

JULY 17, 2008

GROUNDWATER MONITORING DATA SUBMITTAL
SITE-WIDE GROUNDWATER MONITORING PROGRAM
FIRST AND SECOND QUARTERS 2008

NEVADA DIVISION OF ENVIRONMENTAL PROTECTION
FACILITIES NO. H-000536 AND H-000540
HENDERSON, NEVADA



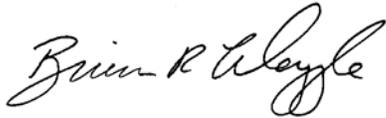
HARGIS + ASSOCIATES, INC.
HYDROGEOLOGY • ENGINEERING

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 of data and information collected by other firms pertaining to the Site-Wide Groundwater Monitoring Program for incorporation into this data submittal.

HARGIS + ASSOCIATES, INC.

A handwritten signature in black ink that reads "Brian R. Waggle". The signature is written in a cursive, flowing style.

Brian R. Waggle, RG, CEM
Senior Hydrogeologist
Nevada Certified Environmental Manager
No. EM - 1903 (Expires 05/27/10)

Date Signed: July 17, 2008

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 collection of groundwater samples and analytical laboratory coordination:

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

de maximis, inc.

A handwritten signature in black ink, appearing to read "Edward Modiano". The signature is written in a cursive, slightly slanted style.

Edward Modiano, PG, CEM
Nevada Certified Environmental Manager
EM No. 2107 (Expires 10/18/09)

Date Signed: July 17, 2008



GROUNDWATER MONITORING DATA SUBMITTAL
SITE-WIDE GROUNDWATER MONITORING PROGRAM
FIRST AND SECOND QUARTERS 2008

NEVADA DIVISION OF ENVIRONMENTAL PROTECTION
FACILITIES NO. H-000536 AND H-000540
HENDERSON, NEVADA

TABLE OF CONTENTS

Section	Page
ACRONYMS AND ABBREVIATIONS.....	v
1.0 INTRODUCTION.....	1
2.0 SCOPE	2
3.0 WATER LEVEL MEASUREMENTS AND NON-AQUEOUS PHASE LIQUID GAUGING	3
4.0 GROUNDWATER SAMPLING	4
5.0 VARIATIONS.....	6
6.0 REFERENCES.....	7



TABLE OF CONTENTS (continued)

TABLES

Table

1	SUMMARY OF PLANNED GROUNDWATER MONITORING PROGRAM FOR 2008
2	WATER LEVEL DATA
3	WATER QUALITY DATA

ILLUSTRATIONS

Figure

1	QUARTERLY GROUNDWATER MONITORING PROGRAM STUDY AREA
2	WATER LEVELS, ALLUVIAL AQUIFER, FIRST QUARTER 2008
3	WATER LEVELS, ALLUVIAL AQUIFER, SECOND QUARTER 2008
4	WATER LEVELS, FINE-GRAINED UPPER MUDDY CREEK FORMATION, FIRST QUARTER 2008
5	WATER LEVELS, FINE-GRAINED UPPER MUDDY CREEK FORMATION, SECOND QUARTER 2008
6	WATER LEVELS, COARSE-GRAINED UPPER MUDDY CREEK FORMATION, FIRST QUARTER 2008
7	WATER LEVELS, COARSE-GRAINED UPPER MUDDY CREEK FORMATION, SECOND QUARTER 2008
8	WATER LEVEL HYDROGRAPHS – ALLUVIAL AQUIFER MONITOR WELLS - TRANSECT NO. 1
9	WATER LEVEL HYDROGRAPHS – ALLUVIAL AQUIFER MONITOR WELLS - TRANSECT NO. 2
10	WATER LEVEL HYDROGRAPHS – UPPER MUDDY CREEK FORMATION MONITOR WELLS - TRANSECT NO. 2



TABLE OF CONTENTS (continued)

