July 5, 2000

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U.S. Environmental Protection Agency
Region IX
Mail Code SFD-7-1
75 Hawthorne Street
San Francisco, California 94105

DRAFT MW-20 PILOT PROGRAM SUMMARY REPORT - DEL AMO STUDY AREA

The Department of Toxic Substances Control (DTSC) has reviewed the above referenced document, dated December 10, 1999. Attached are comments from DTSC's Geologic Services Unit (GSU). The draft GSU comments were presented to you and discussed at the March 28, 2000 meeting at the Dames & Moore offices in Santa Ana. Also, for your reference I'm attaching previous comments from GSU that were submitted to you in 1999. Additional comments are listed below.

GENERAL COMMENT:

1. Section 1.0, 2nd paragraph: Please define the “four-tiered evaluation process”.

2. Section 2.0, 3rd paragraph: Please provide a more in-depth rationale of why specific technologies were eliminated. For example:
   A. Institutional controls (groundwater monitoring and access restrictions) has already been approved in the groundwater ROD, and it is unclear why it is retained here.
   B. It is not clear why hydraulic extraction has been retained, since the pilot program showed that it was not an effective remedy. If hydraulic extraction for containment would yield different results please include them in the text.
C: It is stated that permeable barriers were not retained because the technology would take a very long time to cleanup the LNAPL, however natural attenuation was retained and it would take at least as long.

If you have any questions regarding these comments please contact Ms. Gloria Conti, Project Manager, at (714) 484-5469, or GConti@DTSC.ca.gov.

Sincerely,

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Enclosures

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INTRODUCTION

The Geological Services Unit (GSU) of the Department of Toxic Substances Control (DTSC) has reviewed the Draft MW-20 Pilot Program Summary Report for Del Amo Study Area located in Los Angeles, California. The summary report, dated December 10, 1999, was prepared by Dames & Moore (D&M).

The Del Amo study area includes the approximately 300-acre former synthetic rubber manufacturing plant complex, which is the focus of a broader remedial investigation/feasibility study (RI/FS). Several investigations have been conducted in the MW-20 area since 1992. The findings indicated that as much as eight feet of accumulated light non-aqueous phase liquid (LNAPL) had been measured in MW-20. It was also indicated that LNAPL was found to be trapped in saturated sediments below the water table. Because the LNAPL is in direct contact with and submerged below the...
water table, it is a continuing source of dissolved groundwater contamination, and requires an evaluation of treatability.

In 1993, a treatability study was submitted to the U.S. Environmental protection Agency (EPA) for review. EPA subsequently requested incorporation of additional site-specific data into the treatability study to address more fully the efficacy of source remediation. A pilot program, focusing on a small area of the larger study, was proposed to assess the efficacy of source recovery by hydraulic extraction and collection of additional site-specific data necessary to evaluate fully the efficacy of other remedial technologies.

The purpose of the pilot program was to: (1) continue removal of LNAPL from the vicinity of MW-20; (2) evaluate LNAPL mobility and the effectiveness of LNAPL removal by hydraulic extraction; and (3) collect site-specific data necessary to further evaluate the applicability and effectiveness of other LNAPL removal technologies. In addition, the pilot program determined whether the designed pumping well field will achieve hydraulic capture of the dissolved phase plume emanating from the residual LNAPL. This review identifies concerns that are included in the following comments and should be addressed by the responsible parties and their consultants. Questions regarding this memo should be directed to Joe Hwong at (714) 484-5406.

GENERAL COMMENTS

1. Figures illustrating the current extent of the LNAPL plume in the vicinity of MW-20 should be included in the report to allow better evaluation of the extraction and observation well arrays completed during the pilot program.

2. The summary report should provide sufficient evidence and supporting data to demonstrate that natural attenuation is occurring at the Del Amo site. The methodology should be followed for data collection and analysis to support any claims of natural attenuation. The data should demonstrate that natural attenuation will reduce the concentrations of the contaminants to levels below regulatory standards before potential receptor exposure pathways are completed. Based on this technical evaluation, the report should include an estimate of the time for contaminant reduction to occur.

3. Numerous typographical errors were found in the summary report. In addition, several figures were referred to but not included in the report (i.e., Figure 1-2). Enhanced quality control must be conducted for future report submittals to DTSC.

SPECIFIC COMMENTS

1. Page 1-5, Section 4.2, Phase II - Appendix B in Volume I describing the dual-
pump extraction system and the water and air treatment system was not included in the report for review.

