OCTOBER 9, 2008

ADDITIONAL DNAPL RECONNAISSANCE BORINGS
DATA SUBMITTAL REPORT
FORMER MONTROSE FACILITY
MONTROSE CHEMICAL CORPORATION OF CALIFORNIA
HENDERSON, NEVADA

HARGIS + ASSOCIATES, INC.
HYDROGEOLOGY • ENGINEERING

JURAT

I hereby certify that I am responsible for the services described in this document and for the preparation of this document. The services described in this document have been provided in a manner consistent with the current standards of the profession and to the best of my knowledge comply with all applicable federal, state and local statutes, regulations and ordinances.

For the services provided and attested to with this Jurat including the compilation and evaluation of DNAPL data collected by Hargis + Associates, Inc. on behalf of Montrose Chemical Corporation and the inclusion of additional DNAPL data provided by other firms summarized in this data submittal report.

I hereby certify that all laboratory analytical data was generated by a laboratory certified by the NDEP for each constituent and media presented herein.

HARGIS + ASSOCIATES, INC.

Michael R. Long, CEM
Principal Hydrogeologist
Nevada Certified Environmental Manager
No. EM - 1891 (Expires 05/27/10)

Date Signed: October 9, 2008

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ACRONYMS AND ABBREVIATIONS

bgs	below ground surface
CSM	conceptual site model
DNAPL	dense non-aqueous phase liquids
DVSR	data validation summary report
DSR	data submittal report
FID	flame ionization detector
H+A	Hargis + Associates, Inc.
IDW	investigation derived waste
LNAPL	light non-aqueous phase liquids
Montrose	Montrose Chemical Corporation of California
NAPL	non-aqueous phase liquids
NDEP	Nevada Division of Environmental Protection
PID	photoionization detector
ppm	parts per million
PVC	Polyvinyl chloride
SGWI	Supplemental Groundwater Investigation
SRCs	site-related chemicals
Stauffer	Stauffer Chemical Company
SVOCs	semi-volatile organic compounds
the Site	Montrose, Stauffer facilities and surrounding area
UMCf	Fine-Grained Upper Muddy Creek Formation
VOCs	volatile organic compounds

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EXECUTIVE SUMMARY

Five dense non-aqueous phase liquid (DNAPL) Reconnaissance soil borings (RB-09, RB-12, RB-14, RB-15, and RB-17) and three Fine-Grained Upper Muddy Creek Formation (UMCf) groundwater monitor wells (MC-MW-15, RB-10/MC-MW-17, RB-11/MC-MW-18) were drilled and constructed during the Spring 2007 and Spring 2008 Reconnaissance Boring Investigations. In addition, five monitor wells and one soil boring were drilled as part of the Closed Ponds Investigation in July 2008 by Geosyntec. These borings and monitor wells were installed as part of the contingency portion of the Supplemental Groundwater Investigation Workplan to help estimate the potential extent of subsurface DNAPL observed in the vicinity of the Montrose Former Plant Site. Evidence collected during the installation of the borings and monitor wells included the results of field screening for DNAPL and sampling analytical results. No direct evidence of DNAPL was observed visually, with a non-aqueous phase liquid (NAPL) probe or with reaction to treated FLUTe® ribbon fabric in any of the soil borings or wells installed during these investigations. The only evidence of potential DNAPL in soil borings RB-12, RB-14, and MCB-1, and monitor wells MC-MW-15, MC-MW-17, MC-MW-18. AA-MW-20 and AA-MW-21 was indirect evidence in the form of slightly elevated flame ionization detector (FID) or photoionization detector (PID) readings from soils and/or percent of maximum water solubility values greater than 5% for selected compounds in the groundwater. This evidence is not considered sufficient to indicate the presence of DNAPL. The slightly elevated FID/PID readings are likely the result of vapors from the elevated dissolved concentrations of volatile organic compounds (VOCs) in the groundwater.

The data collected during these additional DNAPL investigations, the Closed Ponds Area Investigation by Geosyntec, and data collected previously during the Supplemental Groundwater Investigation and summarized in the Conceptual Site Model (CSM) have been

used to estimate the extent of DNAPL in the Alluvial Aquifer and the Fine-Grained Upper Muddy Creek Formation (UMCf) at the Site (Figures 2 and 3).