11	WATER LEVEL HYDROGRAPHS – ALLUVIAL AQUIFER MONITOR WELLS - TRANSECT NO. 3
12	WATER LEVEL HYDROGRAPHS – UPPER MUDDY CREEK FORMATION MONITOR WELLS - TRANSECT NO. 3
13	WATER LEVEL HYDROGRAPHS – ALLUVIAL AQUIFER MONITOR WELLS - TRANSECT NO. 4
14	WATER LEVEL HYDROGRAPHS – UPPER MUDDY CREEK FORMATION MONITOR WELLS - TRANSECT NO. 4
15	WATER LEVEL HYDROGRAPHS – ALLUVIAL AQUIFER MONITOR WELLS - TRANSECT NO. 5
16	WATER LEVEL HYDROGRAPHS – ALLUVIAL AQUIFER MONITOR WELLS - TRANSECT NO. 6
17	CHLOROBENZENE, ALLUVIAL AQUIFER, SECOND QUARTER 2008
18	CHLOROBENZENE, FINE-GRAINED UPPER MUDDY CREEK FORMATION, SECOND QUARTER 2008
19	CHLOROBENZENE, COARSE-GRAINED UPPER MUDDY CREEK FORMATION, SECOND QUARTER 2008
20	BENZENE, ALLUVIAL AQUIFER, SECOND QUARTER 2008
21	BENZENE, FINE-GRAINED UPPER MUDDY CREEK FORMATION, SECOND QUARTER 2008
22	BENZENE, COARSE-GRAINED UPPER MUDDY CREEK FORMATION, SECOND QUARTER 2008
23	CHLOROFORM, ALLUVIAL AQUIFER, SECOND QUARTER 2008
24	CHLOROFORM, FINE-GRAINED UPPER MUDDY CREEK FORMATION, SECOND QUARTER 2008
25	CHLOROFORM, COARSE-GRAINED UPPER MUDDY CREEK FORMATION, SECOND QUARTER 2008
26	1,2-DICHLOROBENZENE, ALLUVIAL AQUIFER, SECOND QUARTER 2008
27	1,2-DICHLOROBENZENE, FINE-GRAINED UPPER MUDDY CREEK FORMATION, SECOND QUARTER 2008



TABLE OF CONTENTS (continued)

28	1,2-DICHLOROBENZENE, COARSE-GRAINED UPPER MUDDY CREEK FORMATION, SECOND QUARTER 2008
29	1,4-DICHLOROBENZENE, ALLUVIAL AQUIFER, SECOND QUARTER 2008
30	1,4-DICHLOROBENZENE, FINE-GRAINED UPPER MUDDY CREEK FORMATION, SECOND QUARTER 2008
31	1,4-DICHLOROBENZENE, COARSE-GRAINED UPPER MUDDY CREEK FORMATION, SECOND QUARTER 2008
32	BETA-BHC, ALLUVIAL AQUIFER, SECOND QUARTER 2008
33	BETA-BHC, FINE-GRAINED UPPER MUDDY CREEK FORMATION, SECOND QUARTER 2008
34	BETA-BHC, COARSE-GRAINED UPPER MUDDY CREEK FORMATION, SECOND QUARTER 2008
35	ARSENIC, ALLUVIAL AQUIFER, SECOND QUARTER 2008
36	ARSENIC, FINE-GRAINED UPPER MUDDY CREEK FORMATION, SECOND QUARTER 2008
37	ARSENIC, COARSE-GRAINED UPPER MUDDY CREEK FORMATION, SECOND QUARTER 2008
38	TOTAL DISSOLVED SOLIDS, ALLUVIAL AQUIFER, SECOND QUARTER 2008
39	TOTAL DISSOLVED SOLIDS, FINE-GRAINED UPPER MUDDY CREEK FORMATION, SECOND QUARTER 2008
40	TOTAL DISSOLVED SOLIDS, COARSE-GRAINED UPPER MUDDY CREEK FORMATION, SECOND QUARTER 2008

APPENDICES

Appendix

- A FIELD FORMS
- B ANALYTICAL LABORATORY REPORTS

TABLE OF CONTENTS (continued)ACRONYMS AND ABBREVIATIONS

beta-BHC	beta-Benzene hexachloride
de maximis	de maximis, inc.
EPA	U.S. Environmental Protection Agency
GWTS	Groundwater treatment system
H+A	Hargis + Associates, Inc.
MCL	Maximum Contaminant Level
Montrose	Montrose Chemical Corporation of California
NAPL	Non-Aqueous Phase Liquid
NDEP	Nevada Division of Environmental Protection
OCPs	Organochlorine pesticides
RCRA	Resource Conservation and Recovery Act
SOPs	Standard operating procedures
Stauffer	Stauffer Chemical Company
SMC	Stauffer Management Company LLC
Syngenta	Syngenta Crop Protection, Inc.
TDS	Total dissolved solids
the Companies	Montrose, SMC/Syngenta, and Olin Chlor-Alkali Corporation
UMCc	Coarse-grained Upper Muddy Creek Formation
UMCf	Fine-grained Upper Muddy Creek Formation
VOCs	Volatile organic compounds

GROUNDWATER MONITORING DATA SUBMITTAL
SITE-WIDE GROUNDWATER MONITORING PROGRAM
FIRST AND SECOND QUARTERS 2008

NEVADA DIVISION OF ENVIRONMENTAL PROTECTION
FACILITIES NO. H-000536 AND H-000540
HENDERSON, NEVADA

1.0 INTRODUCTION

This report is the first semi-annual 2008 groundwater monitoring data submittal for the Site-Wide Groundwater Monitoring Program submitted on behalf of Montrose Chemical Corporation of California (Montrose), Stauffer Management Company LLC/Syngenta Crop Protection, Inc. (SMC/Syngenta) and Olin Chlor-Alkali Corporation (the Companies). This submittal presents data obtained during the first and second quarter groundwater monitoring events.

