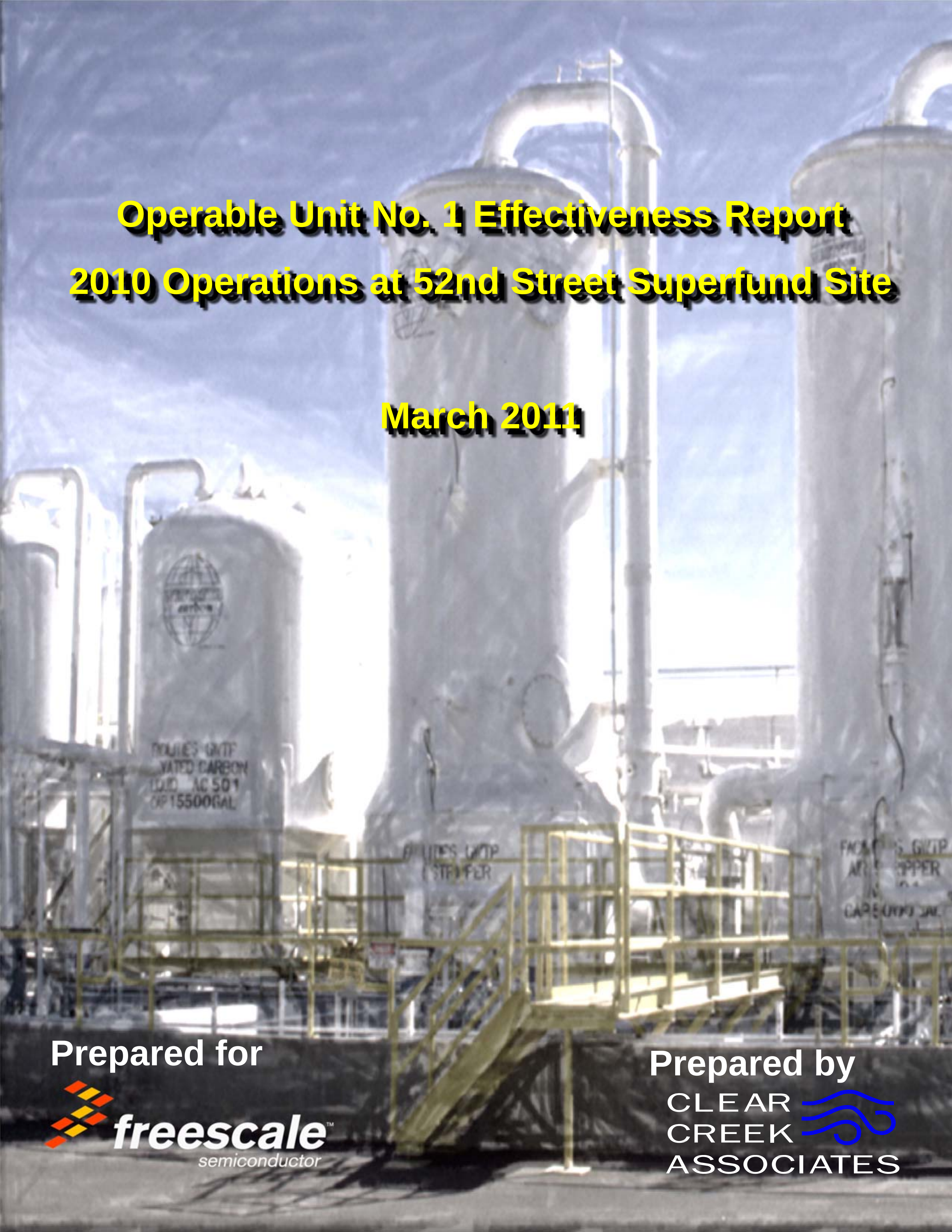

Operable Unit No. 1 Effectiveness Report
2010 Operations at 52nd Street Superfund Site

March 2011

Prepared for

freescale
semiconductor

Prepared by

CLEAR CREEK ASSOCIATES

Freescale Semiconductor, Inc. 2100 E. Elliot Road, Tempe, AZ 85284

Launched by Motorola
freescale™
semiconductor

March 31, 2011

Wendy Flood
Remedial Projects Manager
Arizona Department of Environmental Quality
1110 W. Washington Street
Phoenix, Arizona 85007

Re: 52nd Street Superfund Site
Operable Unit No. 1 Effectiveness Report – 2010 Operations

Dear Wendy:

Enclosed are copies of the Operable Unit No. 1 Effectiveness Report for 2010 Operations along with CDs of the report as per the attached Distribution List. This report is prepared in accordance with the requirements of Consent Order CV 89-16807.