The presence of NAPL and/or its dissolved plume will continue to be monitored during the 2008 (October sampling event) and the 2009 site-wide monitoring program being conducted by the Companies at the combined former Montrose and Stauffer sites. This program includes DNAPL gauging of wells to assist in evaluation of DNAPL mobility for future consideration as part of the joint program Groundwater Remedial Alternative Study.

DNAPL screening using the FID/PID measurements, FLUTe® ribbon and visual inspection of core has been included in ongoing investigations in the Closed Ponds Area and is planned for the upcoming investigation of Site-Related Chemicals (SRCs) in the UMCf in the vicinity of the Companies' Groundwater Treatment System.

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1.0 INTRODUCTION

This data submittal report (DSR) was prepared by Hargis + Associates, Inc. (H+A) on behalf of the Montrose Chemical Corporation of California (Montrose) to present information gathered during the implementation of the Additional Dense Non-Aqueous Phase Liquid (DNAPL) Reconnaissance Boring Investigations of 2007 and 2008 conducted at and near the former Montrose facilities [the Site] (Figure 1). In addition, per the request of NDEP during the meeting on September 4th to discuss the RAS process, this report also includes information regarding evidence of DNAPL collected by Geosyntec as part of investigations conducted in the Closed Ponds Area during 2008 (Figure 1).

The 2007 and 2008 DNAPL investigations were conducted to further investigate the extent of DNAPL discovered during the Montrose Supplemental Groundwater Investigation (SGWI) work conducted during the fall of 2006 (H+A, 2006 a, b ,c, and d). The extent of DNAPL was identified as Data Gap #7 in the Conceptual Site Model (CSM) report dated September 21, 2007 and revised and resubmitted July 25, 2008 (H+A, 2007e and 2008). Therefore, these investigations supplement the data generated by the original RB-Series soil borings (RB-01 through RB-08) and the UMCf monitor wells (MC-MW-09 through MC-MW-12) reported in the CSM Report (H+A, 2007e and 2008).

These investigations were conducted in accordance with the contingency portion of the workplan prepared and submitted to the Nevada Division of Environmental Protection (NDEP) for review on February 24, 2006. The SGWI Workplan (the groundwater workplan) focused primarily on determining the distribution of site-related chemicals (SRCs) in the alluvial aquifer and Muddy Creek Formation and on evaluating the possible presence of DNAPL or DNAPL-like materials in the vicinity of potential Montrose source areas (H+A, 2006a, 2006b, 2006c, and 2006d).

The workplan was approved by NDEP in a letter to Montrose dated August 18, 2006 (NDEP, 2006). As part of the contingency process Montrose submitted to NDEP, via e-mail and hard copy, two technical memorandums outlining additional work to further evaluate the potential extent of the DNAPL (H+A, 2007a and 2007c). The first technical memorandum was submitted to the state on February 16, 2007 (H+A, 2007a). NDEP issued an approval of the content of the memorandum on March 5, 2007 (NDEP, 2007a). The second technical memorandum was submitted on June 21, 2007 and approved by NDEP the same day (NDEP, 2007b).

1.1 INVESTIGATION GOALS

The goal of the supplemental DNAPL investigations is to collect sufficient additional information to evaluate the extent of DNAPL to the north and east of the MC-MW-12 area where DNAPL was observed downgradient of the Former Plant Site during the 2006 Supplemental Groundwater Investigation. These activities were performed in support of Data Gap #7 listed in the September 21, 2007 and July 25, 2008 versions of the CSM for the combined former Montrose and Stauffer Chemical Company (Stauffer) facilities (H+A, 2007e and 2008). The goal of the Closed Ponds Area Investigations is to better understand the hydrogeologic and hydrogeochemical regime in the vicinity of the Closed Ponds Area and included field screening for DNAPL.

1.2 SCOPE OF THE INVESTIGATION

The investigation of DNAPL extent was conducted in two phases implemented in the Spring of 2007 and the Spring of 2008 as outlined below. Workplans developed for these two investigations included considerable flexibility to adapt the course of the field investigations to build upon the findings developed earlier in each program. To provide clarity in this report, the narrative focuses on the work that was completed and its relevance to the goals of this investigation program.

