acridine	224-42-0	3.85E-03	Human Health	Calculation[a]
Dibenzo(a,e)pyrene	192-65-4	5.40E-01	Human Health	TSWQS[c]
Dibenzo(a,h)pyrene	189-64-0	5.40E-01	Human Health	TSWQS[c]
Dibenzo(a,i)pyrene	189-55-9	5.40E-01	Human Health	TSWQS[c]
Dibenzo(c,g)carbazole, 7H-	194-59-2	5.40E-01	Human Health	TSWQS[c]
Dibromoethane, 1,2-	106-93-4	2.23E-01	Human Health	TSWQS
Dichlorobenzene, 1,2-	95-50-1	9.90E+01	Aquatic	RBEL
Dichlorobenzene, 1,3-	541-73-1	1.42E+02	Aquatic	RBEL
Dichlorobenzene, 1,4-	106-46-7	9.90E+01	Aquatic	RBEL
Dichloroethane, 1,2-	107-06-2	4.93E+01	Human Health	TSWQS
Dichloroethene, trans-1,2-	156-60-5	1.00E+04	Human Health	RBEL
Dichloroethylene, 1,1-	75-35-4	3.90E+00	Human Health	TSWQS
Dichloromethane	75-09-2	5.42E+03	Aquatic	RBEL
Dichloropropane, 1,2-	78-87-5	1.50E+02	Human Health	RBEL
Dichloropropane, 1,3-	142-28-9	5.12E+01	Human Health	Calculation[a]
Dichloropropane, 2,2-	594-20-7	5.92E+01	Human Health	Calculation[a]
Dichloropropanol	616-23-9	2.14E+04	Human Health	Calculation[a]
Diethyl phthalate	84-66-2	4.42E+02	Aquatic	RBEL

Attachment C: Table 4-1 of the PRG Report (Continued)

Table 4-1
Preliminary Remediation Goals (PRGs) for Interim Measures Area

Analyte	Cas.No.	Surface Water PRG (µg/L)	Critical Pathway	Source
Dimethyl phthalate	131-11-3	5.80E+02	Aquatic	RBEL
Dimethyl-benz(a)anthracene, 7,12-[e]	57-97-6	2.72E-06	Human Health	Calculation[a]
Dimethylphenol, 2,4-	105-67-9	6.60E+01	Aquatic	Calculation[a]
Di-n-butyl phthalate	84-74-2	5.00E+00	Aquatic	RBEL
Dinitro-o-cresol, 4,6-	534-52-1	2.80E+02	Human Health	RBEL
Dinitrophenol, 2,4-	51-28-5	6.70E+02	Aquatic	RBEL
Dinitrotoluene, 2,4-	121-14-2	3.40E+01	Human Health	RBEL
Di-n-octyl phthalate	117-84-0	1.06E-01	Human Health	Calculation[a]
Dioxane, 1,4-	123-91-1	4.83E+04	Human Health	Calculation[a]
Diphenylhydrazine, 1,2-	122-66-7	2.00E+00	Human Health	RBEL
Ethylene oxide	75-21-8	3.23E+02	Human Health	Calculation[a]
Ethyleneimined	151-56-4			
Fluoranthene	206-44-0	2.96E+00	Aquatic	RBEL
Formaldehyde	50-00-0	3.80E+02	Aquatic	Calculation[a]
Hydrogen sulfide	7783-06-4	2.00E+00	Aquatic	RBEL
Indeno(1,2,3-cd)pyrene	193-39-5	1.80E-01	Human Health	RBEL
Methanethiol	74-93-1	4.10E+03	Human Health	Calculation[a]
Methyl ethyl ketone	78-93-3	9.75E+04	Aquatic	Calculation[a]
Methylcholanthrene, 3-	56-49-5	3.43E-05	Human Health	Calculation[a]
Naphthalene	91-20-3	1.25E+02	Aquatic	RBEL
Nitroaniline, p-	100-01-6	1.12E+03	Human Health	Calculation[a]
Nitrobenzene	98-95-3	6.68E+01	Aquatic	RBEL
Nitrophenol, 4-	100-02-7	3.59E+02	Aquatic	RBEL
Pentachlorophenol	87-86-5	9.56E+00	Aquatic	TSWQS
Phenol	108-95-2	2.75E+03	Aquatic	RBEL
Pyridine	110-86-1	8.89E+03	Human Health	TSWQS
Tetrachloroethane, 1,1,1,2-	630-20-6	5.50E+01	Human Health	Calculation[a]
Tetrachloroethane, 1,1,2,2-	79-34-5	4.00E+01	Human Health	RBEL
Tetrachloroethylene	127-18-4	2.15E+02	Human Health	TSWQS
Toluene	108-88-3	4.80E+02	Aquatic	RBEL
Trichlorobenzene, 1,2,3-	87-61-6	5.94E+01	Human Health	Calculation[a]
Trichlorobenzene, 1,2,4-	120-82-1	2.20E+01	Aquatic	RBEL
Trichlorobenzene, 1,3,5-	108-70-3	4.36E+01	Human Health	Calculation[a]
Trichloroethane, 1,1,1-	71-55-6	1.56E+03	Aquatic	RBEL
Trichloroethane, 1,1,2-	79-00-5	1.60E+02	Human Health	RBEL
Trichloroethene	79-01-6	4.08E+02	Human Health	TSWQS
Trichlorophenol, 2,4,5-	95-95-4	1.20E+01	Aquatic	TSWQS
Trichlorophenol, 2,4,6-	88-06-2	2.40E+01	Human Health	RBEL