2. Page I-6, Section 4.2.1, Extraction Well Network - Figure I-2 in Volume I illustrating the extraction well and observation well networks was not included in the report for review.

3. Page II-5, Section 1.1.5, Lithologic Correlation - This section states “To aid in the assessment of permeability, sediments were divided into five lithotype categories: medium sands, fine sands, silty sands, sandy silts, and silt (silts and clays). The initial conceptual lithotype categories were refined after completion of the pre-pumping coring and laboratory programs, which included derivation of intrinsic and fluid-dependent flow properties of the sediments. Based on the testing results, the original five grain-size categories were refined into four lithotypes exhibiting distinct fluid flow properties.” Provide information on how the five grain-size categories correlated with the four fluid flow properties, or reference the appropriate report. In addition, explain how this correlation of lithotypes can be applied to other areas of the site.

4. Page II-9, Section 1.2.3.2, Capillary Characteristics - Hydraulic conductivities range from $8.28 \times 10^{-4}$ centimeters per second (cm/sec) in medium sands to $3.66 \times 10^{-6}$ cm/sec in silts. These values were derived from relative permeability and capillary characteristics testing presented in Table II-3. The largest difference of hydraulic conductivity between medium sands and silts is only two orders of magnitude. Provide the ranges of hydraulic conductivities from actual field data after pumping tests and compare these numbers to the data derived from the Phase I laboratory testing.

Figure II-24 is incorrectly referred to as Figure II-23 for the capillary pressure curves.

5. Page II-11, Section 1.3.1.1, Capillary Characteristics - Figures II-24 and II-25 are incorrectly referred to as Figures II-23 and II-23 for the capillary pressure curves by PTS Laboratories and Shell Bellaire Technology (BTC).

6. Page II-16, Section 2.1, Pre- and Post-Pumping LNAPL Distribution - The paragraph states “The only apparent discrepancy between pre- and post-pumping LNAPL distribution occurs at the depth interval of 86.4 to 89.2 feet below ground surface (bgs). Post-pumping core screening did not detect the presence of LNAPL in this interval, whereas pre-pumping screening had detected LNAPL.” Describe the lithotypes in the interval between 86.4 to 89.2 feet bgs. A discussion of the reasons for this discrepancy should be included in the report. If the data does not support any specific conclusion, it should be so
7. **Figure II-28** - Based on the comparison of laboratory-derived irreducible LNAPL saturation and field LNAPL measurement data presented in Figure II-28, the laboratory-derived values are approximately 10 to 20 percent higher than the field measurement data. Explain the discrepancy between laboratory and field measurement data and how it will affect the actual field remedial activities. Furthermore, Dames & Moore should provide documentation which supports the use of the selected saturation data.

8. **Page III-1, Section 1.1, Test 0 - Background Period** - Graphs of water level fluctuation during this period are shown on Figure III-2. However, only the data recorded in monitoring well OWL0012 is presented in the figure. State whether water level changes were also recorded in other wells during the test. In addition, explain how the data recorded from these wells compare to OWL0012. If any data for any well other than well OWL0012 was recorded, it should be included and discussed in the report.

9. **Page III-1, Section 1.1, Test 0 - Background Period** - A total of six columns with numerous values, described as rates and duration of extraction, are presented in Figure III-3. However, it is not clear what each of these values represents. An appropriate figure illustrating each value should be included and explained in detail.

10. **Figure III-4** - Based on hydraulic responses in observation wells presented in Figure II-28, simultaneous drawdown was observed only in well OWL0003A when pumping began in extraction well SWL0001. Explain the cause for the simultaneous drawdown responses. What lithotypes correlate between these two wells, if any. In addition, large fluctuations occurred from approximately 60,000 to 90,000 minutes of pumping in all observation wells. An explanation should be provided regarding these anomalies.

11. **Page III-3, Section 1.3.2, LNAPL Accumulation** - Figure III-3 is incorrectly referred to as Figure 2 for the LNAPL accumulation in extraction wells.

12. **Page III-7, Section 2.2, Potentiometric Response to Pumping - Test 3** - The paragraph states "In general, the radius of influence (as defined by discernable drawdown of 0.2 feet) was about 30 feet in the A-units, between 10 and 20 feet in the B-units, about 10 feet in the C-units, and less than 30 feet in the D-units." The radius of influence may not have been estimated properly because C-units are designated as sandy silts and D-units are silts and clays. In addition, based on observed drawdown during Test 3, drawdowns were at or near the discernable limit of 0.2 feet in wells located greater than 8 feet from extraction.
wells. Due to the low discerned value and sensitivities of water level changes, short-term water level monitoring prior to any pumping test should be conducted in order to collect data for filtering out anomalies that may be caused by other factors, such as atmospheric pressure changes.