1.2.1 Scope of the Spring 2007 DNAPL Reconnaissance Investigation

The scope of the Spring 2007 Reconnaissance investigation included drilling three additional DNAPL borings (identified as RB-09, RB-12, and RB-14) and the installing of one UMCf monitor well (MC-MW-15) (Figure 1). Additionally planned soil borings RB-10 and RB-11, located on property owned by Tronox adjacent to the former Montrose facility, were not completed during the Spring 2007 investigation due to delays in securing access to the Tronox property. These borings were later installed as part of the Spring 2008 program.

1.2.2 Scope of the Spring 2008 DNAPL Reconnaissance Investigation

The scope of the Spring 2008 Reconnaissance investigation included 1) the installation of the two borings (RB-10 and RB-11) delayed from the Spring 2007 program by access issues, 2) the installation of two additional borings (RB-15 and RB-17) to aid in estimating the eastern boundary of the DNAPL impacted area and, 3) the conversion of two borings into monitor wells (RB-10/MC-MW-17 and RB-11/MC-MW-18).

1.2.3 Scope of the Closed Ponds Area Investigation

The investigation of the Closed Ponds Area was conducted by Geosyntec according to their workplan (Geosyntec, 2008) in July 2008 and the scope included constructing five monitor wells (AA-MW-20 through AA-MW-24) and one soil boring (MCB-1) (Figure 1) using SOPs for the Site (H+A, 2007b). All locations were screened using a PID meter and locations downgradient of the Closed Ponds Area were also screened using FLUTe® ribbon (Table 5, Figures 2 and 3).

2.0 SUMMARY OF FIELD INVESTIGATIONS

The following sections report the procedures used and the findings of the work actually completed. Lithologic logs and well construction diagrams for the Spring 2007 and 2008 DNAPL work are included in Appendix A. Laboratory analyses for the soil and groundwater samples were conducted by Test America, Irvine, California, a Nevada-certified analytical laboratory (Appendix B). Data validation was performed on the laboratory analytical data generated during these investigations. The Spring 2007 data validation summary report (DVSR), including laboratory analytical reports, has been submitted to NDEP under separate cover dated July 19, 2007 (H+A, 2007d). The DVSR for the Spring 2008 investigation is included in Appendix C. The DVSR for the Closed Ponds Area investigation conducted by Geosyntec is included in Appendix D.

All field investigation work was conducted under the supervision of a State-of-Nevada Certified Environmental Manager in accordance with the Standard Operating Procedures (H+A, 2007b). The results of the field screening and sampling analytical results are provided in Tables 1 through 6 and on Figures 2 and 3.

Boart Longyear, a Nevada-licensed well drilling contractor, drilled the soil borings and constructed the monitor wells using the Rotosonic drilling method. The Rotosonic method generates continuous-core, which are extracted into clear plastic liners, which are then cut open to examine and/or collect soil samples from the core. The method provides a relatively undisturbed portion of the formation and also minimizes drilling wastes.

2.1 SPRING 2007 RECONNAISSANCE BORING INVESTIGATION

Three borings (RB-09, RB-12, and RB-14) and one well (MC-MW-15) were drilled during the Spring 2007 Investigation (April 2 through 17, 2007). The location of these investigation activities is shown on Figure 1. This work focused on the area to the north and east of monitor well MC-MW-12.

The borings were installed to a total depth of approximately 150 feet because previous investigations indicated that evidence of DNAPL had not been encountered in the UMCf below this depth. The locations were chosen based on review of the DNAPL screening results (i.e. photoionization detector (PID) readings, flame ionization detector (FID) readings, FLUTEe® ribbon positive reactions and maximum solubility concentrations of benzene and chlorobenzene) compiled from the Fall 2006 work. The soil samples were to be analyzed for DNAPL-forming compounds detected in Fall 2006, including: volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and organochlorine pesticides. All soil cores from each boring were to be monitored using FID and PID meters, tested with FLUTEe® ribbon and visually examined to identify any DNAPL-like substances.

2.1.1 DNAPL Reconnaissance Borings

As a general procedure, all borings were sampled at 10-foot intervals starting at 10 feet below grade except for RB-09 as noted below. All soil cores from each boring were monitored using FID and PID meters, tested with FLUTEe® ribbon and visually examined to identify any DNAPL-like substances. All soil samples were analyzed for VOCs, SVOCs and organochlorine pesticides. Lithologic logs and well construction diagrams for these borings are presented in Appendix A.