If you have any questions, please call.

Sincerely,

Jenn McCall
Strategic Programs Manager
Freescale Semiconductor, Inc.

cc: See attached distribution list

CLEAR CREEK ASSOCIATES

Practical Solutions in Groundwater Science

6155 E. Indian School Rd., Suite 200
Scottsdale, Arizona 85251
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March 30, 2011

Ms. Jenn McCall
Strategic Programs Manager
Freescale Semiconductor, Inc.
MD EL-614
2100 E. Elliot Road
Tempe, Arizona 85284.

Re: Operable Unit No. 1 Effectiveness Report
2010 Operations
Motorola 52nd Street Superfund Site

Please find enclosed the Motorola 52nd Street Superfund Site Operable Unit No. 1 (OU1) Effectiveness Report describing the performance of OU1 during 2010. This report was prepared for submittal to ADEQ in accordance with the annual reporting requirements in Consent Order CV-89-16807. Copies of the OU1 report and CDs of the report are being transmitted directly to ADEQ. Additional copies of the report and CDs have been transmitted directly as per the distribution list.

Please call if you have any questions.

Sincerely,

CLEAR CREEK ASSOCIATES

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Project Manager

Thomas R. Suriano, RG
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Senior Hydrogeologist

Barbara H. Murphy
Barbara H. Murphy, RG, CPG
Senior Geologist

CC: See attached Distribution List

52nd STREET SUPERFUND SITE
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OPERABLE UNIT NO. 1 EFFECTIVENESS REPORT

2010 OPERATIONS

52ND STREET SUPERFUND SITE

PREPARED FOR FREESCALE SEMICONDUCTOR, INC.

MARCH 2011

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ARIZONA, U.S.A.
Expires 03 / 31 / 2014

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OPERABLE UNIT NO. 1 EFFECTIVENESS REPORT
2010 OPERATIONS
52ND STREET SUPERFUND SITE

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Expires 03 / 31 / 2014

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LIST OF ACRONYMS AND ABBREVIATIONS

ADEQ	Arizona Department of Environmental Quality
ADOT	Arizona Department of Transportation
ADWR	Arizona Department of Water Resources
amsl	above mean sea level
bgs	below ground surface
cm/sec	centimeters per second
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cis1,2-DCE	cis-1,2-Dichloroethylene
1,1–DCA	1,1-Dichloroethane
1,2–DCA	1,2-Dichloroethane
DCE	1,1-Dichloroethene
DNAPL	dense non-aqueous phase liquids
EPA	US Environmental Protection Agency
FCDMC	Flood Control District of Maricopa County
FLUTe	Flexible Liner Underground Technologies system well
FR RI	Final Remedy Remedial Investigation
FS	Feasibility Study
gpm	gallons per minute
GRAA	Groundwater Remedial Alternatives Analysis
IGWTP	Integrated Groundwater Treatment Plant
LCS	laboratory control samples
LCSD	laboratory control sample duplicate
LOD	Letter of Determination
MCL	maximum contaminant level
MS	matrix spike
MSD	matrix spike duplicate
msl	mean sea level
OCC	Old Crosscut Canal
OSWER	Office of Solid Waste and Emergency Response
OU1	Operable Unit No. 1
ppb	parts per billion
ppbv	parts per billion by volume
ppm	parts per million
RI	Remedial Investigation
ROD	Record of Decision
PCE	Tetrachloroethene
PTP	Pilot Treatment Plant
PQGWWP	Poor Quality Groundwater Withdrawal Permit
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
RPD	relative percent difference
SRP	Salt River Project
SWPL	Southwest Parking Lot (at the 52nd Street Facility)
TCA	1,1,1-Trichloroethane
TCE	Trichloroethylene
t-1,2-DCE	trans-1,2-Dichloroethene
ug/l or ug/L	micrograms per liter
VOCs	Volatile Organic Compounds
VC	Vinyl Chloride
WQARF	Water Quality Assurance Revolving Fund