13. **Page III-9, Section 2.3, Potentiometric Response to Pumping - Test 6** - The paragraph states “However, toward the end of Test 6, all wells show an increase in drawdown resulting from doubling the pumping rate in EWL0003 from 2 gallons per minute (gpm) to 4 gpm.” State whether well EWL0003 can sustain a pumping rate of 4 gpm without dewatering the well. In addition, state how long it took before observation wells responded to the increasing pumping rate.

14. **Figures 4 through 13** - Hydraulic responses in observation wells have been corrected for regional influences. Explain the regional influences and how they affect the drawdown.

15. **Page III-10, Section 2.6, LNAPL Accumulation and Fluid Production** - Figure III-3 is incorrectly referred to as Figure 2 for the LNAPL accumulation in extraction wells.

16. **Page III-13, Section 3.1, Effectiveness of Hydraulic Extraction, first bullet** - The bullet states “Extended hydraulic extraction did not result in dewatering of any the monitored units. Therefore, SVE related remedial technologies are expected to be an ineffective method for LNAPL reduction.” Clarify the correlation made between SVE and extended hydraulic extraction, and provide supporting information to demonstrate that these units cannot be dewatered in a practicable manner.

17. **Appendix A, LNAPL and Dissolved Phase Benzene Removal Volume Calculation, Step 2** - The gram per pound is incorrectly referred to as pound per gallon in the sample calculation for Test 3A.

18. **Volume IV, Executive Summary, second paragraph** - The paragraph states “From a risk point of view, the rate of LNAPL dissolved is balanced by the rate of natural attenuation such that further source reduction will have no impact on a downgradient receptor well.” No supporting documentation has been provided to support this statement.

19. **Page IV-7, Section 3.3.3, LNAPL (Oil) Saturation, third paragraph** - Three rounds of core sampling were conducted to determine the presence of LNAPL. However, only one sample was collected from SBL0110 during Round 2 while 10 and five samples were collected in Rounds 1 and 3, respectively. An explanation should be provided regarding the inconsistent number of samples.
20. Page IV-9, Section 5.0, Spatial LNAPL Distribution, third paragraph - Provide a detailed description to explain why saturated profiles shown in Figures 29 and 30 are more continuous than those in Figures 23 and 24. In addition, a discussion needs to be provided explaining why global statistics of the averaged saturation data in Figure 31 are less skewed than those in Figure 22.

21. Page IV-21, Section 8.0, LNAPL Dissolution and Risk Reduction, second paragraph - This paragraph states “Since LNAPLs were submerged beneath the groundwater, direct volatilization from LNAPL to air became an insignificant transport pathway.” However, direct volatilization from LNAPL to the vadose zone may result from lowering the groundwater table by pumping or seasonal fluctuations in groundwater elevations and may still need to be evaluated.

22. Page IV-21, Section 8.0, LNAPL Dissolution and Risk Reduction, third paragraph - State whether any dissolved phase LNAPLs were detected in the vicinity of MW-20 or other portions of the study area. If dissolved phase LNAPLs were detected in previous investigations, the actual detected concentrations should be used to evaluate site conditions.

23. Figure 60 - Groundwater saturation profiles adjacent to pumping well SWL0001 under a pumping rate of 1 gpm was presented in Figure 60. Based on this figure, an anomaly occurred at a depth of approximately 17 feet below mean sea level, at a radius of 1 and 5 feet from the pumping well. An explanation should be provided regarding this anomaly.
Per your request, I have reviewed the Draft MW-20 Pilot Program Summary Report, Volumes I - III, Del Amo Study Area, dated August 13, 1999. (Log # 991052A)

GENERAL COMMENTS

1. The document does not have a Table of Contents. A Table of Contents should be provided to facilitate document review.

2. The document refers to appendices that have not been provided, and generally lacks adequate graphics to support specific discussions and examples described in the text. Occurrences of these will be cited separately in the specific comments section.

3. Some figures included in the document are only numbered, not labeled. All figures should be formally titled as well as numbered.

4. Tables are included as text, particularly in Volume III, without being named or numbered. Each list or table-like presentation should be separately labeled and numbered.
Numerous acronyms are used in this document. A list of acronyms should be provided following the Table of Contents to facilitate document review.

SPECIFIC COMMENTS

6. Vol. I, Section 4.0, Program Overview, page I-2. A list of documents of other investigations that include MW-20 area data is included as text in this section.