RBEL = Risk-Based Exposure Limit (Ecological - April 2002 Update, Human Health - September 2005 Update)
TSWQS = Texas Surface Water Quality Standard. Value obtained from Tables 1 and 3 of the TCEQ 2000a. Human health criteria is based on ingestion of salt water fish. Aquatic toxicity criteria is based on salt water chronic standards.

[a] Calculated in accordance with "*Procedures to Implement Surface Water Quality Criteria* " (RG-194, January 1993).
[a] Calculated in accordance with "*Procedures to Implement Surface Water Quality Criteria* " (RG-194, January 1993).
[b] Dibenz(a,h,)acridine used as a surrogate.
[c] Benzo(a)pyrene used as a surrogate.
[d] No human health or aquatic toxicity values available.
[e] No federal or state aquatic life criteria available, and sufficient toxicity information is not appropriate to develop an appropriate surface water benchmark for benzo(a)anthracene and dimethyl-benz(a)anthracene 7,12. Additional study may be required if these COCs are detected during the IM or Facility wide investigation.

Attachment D

Acronym List (from PRG Report)

Attachment D: Acronym List (from PRG Report)

LIST OF ACRONYMS

AFJ	Agreed Final Judgment
AOC	Administrative Order on Consent
APAR	Affected Property Assessment Report
COCs	Chemicals of Concern
CSM	Conceptual Site Model
EPA	Environmental Protection Agency
FRGs	Final Remediation Goals
HASP	Health and Safety Plan
IM	Interim Measures
LC50	Lethal Concentration to 50% of the Population
LNAPL	Light Non-Aqueous Phase Liquid
MDL	Method Detection Limit
MTBE	Methyl Tertiary-butyl Ether
NAPL	Non-Aqueous Phase Liquid
PAHs	Polycyclic Aromatic Hydrocarbons
PR/VSI	Preliminary Review/Visual Site Inspection
PRG	Preliminary Remediation Goals
PRGs	Preliminary Remediation Goals
RAGs	Risk Assessment Guidance for Superfund
TBCDS	Texas Biological and Conservation Data System
TCEQ	Texas Commission on Environmental Quality
TDS	Total Dissolved Solids
TPWD	Texas Parks and Wildlife Department
UCL	Upper Confidence Limit
USFWS	United States Fish and Wildlife Service
VOC	Volatile Organic Compound
WWTS	Waste Water Treatment System

Attachment E

Definition of “Facility” (from PRG Report)

Attachment E: Definition of "Facility" (from PRG Report)

The AOC defines the "Facility" as "...the area of contamination beyond the Coastal Refinery property boundary north, northeast and east of the Coastal Refinery East Plant-North and extending onto or under the portion of Elementis Chrome and Chemical, Inc., (Elementis) [adjacent] property located East of Cantwell Lane and to the Inner Harbor Ship Channel"(AOC, Section I.) The "Facility" may also be expanded to include areas west of Cantwell Lane in the IM Area as defined in Section 2.1 of this PRG report, should contamination contiguously extend into that area. Figure 1-1 is a site map depicting the area covered under the AOC, including the IM area, all other areas that make up the Facility, and adjacent properties.

Attachment F

LNAPL Sample Results

Attachment F: LNAPL Sample Results

Parameter	Sample Taken Next to P-8	Sample Taken Next to EPZ-3	Average LNAPL Value
Density (g/mL)	0.8431	0.8594	0.8508
Interfacial Tension between LNAPL and water (mN/m)	21	22	21.5
Surface Tension between LNAPL and air (mN/m)	29	30	29.5
Kinematic Viscosity (cSt @ 60°F)	1.04	0.91	0.98
Key LNAPL Components (WT %)			
Benzene	55.05	77.75	65.40
C10 Aromatics	4.40	1.50	2.95
C11 Naphthenes	8.16	4.13	6.15
C11 Paraffins	8.36	3.77	6.07

cSt - Centistokes.
g/mL - Grams per milliliter.
LNAPL - Light non-aqueous phase liquid.
mN/m - MilliNewtons per meter.
WT - Weight.