OPERABLE UNIT NO. 1 EFFECTIVENESS REPORT
2010 OPERATIONS
52ND STREET SUPERFUND SITE

EXECUTIVE SUMMARY

In accordance with the September 27, 1988 Letter of Determination (LOD) for the Motorola 52nd Street facility, located in Phoenix, Arizona, the objectives of the Operable Unit No.1 (OU1) groundwater remedy are to: 1) contain contaminant migration (east of) the Old Crosscut Canal (OCC) ; and 2) use all of the treated water at the Motorola 52nd Street facility. The September 30, 1988 Record of Decision indicates that "The selected remedy provides partial clean-up of on-site and off-site soil and alluvium groundwater." The 1989 Consent Order also states that "The design and operation of groundwater extraction system shall also have a beneficial impact on the quality of groundwater within the bedrock."

During 2010, the on-site and off-site OU1 extraction wells and the SWPL (Southwest Parking Lot) extraction wells produced a total of 123,475,672 gallons (378.88 acre-feet) of groundwater that were treated by the OU1 system. The treated water was used as process water at the 52nd Street facility by ON Semiconductor, reducing the volume of water that ON Semiconductor obtained from the City of Phoenix. The OU1 system was operational for 93.5 percent of the year. Shut downs for routine and periodic maintenance accounted for the remaining 6.5 percent of the year. An estimated 793 pounds (65gallons) of volatile organic compounds (VOCs) were recovered and disposed of as hazardous waste during 2010. Included in this amount are 8.7 pounds (0.53 gallons) of VOCs that were extracted as DNAPL (dense non-aqueous phase liquids) and as groundwater with high VOC concentrations from monitor well MP03-D (and MP03-C in 2009 and 2010) in the bedrock onsite. From start-up through 2010, a total of approximately 3.19 billion gallons (9,786 acre feet) of water have been extracted and treated and an estimated 21,178 pounds (1,739 gallons) of VOCs have been recovered. This includes the mass of VOCs removed by the Pilot Treatment Plant (PTP) in the Courtyard area prior to 1992 and DNAPL recovered at well MP03-D (includes some minor amounts from MP03-C in 2009 and 2010). The DNAPL and high concentration groundwater is pumped from MP03-D into a 55-gallon drum. The 55-gallon drum is transported to the Integrated Groundwater Treatment Plant (IGWTP) and stored within secondary containment. The contents of the drum are pumped into the solvent recovery system at the IGWTP. Once the solvent has settled, it is decanted into a 55-gallon waste accumulation drum stored within the secondary containment. When the decant process is complete, a valve is manually opened and the water is blended into the influent stream of the treatment system between the feed tanks (T-101 and T-102) and the inlet of the first transfer pumps. When the waste accumulation drum is full, it is transported offsite for disposal as a hazardous waste.

Evaluation of the capture zone was conducted using multiple lines of evidence consistent with US EPA guidance (A Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems, 2008). Water level contouring indicates that the extraction wells along the OCC create a capture zone wider than the width of the observed VOC plume west of the OCC at approximately 46th Street. The depth of the capture zone is estimated to extend to depths greater than the depth of the observed contamination. The estimated extent of capture based on the water level elevation contour maps is supported by the extent of apparent drawdown observed in both the alluvial and bedrock aquifers. The area of significant drawdown exceeds the area of estimated capture. Estimated flow rate calculations, capture zone width calculations and numeric groundwater modeling also support the conclusion that the full extent of the plume at the OCC has been fully contained. Additionally, the overall decreasing Trichloroethene (TCE) concentration trends observed in wells downgradient of the estimated capture zone have supported the conclusion that the OU1 system has established an effective capture zone in the vicinity of the OCC.

While the overall concentration trends observed in down gradient sentinel monitor wells have been downward, recent variations in TCE concentrations in select wells, plus the likely influx of an additional unidentified source of Tetrachloroethene (PCE) have complicated the capture evaluation. The available data indicate that there are data gaps in the north and northwestern portion of the OU1 area that should be analyzed further to support the overall evaluation of capture. A Work Plan will be developed to describe the investigation recommended to address the data gaps.