The Geologic Services Unit (GSU) recommends that this information be separated into a stand alone table, which chronologically lists all reports submitted on the MW-20 area. Separate columns should be provided for report titles, submittal dates, and the referencing convention.


The GSU recommends that this document be listed in the chronology requested in comment No. 6.

8. Vol. II, Section 1.1, Soil Types and Depositional Setting, page II-2. The last paragraph on this page mentions cross sections A-A’ through E-E’.

The GSU recommends that a reference be provided for the document in which the original cross sections are located. In addition, all the cross sections should be reproduced in a smaller (11 X 17), black and white version for inclusion in this document. This reference would be helpful in providing a better understanding of the larger scale elements of the depositional setting and the complex lithologies present.

9. Vol. II, Section 1.1, Soil Types and Depositional Setting, page II-2. The last line of the last paragraph on this page references Appendix A, but no appendices have been included with this submittal.

The GSU recommends that appropriate examples from this appendix be included with the submittal. It is difficult to complete the review without some graphics. The GSU understands the significant expense in duplicating all core photos from Appendix A, which shows millimeter scale details of structural intricacies and lithologic heterogeneities. However, selected examples from this appendix is a reasonable request to facilitate document review.
10. *Vol. II, Section 1.2.1, LNAPL Distribution, page II-6.* In the second paragraph, the occurrence of LNAPL is described by relating the locations to specific lithotypes and depths. The GSU recommends that core photos be included for these specific examples.

11 *Vol. II, Section 1.2.2, LNAPL Saturation, page II-6, and Section 1.2.3, Phase I Intrinsic Properties, page II-7.* Numerous technical terms are used in these sections to discuss all aspects of LNAPL saturation.

The GSU recommends that several terms be briefly reviewed before beginning these sections. At a minimum, the following terms should be discussed: saturation, relative saturation, initial and residual saturation, mobile saturation, in-situ fluid saturation, and irreducible saturation. Any other terms that the writer believes necessary for the reader to clearly understand the testing program that was conducted at the MW-20 area should also be included.

12. *Vol. II, Section 1.2.2, LNAPL Saturation, page II-7.* The text states that high total fluid saturations in silt/clay and sandy silt samples indicate data from these samples are more reliable and reflective of in-situ fluid saturation conditions. The text also states that the data indicate a probable loss of pore fluid.

The GSU recommends that discussion be provided about why some data are more reliable and reflective of in-situ conditions, and why the data indicate pore fluid loss. Possibly, the review of the saturation terms could make these conclusions more understandable.

13. *Vol. II, Section 1.3, Phase II Laboratory Testing Results, page II-9.* The last line of the section references Appendix C, but no appendices have been included with this submittal.

The GSU recommends that the complete appendix be provided or the location of the analytical results in question be referenced as part of another document, not as an appendix.

14. *Vol. II, Section 1.4.1, Relative Permeability, page II-11.* At the top of this page, an unlabeled and unreferenced table has been included.

The GSU recommends that a title, a reference from the text, and a discussion about the purpose of including this table be provided. In addition, two of the columns in the table contain "Oil and Water Corey Exponents." An explanation of the term *Corey Exponent* should be provided.
15. *Vol. II, Section 1.4.2, Relative Fluid Saturation, page II-11.* The text states that high total fluid saturations provide a high degree of confidence in the testing results.

The GSU recommends that discussion be provided about why high total fluid saturations provide a high degree of confidence in the testing results.

16. *Vol. II, Section 2.1, Pre and Post Pumping LNAPL Distribution, page II-13.* The text states that there is a very strong correlation between LNAPL occurrence in pre- and post-pumping core.

The GSU recommends that this statement be reworded to indicate that a possible correlation exists. A look at Figure II-4 suggests there was downward smearing of LNAPL in some locations, and a slight upward movement at others. This section is critical to the purpose and objectives of the report and should be better supported with more detailed discussion and graphics about the correlation.

17. *Vol. III, Section 2.6, LNAPL Accumulation and Fluid Production, page III-11.* The text states that the calculation of the quantities of benzene removed as dissolved phase are presented in Table III-3 and in Appendix D.

The GSU recommends that the exact details of the equation and an example of a complete calculation be included in this section as text, as well as summarized in Appendix D. Also, Table III-3 presents the results of the calculation, but does not give the details of the equation used. That statement should be clarified. Finally, Appendix D is not included and should be included in this report.

If you have any questions, please call me at (916) 255-3691.

cc: Steve Sterling, GSU Supervisor, DTSC, Sacramento