Boring RB-09

Boring RB-09 was sampled at 10 feet below ground surface (bgs), and then at 10-foot intervals down to 150 feet bgs, except for the interval inadvertently missed at 110 feet bgs.

Boring RB-12

Boring RB-12 was sampled at 10 feet bgs, and then at 10-foot intervals down to 130 feet bgs. Elevated (greater than 1,000 parts per million [ppm]) FID readings were observed in RB-12 in the interval from 70 to 85 feet bgs. The workplan had anticipated converting boring RB-12 to a UMCf monitor well. Instead, based on the elevated readings and to collect more soil data, boring RB-12 was abandoned and UMCf monitor well MC-MW-15 was drilled approximately 200 feet north of RB-12. In addition, based on the elevated FID readings at RB-12, another soil boring (RB-14) was installed to the north and east of boring RB-12 to have an additional point on the northern and eastern edge of the DNAPL area.

Boring RB-14

Boring RB-14 was drilled approximately 600 feet northeast of boring RB-12 and approximately 700 feet north of monitor well MC-MW-12. Boring RB-14 was sampled from 10 feet bgs to 150 bgs at 10-foot intervals.

Summary of DNAPL Visual Reconnaissance Findings

There were no positive reactions on the FLUTEe® ribbon at any boring installed in this program (Appendix A).

2.1.2 UMCf Monitor Well MC-MW-15 Construction

Based on the findings at boring RB-12, monitor well MC-MW-15 was constructed approximately 200 feet north of boring RB-12. The location of this well, besides being selected to collect groundwater samples for the UMCf was also selected to get additional information on the extent of the elevated FID readings encountered to the north of soil borings RB-12.

The UMCf monitor well MC-MW-15 was drilled and constructed using the methods outlined in the workplan. Schedule 80 PVC well screen used during the construction of MC-MW-12 had degraded due to reactions with SRCs in UMCf groundwater. Therefore, it was decided that stainless steel well screen and blank steel casing would be installed in monitor wells completed in the alluvial aquifer, as well as the UMCf, in areas where high concentrations of SRCs were anticipated. Consequently, 4-inch diameter blank steel casing and stainless steel well screen were installed in monitor well MC-MW-15 (Appendix A). Monitor well MC-MW-15 was later developed and sampled as part of the Spring 2008 DNAPL Reconnaissance Investigation.

2.2 SPRING 2008 RECONNAISSANCE BORING INVESTIGATION

For the Spring 2008 Investigation, two soil borings (RB-15 and RB-17) and two soil borings converted to monitor wells (RB-10/MC-MW-17 and RB-11/MC-MW-18) were installed during March 20 through April 10, 2008 (Figure 1). Soil sampling target depths, DNAPL investigation techniques and the analytical suite for all soil samples were the same as for the Spring 2007 investigation (every 10 feet starting at 10 feet bgs to the total depth of the borehole). The soil

samples were analyzed for VOCs, SVOCs and organochlorine pesticides and all soil cores were monitored using FID and PID meters, FLUTE® ribbon and visually examined to identify any DNAPL-like substances. Lithologic logs and well construction diagrams for these borings were presented in Appendix A.

2.2.1 DNAPL Reconnaissance Borings

Borings RB-10 and RB-11 were originally planned for the Spring 2007 Investigation described above but were included in this Spring 2008 investigation upon resolution of access to Tronox property.

Boring RB-10

Boring RB-10 was sampled at 10 feet bgs, and then at 10-foot intervals down to 150 feet bgs. Elevated FID readings were observed in RB-10 in the interval from 78 to 86 feet bgs. The elevated readings triggered the conversion of soil boring RB-10 to a monitor well (MC-MW-17) and the drilling of an additional reconnaissance boring (RB-17) to the northeast.

Boring RB-11

Boring RB-11 was sampled at 10 feet bgs and then at 10-foot intervals to 140 feet bgs. Elevated FID readings were observed in RB-11 in the interval from 60 to 119 feet bgs. The elevated readings triggered the conversion of soil boring RB-11 to a monitor well (MC-MW-18) and the drilling of an additional reconnaissance boring (RB-15) to the north.