In addition to the capture zone created by the OCC extraction wells, water level contouring indicates that operation of on-site extraction wells in the Courtyard and SWPL areas of the 52nd Street facility creates on-site capture zones within the larger off-site capture zone. These on-site capture zones provide the added benefit of preventing continued migration from the higher concentrations source areas. The vertical extent of the on-site capture zone has been increased as a result of the installation of a new bedrock extraction well as part of the Bedrock Pilot Study. Operation of the bedrock extraction well has also resulted in a significant increase in the mass removal rate and its operations should be continued.

Overall, the OU1 system is generally effective at establishing and maintaining hydraulic capture across the width and depth of the contaminant plume. The OU1 system has also had a beneficial impact on groundwater quality in the alluvium and bedrock downgradient of the OCC and has removed a significant amount of mass from the environment over time. Overall, capture is being maintained and mass is being removed, but removing VOCs from the bedrock is very slow due to the low permeability. However, due to the extended time frames required to remove contaminants from the bedrock aquifer, significant reductions in TCE concentrations are not observed in the Courtyard Area, at the OCC area, and upgradient of the OCC despite the mass that has been removed from over 24 years of remedial operations on-site and over 18 years of remediation off-site. The remediation for the site is expected to continue with the current pumping and treatment operations of the contaminated groundwater for the near future. Ongoing system evaluations include additional plume modeling, evaluation of pumping rates for adjustment for plume capture, and assessing whether additional wells may need to be added to monitor and extract the groundwater for treatment.

OPERABLE UNIT NO. 1 EFFECTIVENESS REPORT
2010 OPERATIONS
52ND STREET SUPERFUND SITE

1.0 INTRODUCTION

This annual effectiveness report is being submitted pursuant to the Operable Unit Number 1 Consent Order (CV 89-16807) with the Arizona Department of Environmental Quality (ADEQ). The report covers operations during calendar year 2010. September 2010[1] water quality and December 2010 water level conditions are compared with the 1992 Baseline period. The term "Baseline period" in this report refers to those conditions observed between March and May 1992, prior to start up of the Integrated Groundwater Treatment Plant (IGWTP) and operation of the Old Crosscut Canal (OCC) extraction wells. The first effectiveness report for OU1 operations in 1992 was submitted in May 1993 (Dames & Moore, 1993b). For a more complete discussion of Baseline conditions, refer to the Dames & Moore Baseline Report (Dames & Moore, 1992b), and the 1993 OU1 Effectiveness Report (Dames & Moore, 1993b). September 2010 water quality conditions are also compared to those of previous years in this report.

The data used in this report were provided in various reports by Clear Creek Associates (2010 c, f, g; 2011a, b), Dames & Moore (1992b; 1993b; 1993c), and Gutierrez-Palmenberg, Inc. (2010, 2011). Additional reports that provide data and other information about the OU1 system are listed under Section 7.0, References, of this report. Groundwater monitoring and sampling activities conducted during September 2010 for the third quarter reporting period were completed in accordance with the revised and updated ***Groundwater Monitoring Plan for the 52nd Street Superfund Site, Operable Unit No.1 for Freescale Semiconductor, Inc., dated April 2009*** (Clear Creek Associates 2009d) and amended December 2009; and a Poor Quality Groundwater Withdrawal Permit (PQGWWP) No. 59-530577.0001 (an amended-conveyed permit from Arizona Department of Water Resources [ADWR] effective on August 3, 2005 for the 52nd Street Superfund Site). The results of the groundwater monitoring and sampling activities were reported in the Semi-Annual Progress Report 2010-1 /PQGWWP Report January – June 2010 (submitted to ADEQ in July 2010) and the Semi-Annual Progress Report 2010-2/PQGWWP Report July – December 2010 (submitted to ADEQ in January 2011).

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[1] Routine monitoring at OU1 occurs semi-annually or quarterly (Q) in periods which typically include Q1 (Jan/Feb/Mar); Q2 (Apr/May/Jun); Q3 (Jul/Aug/Sept); and Q4 (Oct/Nov/Dec).