The first and second quarter 2008 monitoring events were conducted in accordance with the requirements of the 2008 Site-Wide Groundwater Monitoring Program (de maximis, 2008) as approved by NDEP (NDEP, 2008). Water level measurements, gauging for the presence of non-aqueous phase liquids (NAPL), and groundwater sampling were conducted in accordance with applicable standard operating procedures (SOPs) (Hargis + Associates, Inc. [H+A], 2007).

The first quarter monitoring event was conducted during the period January 23 through February 8, 2008. The second quarter monitoring event was conducted during the period April 14 through April 28, 2008. These monitoring events included the collection of water level elevations and gauging for the presence of NAPL in the first and second quarters; and the collection of groundwater samples in the second quarter from monitor wells located within an area encompassing the former Stauffer Chemical Company (Stauffer) and Montrose facilities and an area downgradient of the facilities to Las Vegas Wash, Henderson, Nevada (the study area) (Figure 1).

2.0 SCOPE

The scope of work for the first quarter 2008 monitoring event included the measurement of water levels and gauging for the presence of NAPLs at 56 monitor wells. Pursuant to a meeting with NDEP in February 2008, the number of monitor wells gauged for NAPLs was reduced to 22 for the second quarter 2008. The scope of the second quarter monitoring event also included groundwater sampling at a subset of 47 monitor wells. The monitor wells comprising the monitoring program are completed in each of three hydrogeologic units present in the study area (Table 1). Monitor well locations are presented in Figure 1.

This 2008 monitoring program was implemented concurrently with other routine groundwater monitoring activities conducted by the Companies. These additional activities include water level monitoring and groundwater sampling at an additional 29 monitor wells and extraction wells as follows:

- Quarterly monitoring of two upgradient and three downgradient Consent Order monitor wells related to operation of the groundwater treatment system (GWTS);
- Quarterly monitoring of seven transect groundwater monitor wells related to operation of the GWTS immediately downgradient of the GWTS;
- Annual monitoring of the 13 groundwater extraction wells related to the GWTS, and
- Semi-annual monitoring of four monitor wells at the Montrose Closed Ponds (Figure 1).

While the results of these monitoring activities are routinely summarized and submitted to NDEP under separate cover, the alluvial aquifer water level data from the wells were used in the preparation of the contour maps provided in this report as noted below.

3.0 WATER LEVEL MEASUREMENTS AND NON-AQUEOUS PHASE LIQUID GAUGING

Water level measurements and NAPL gauging were conducted in January and April 2008 in accordance with the SOPs prepared for the study area (H+A, 2007). Water level measurements and NAPL gauging were conducted at 42 of the 56 monitor wells during January monitoring event. Some monitor wells could not be measured in January due to access issues with property owners or were unable to be located. Water levels were measured at 51 of the 56 monitor wells during the April monitoring event, and NAPL gauging was conducted at all 22 monitor wells. Similar to the January event, some monitor wells could not be measured in April due to access or were unable to be located. A summary of the water level measurement and NAPL gauging results obtained during the first and second quarter monitoring events is presented in Table 2. Field forms used during water level and NAPL gauging are included in Appendix A.

The water level data were used to prepare water level elevation contour maps for the alluvial aquifer (Figures 2 and 3). These contour maps utilize water level data measured in Consent Order and GWTS transect monitor wells to more accurately depict water level conditions in the site area.

Water level elevation data were also plotted for the fine-grained Upper Muddy Creek Formation (UMCf) and the coarse-grained Upper Muddy Creek Formation (UMCc) (Figures 4 through 7). However, the data have not been contoured because: 1) productive zones within the UMCf are believed to be discontinuous and of limited areal extent; and 2) all but one of the UMCc monitor wells are located in a linear pattern, and differences in screened intervals does not readily allow the data to be contoured. However, review of the data from the Muddy Creek Formation water level maps do indicate that groundwater flow in the area is from predominately from the south to the north. This is consistent with data previously collected in the site area.

Hydrographs of the groundwater elevations for monitor wells located along each of the six monitoring transects are presented in Figures 8 through 16.

4.0 GROUNDWATER SAMPLING

Field Sampling

Groundwater samples were collected in accordance with SOPs with the exception of some monitor wells which required minor modification to the sampling technique (Section 5.0). Field sampling forms used during sampling are presented in Appendix A. Groundwater samples were successfully obtained from all 47 monitor wells designated for sampling in the second quarter.