Boring RB-15

Boring RB-15 was drilled to provide information to the north of boring RB-11 where elevated FID readings were observed. Boring RB-15 was sampled at 10 feet bgs and then at approximately 10-foot intervals down to 110 feet bgs except at 50 feet due to lack of recovery. There were no elevated FID readings or positive reactions on the FLUTEe® ribbon at this boring.

Boring RB-17

Boring RB-17 was drilled to provide information to the northeast of boring RB-10 where elevated FID readings were observed. Boring RB-17 was sampled at 10 feet bgs and then at 10-foot intervals down to 110 feet bgs.

Summary of DNAPL Visual Reconnaissance Findings

There were no positive reactions on the FLUTEe® ribbon at any boring installed in this program (Appendix A).

2.2.2 UMCf Monitor Well Construction

Monitor wells MC-MW-17 and MC-MW-18 were constructed with stainless steel and screened in the elevated FID reading interval with the methods used in the Spring 2007 investigation (Appendix A).

2.3 CLOSED PONDS AREA INVESTIGATION

One boring (MCB-1) and four monitor wells (AA-MW-20 through AA-MW-24) were drilled during the Closed Ponds Area Investigation (June 10 through July 3, 2008). The location of these investigation activities is shown on Figure 1.

As a general procedure, all soil cores retrieved from the borings were screened with a PID and visually observed for indications of DNAPL. All soil cores from each boring located downgradient of the Closed Ponds Area were field tested for the presence of DNAPL with FLUTEe® ribbon. Soil samples were not collected for this investigation.

2.3.1 Closed Pond Area Investigation Boring

Boring MCB-1

Boring MCB-1 was drilled to 105 feet bgs at the upgradient edge of the property. Elevated (greater than 1,000 ppm) PID readings were observed in MCB-1 in the interval from 45 to 70 feet bgs. This boring was drilled adjacent to monitor well H-11 to provide lithologic information to supplement the original well log. No well was planned for or installed at this location. DNAPL was not visually observed in the soil core from this boring.

Summary of DNAPL Visual Findings

DNAPL was not visually observed at the boring installed in this program (Table 5).

2.3.2 Closed Pond Area Investigation Wells

The monitor wells were drilled and constructed using the methods outlined in the workplan. The monitor wells were constructed with 4-inch diameter Schedule 40 PVC screen and a 5-foot Schedule 40 PVC sump. The borings for the wells were drilled to 150 ft bgs except for AA-MW-24 which was drilled to 116 ft bgs (Table 5). Prior to the construction of the monitor wells, all associated boreholes were backfilled to the total depth of the well.

AA-MW-20

Monitor well AA-MW-20 was drilled at the northwestern edge of the Closed Pond Area. An elevated PID reading was observed at 105 feet bgs. DNAPL or positive reactions on the FLUTEe® ribbon were not visually observed in the soil core from this boring. AA-MW-20 was constructed to a total depth of 71 feet and is screened from 46 to 66 ft bgs (Table 5).

AA-MW-21

Monitor well AA-MW-21 was drilled between the Closed Pond Area and the Former Plant Site. No elevated PID readings were observed. DNAPL or positive reactions on the FLUTEe® ribbon were not visually observed in the soil core from this boring. AA-MW-21 was constructed to a total depth of 79 feet and is screened from 54 to 74 ft bgs (Table 5).

AA-MW-22

Monitor well AA-MW-22 was drilled at the northeastern edge of the Closed Pond Area. No elevated PID readings were observed. DNAPL or positive reactions on the FLUTEe® ribbon were not visually observed in the soil core from this boring. AA-MW-22 was constructed to a total depth of 80 feet and is screened from 55 to 75 ft bgs (Table 5).

AA-MW-23

Monitor well AA-MW-23 was drilled to the northeast of the monitor well AA-MW-22. No elevated PID readings were observed. DNAPL or positive reactions on the FLUTEe® ribbon were not visually observed in the soil core from this boring. AA-MW-23 was constructed to a total depth of 70 feet and is screened from 45 to 65 ft bgs (Table 5).

AA-MW-24

Monitor well AA-MW-24 was drilled just upgradient of the Closed Pond Area. No elevated PID readings were observed. DNAPL was not visually observed in the soil core from this boring. AA-MW-24 was constructed to a total depth of 80 feet and is screened from 55 to 75 ft bgs (Table 5).

2.4 GROUNDWATER SAMPLING

MC-MW-17 and MC-MW-18 were developed on April 16 -17, 2008. MC-MW-15 was developed on May 1, 2008. Initial groundwater samples were collected from these new wells on May 8, 2008 and analyzed for VOCs, SVOCs, organochlorine pesticides and organic acids per the workplan (Table 3). The wells were checked for the presence of non-aqueous phase liquids (NAPL) using a NAPL probe immediately before initial sampling.

Monitor wells AA-MW-20 through AA-MW-24 were developed on July 9 and 10, 2008. Initial groundwater samples were collected from these new wells on July 16, 2008 and analyzed for VOCs, SVOCs, selected metals, perchlorate, pesticides, and general chemicals (Table 6).

Water level measurements, measurements for the presence of NAPL, and groundwater sampling were conducted in accordance with applicable standard operating procedures (SOPs)

which includes low-purge procedures (H+A, 2007b). No problems were encountered during sampling. The samples were analyzed by Test America, Irvine, California.

NAPL probe measurements did not detect NAPL in the wells installed in this program. The analytical results from groundwater samples collected from MC-MW-15, RB-10/MC-MW-17, RB-11/MC-MW-18, AA-MW-20, and AA-MW-21 indicated elevated concentrations of benzene, chlorobenzene, chloroform, 1,2-dichlorobenzene or 1,4-dichlorobenzene (Tables 3 and 6).

2.5 INVESTIGATION-DERIVED WASTES

Wastes generated during this investigation included soil cuttings, personal protection equipment, decontamination water and well purge water. All wastes generated during this investigation were appropriately handled, containerized and temporarily stored on site. The soil and groundwater waste, which had been previously profiled for the Site, has been manifested and it has been or is currently waiting to be picked up by a licensed-transporter (either AET Environmental, Inc., or H2O Environmental) and shipped to U.S. Ecology Inc., located 11 miles south of Beatty, Nevada.

3.0 EVIDENCE OF DNAPL AND NATURE AND EXTENT OF DNAPL

The Spring 2007 and Spring 2008 Reconnaissance Boring Investigations included the collection of field screening data and collection of soil and groundwater samples to define the area of DNAPL presence downgradient of the Montrose Former Plant Site. Field screening and analytical techniques were designed to support a multiple-lines-of-evidence approach to data analysis for determining the presence of DNAPL. Field-screening methods included visual observation of the soil cores provided by the Rotosonic drilling method, measurement of VOC soil vapor concentrations using PID/FID readings, and readings of treated FLUTe® ribbon fabric applied directly onto the soil core. Sampling activities included analysis of soil samples from borings, analysis of groundwater samples from monitor wells and NAPL probe measurements in monitor wells. The results of the field screening and sampling analytical results are provided in Tables 1 through 3 and on Figures 2 and 3.

3.1 OVERVIEW OF LINES-OF-EVIDENCE EVALUATION

Determining the location and extent of DNAPL is always difficult. This difficulty is attributable to the physical and chemical characteristics of DNAPL and the influences that these characteristics have on the way DNAPL moves through the vadose zone and groundwater. These same factors result in difficulties in managing a dissolved-phase plume resulting from DNAPL sources. Thus, it is typical to use several lines of evidence to determine if DNAPL is present and to help estimate the location and extent of any DNAPL that is present.

Current and previous EPA guidance regarding defining the existence and extent of DNAPL indicate that it is best to use a “preponderance of evidence” approach. This approach includes review of several lines of direct and indirect evidence to define the most likely areas where DNAPL may exist in the subsurface.

Direct Evidence

Direct evidence can be used to estimate areas where residual DNAPL is present in the soil column or aquifer matrix or where floating light non-aqueous phase liquid (LNAPL) or pooled DNAPL may exist. An example of direct evidence is a positive finding from NAPL-reactive fabric (such as a FLUTe® ribbon) when directly applied to a subsurface core. Such direct visual

evidence not only provides information regarding the presence of DNAPL, but also provides evidence of the type of DNAPL present (i.e., residual or disseminated DNAPL in the soil or aquifer matrix). An additional line of direct evidence is free phase liquid collected in specially-designed DNAPL collection sumps placed in the bottom of a monitor well or based on encountering LNAPL above the water surface in wells screened above the water table. Encountering free phase liquid can indicate the presence of floating LNAPL or pooled DNAPL at the well location where the sample was collected. Finally, NAPL can be visually identified by field geologists in cases when intact core samples of subsurface sediments containing DNAPL are brought to the surface.