Analytes

All groundwater samples were analyzed for the following chemical groups:

- Volatile organic compounds (VOCs) using U.S. Environmental Protection Agency (EPA) Method 8260B;
- Semi-VOCs using EPA Method 8270C;
- Organochlorine pesticides (OCPs) using EPA Method 8081A;
- Resource Conservation and Recovery Act (RCRA) metals using EPA Methods 6010 and 7470A, and
- Total dissolved solids (TDS) using EPA Method 160.1.

In addition, pursuant to discussions with NDEP, selected groundwater samples were analyzed for the organic acids dimethyl phosphorodithioic acid, benzenesulfonic acid, phthalic acid, diethyl phosphorodithioic acid, and 4-chlorobenzenesulfonic acid using high performance liquid chromatography.

All analyses were conducted by Test America Laboratories, Inc., or other State of Nevada certified subcontractor laboratories and the analytical reports are presented in Appendix B.

Water Quality Data

Water quality data obtained during the second quarter 2008 monitoring event are presented in Table 3. The water quality analytical data were used to prepare maps of the concentrations of prevalent VOCs and other selected analytes for each of the hydrogeologic units in the study area. The prevalent VOCs in the study area include chlorobenzene, benzene, chloroform, 1,2-dichlorobenzene, and 1,4-dichlorobenzene. The other selected analytes include arsenic, TDS, and beta-benzene hexachloride (beta-BHC) (Figures 17 through 40).

Quality Assurance/Quality Control

Quality assurance/quality control samples collected for the second quarter 2008 monitoring event included the following:

- A trip blank for VOC analysis was submitted with each shipment to the laboratory and analyzed for VOCs. Review of the analytical data indicates that no VOCs were detected in the trip blanks during the monitoring event (Appendix B).
- When non-dedicated groundwater sampling equipment is used, one equipment rinsate blank was collected during the first day and last day that groundwater sampling was performed. The equipment rinsate blanks were analyzed for VOCs, semi-VOCs, OCPs, RCRA metals and TDS. Review of the analytical data indicates that no compounds were detected in the equipment rinsate blanks (Appendix B).
- Field duplicate samples were collected at a minimum frequency of one per 20 samples. Field duplicate samples were analyzed by the same analytical methods as was the original sample (Appendix B). The results of the field duplicate sample analyses will be evaluated as part of data validation.

Management of Investigation Derived Waste

Purge water generated during groundwater sampling was contained and characterized. After characterization, all purge water was disposed of off-site at a licensed facility in accordance with federal, state, and local requirements.

5.0 VARIATIONS

Variations occurred during the second quarter 2008 monitoring event. These variations included:

- Drawdown during the sampling of some monitor wells exceeded the goal of minimal drawdown of less than 0.1 meters or approximately four inches (Appendix A). The wells are generally located in areas of the former Stauffer and Montrose facilities where the hydrogeologic units are not productive. The exceedance of the drawdown goal is a reflection of this condition.
- Field parameters for some monitor wells were slightly outside the definition of stabilization prior to sampling. This issue will be examined and evaluated prior to the next groundwater sampling event currently planned for October 2008.
- A larger list of semi-VOCs was analyzed on all groundwater samples during this sampling event (Table 3; Appendix B). This inadvertently occurred because of a miscommunication with the analytical laboratory. However, future Site-Wide Groundwater Monitoring Program semi-annual event samples will be analyzed for only the semi-VOC analytes listed in the approved workplan.
- Some RCRA 8 metals were analyzed using the 6010B method versus the 6020 method previously used (laboratory reports IRD1444, IRD1559, IRD1777, IRD2040, and IRD2601). All samples collected in future semi-annual events will be analyzed by the 6020 method for the RCRA 8 metals. It should be noted that all 6010B reporting limits are equal to or less than the primary Maximum Contaminant Level (MCL).
- No field blanks were collected during the monitoring event.

6.0 REFERENCES

- de maximis, inc. (de maximis), 2008. 2008 Site Wide Groundwater Monitoring Chart Clarification, Henderson GWTS Site, NDEP Facility #H-000536. May 15, 2008.
- Hargis + Associates, Inc. (H+A), 2007. Field Sampling and Standard Operating Procedures, Site-Wide Soil and Groundwater Investigations, Former Montrose and Stauffer Sites, Henderson, Nevada. Revision 2.0. May 11, 2007.
- Nevada Division of Environmental Protection (NDEP), 2008. Electronic message from Ms. Marysia Skorska, NDEP, to Mr. Edward Modiano, de maximis, inc. re: Site-Wide Monitoring Chart Clarification letter. May 22, 2008.