Indirect Evidence

Indirect evidence cannot be used to conclusively indicate the presence of a NAPL, but can indicate the potential presence of DNAPL or LNAPL. Indirect evidence is therefore only used as corroborative evidence and should be evaluated carefully and qualified, especially if direct evidence is not observed. When determining the presence of DNAPL or LNAPL, each type of indirect evidence has potential values and weaknesses.

A positive finding using a NAPL probe provides only evidence of fluids of different specific gravity or density (actually optical or electrical properties that result from different specific gravity/density) but does not provide any indication of the chemical makeup of the fluid. This is particularly true in cases when the NAPL probe appears to indicate a positive finding in a monitor well collection sump. Other liquids, such as brines or aqueous solutions with varying total dissolved solids (TDS) content, can also collect in the sump and brines also have different optical properties than less saline groundwater. Differentiating brines or groundwater with variable TDS concentrations from DNAPL requires chemical analysis of the potential NAPL. Therefore, NAPL probe evidence alone cannot be used to conclusively identify a DNAPL or LNAPL.

Elevated concentrations of chemicals that can potentially form DNAPLs or LNAPLs, and are identified in soil gas and/or groundwater by chemical analysis or PID/FID measurements, are typically viewed as good corroborative evidence of the presence of DNAPL or LNAPL. Presence of dissolved phase organics in groundwater samples at concentrations that approach the solubility limit, or a large percentage of the solubility limit, are given the most weight as

evidence. The type of NAPL that may be present (DNAPL or LNAPL) is then based on the specific gravity of the particular organic compound.

The presence of high concentrations of dissolved phase organics in soil gas or groundwater can only indicate that a DNAPL or LNAPL source possibly exists nearby in the soil gas or upgradient in the groundwater. However, the presence of high concentrations of organic compounds in groundwater at a particular location can be explained in other ways. Organic vapors in soil gas and dissolved phase organics in groundwater, even at highly elevated concentrations, can migrate with the soil gas and/or groundwater for significant distances. Additionally, elevated concentrations of organic compounds in soil gas and/or groundwater may be residuals associated with a historical LNAPL or DNAPL source that no longer exists today. This type of indirect evidence does not provide information on the type of NAPL (residual or pooled) that may exist, or previously existed, near the sample location. Likewise, the presence of elevated organic vapors does not provide sufficient evidence to determine if the vapors are related to organic compounds in a DNAPL or LNAPL or if the vapors are related to dissolved phase chemicals in groundwater and/or soil moisture.

Preponderance of Evidence

All of the evidence must be evaluated and qualified individually and then combined to estimate the area where LNAPL or DNAPL may exist at the Site. The direct evidence must be weighed more heavily to develop any estimate of the physical location(s) and extent of NAPL.

In summary, the data that can provide direct evidence of NAPL include visual identification of NAPL-like substances in the soil or aquifer matrix in core collected at the site, reaction to FLUTe® ribbon applied to the core, and the verification analysis of samples of free phase or dense fluids from monitor wells. The data that provide indirect evidence of NAPL include:

- Detection of fluids of different specific gravity or density (actually optical properties that result from different specific gravity/density) in monitor wells using a NAPL probe;
- Elevated concentrations of VOCs or SVOCs approaching maximum solubility detected in soil gas samples and/or groundwater, and
- Detection of elevated concentrations of organic vapors using a PID and/or a FID to screen drill cuttings and cores and detection of organic odors during drilling operations.

3.2 CURRENT INVESTIGATION FINDINGS

The following is a summary of the findings of this two-phase investigation program:

- No direct evidence of DNAPL (visual observation, NAPL probe measurement or FLUTe® ribbon reaction) was observed in any soil boring or monitor well drilled during the 2007 and 2008 investigations.
- Indirect evidence of DNAPL from field screening (consisting of FID/PID readings greater than 1,000 ppm), were observed in soil borings RB-12, RB-14, and MCB-1, and monitor wells MC-MW-15, RB-10/MC-MW-17, RB-11/MC-MW-18, and AA-MW-20 (Figures 2 and 3).
- The analytical results from soil samples collected from the new soil borings and monitor wells and groundwater samples collected from the monitor wells indicate that elevated concentrations of benzene, chlorobenzene, chloroform, 1,2-dichlorobenzene or 1,4-dichlorobenzene were observed in borings/monitor wells RB-12, RB-14, MC-MW-15, RB-10/MC-MW-17, RB-11/MC-MW-18, AA-MW-20, and AA-MW-21 (Figure 3).

3.3 INTERPRETATION AND ON-GOING INVESTIGATIONS

Using the preponderance of evidence approach advocated by the EPA and discussed in Section 3.1, all of the evidence was viewed together to estimate the area where DNAPL most likely still exists at the Site. Updated composite maps (Figure 2 for the Alluvial Aquifer and Figure 3 for the UMCf) similar to the maps submitted with the revised Conceptual Site Model report (H+A, 2008) have been prepared. These maps present all forms of evidence of DNAPL collected during: these recent Reconnaissance Boring Investigations; the data collected as part of the 2006 SGWI; and the additional DNAPL reconnaissance data collected in the area of the Montrose Closed Ponds Area in mid-2008 generated as part of the Closed Ponds Area Investigation (Geosyntec, 2008).

Evidence Display Maps

Figures 2 and 3 display both direct and indirect evidence of NAPL at the site in the Alluvial Aquifer and UMCf, respectively. The direct evidence maps include a map of visual identification of NAPL and a map of FLUTe® ribbon reaction. The indirect evidence maps include a map of FID readings and a map of percent of maximum solubility by chemical. The groundwater

concentration data from the groundwater plume maps were used to calculate percent of maximum solubility for each of the organic compounds that can form LNAPL or DNAPL and that have been detected at concentrations exceeding 5% of their maximum solubility in water. Those chemicals that were detected in groundwater samples at concentrations equal to or greater than 5% of their maximum solubility (Table 4) include: benzene, chlorobenzene, 1,2-dichlorobenzene, 1,4-dichlorobenzene, and chloroform. For each monitor well, the highest percent of maximum water solubility of any of these compounds was used to prepare the "Percent Water Solubility (Maximum)" map.

Preponderance of Evidence Summary Maps

The larger maps on Figure 2 and 3 outline the area where the preponderance of evidence indicates that DNAPL is likely present in either residual form in the aquifer matrix or as potentially pooled NAPL. DNAPL observed in the vicinity of the former Montrose facilities was encountered as a residual mass (i.e., not pooled) between 30 and 120 feet bgs over this area. The shallowest occurrences of DNAPL were observed in the 2006 reconnaissance boring RB-03 located in the northwest portion of the Montrose Former Plant Site. Additional investigations are ongoing to further evaluate the potential occurrence of DNAPL in other parts of the study area.

Achievement of Goals

Review of the Evidence of Potential DNAPL Figures 2 and 3 indicate that the no new locations drilled during the Spring 2007 and 2008 investigations yielded direct evidence of DNAPL. Monitor wells MC-MW-10 and MC-MW-12, drilled during the initial phase of field investigation under the original workplan, are the furthest downgradient locations where DNAPL materials have been observed from the former Montrose-operated facilities of the Closed Ponds Area and the Former Plant Site. The eastern and northern extent of DNAPL occurrence has been sufficiently defined per the goals of this program. No additional work in this area is needed but additional DNAPL work will continue under the proposed work discussed below.

Future Monitoring and Data Acquisition

The presence of NAPL and/or its dissolved plume will continue to be monitored during the 2008 (October sampling event) and the 2009 site-wide monitoring program being conducted by the Companies at the combined former Montrose and Stauffer sites. This program includes DNAPL gauging of wells to assist in evaluation of DNAPL mobility for future consideration as part of the joint program Groundwater Remedial Alternative Study.

DNAPL screening has been included in ongoing investigations in the Closed Ponds Area (see Figures 2 and 3) and is planned for the upcoming investigation of SRCs in the UMCf in the vicinity of the Companies' Groundwater Treatment System.

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