1.1 PURPOSE AND OBJECTIVES

The primary purpose of this report is to provide an assessment of the overall effectiveness of Operable Unit No. 1 (OU1) with respect to hydraulic containment of contaminated groundwater. The objectives of this report are to:

- define the zone(s) of capture created by the onsite and offsite extraction wells, and evaluate whether the capture zone is adequate to contain contaminant migration;

- assess the hydraulic effects of the continued operation of the OU1 extraction wells; and evaluate the effects of OU1 on VOC (volatile organic compounds) concentrations in groundwater.

1.2 SITE DESCRIPTION

The OU1 area is generally bounded by 52nd Street on the east, Palm Lane on the north, Roosevelt Street on the south and 44th Street on the west in the eastern part of Phoenix, Arizona. The locations of OU1 and the OU1 wells are shown on Figure 1. The wells shown on Figure 1 represent the wells that are included in the OU1 Groundwater Monitoring Plans (Clear Creek Associates 2009d, ADEQ 2002, Dames & Moore 1998a). The locations of wells that have been abandoned or are no longer sampled are also shown for historical reference. For the sake of clarity, only selected wells are presented on some subsequent figures due to the density of wells. In areas with a large number of wells, such as the SWPL (southwest parking lot) area, representative wells were selected for some of the figures because map scale limited the amount of data that could be clearly shown. Although most of the wells are shown in these dense areas, in some cases, a few wells were not included. However, the data for all of the currently-monitored OU1 wells shown on Figure 1 are presented in the tables included in this report and all data were considered in the overall system evaluation.

The OU1 area is generally underlain by a thin alluvial cover over a shallow bedrock surface. Figures 2 and 3 show cross-sectional views of the OU1 area including the general alluvium/bedrock contact, key monitor and extraction wells, and the groundwater level elevation. The locations of the cross sections are shown on Figure 1. The locations of these cross sections have been modified from the baseline report and earlier OU1 Effectiveness Reports to incorporate newly-installed wells and to more clearly illustrate the hydraulic effects and capture zone of the OU1 system. In addition, some wells in close proximity to a cross section have been projected to the cross sectional view. The direction and approximate location of the projection is also shown on plan view figures.

Currently, the groundwater treated at the OU1 IGWTP is used at the ON Semiconductor facility. Freescale was notified in February 2009 that ON Semiconductor may be discontinuing operations at the 52nd Street facility, originally considered for the third quarter of 2010 (now expected in later 2011), and would no longer serve as a beneficial end use for the treated groundwater. Freescale notified ADEQ of this pending change and later submitted a letter regarding ***Evaluation of Remediated Groundwater End Use Options, 52nd Street Superfund Site, - Operable Unit 1*** to ADEQ on June 10, 2009. ADEQ and the EPA collectively reviewed the June 10, 2009 end use options evaluation and submitted comments to Freescale/Clear Creek on July 14, 2009. Clear Creek, at the request of Freescale, responded to the comments from ADEQ and EPA in a letter dated December 11, 2009. Clear Creek/Freescale provided an update in the report ***Evaluations of Remediated Groundwater End Use Options – Revised, Operable Unit No. 1, 52nd Street Superfund Site, Phoenix, Arizona*** submitted to ADEQ on April 30, 2010. On behalf of Freescale, Clear Creek submitted a ***Final Evaluation Report - End Use Alternatives for Remediated Groundwater – Operable Unit No. 1, 52nd Street Superfund Site*** to ADEQ on December 10, 2010. Based on this analysis, as its preferred alternative, Freescale has proposed discharging treated water to the Grand Canal via the Old Crosscut Canal using underground pipelines from the IGWTP along 50th and Culver Streets (in City of Phoenix Right-of-Way), across the Brunson-Lee Elementary School property, and then to the Old Crosscut Canal. The previously approved discharge to the City of Phoenix sanitary sewer (approved by ADEQ/EPA in a letter dated July 14, 2009) would be used as an alternative for discharge of the treated water during maintenance and canal dry-up periods.

As part of the Bedrock Pilot Study, one new extraction well (DM314) and two new monitor wells (DM614 and DM615) were installed near the 52nd Street facility in late December 2008 – early January 2009. The start up of the bedrock extraction well and the additional Bedrock Pilot Study monitoring began on September 9, 2009 and continued for about one year. Clear Creek has continued conducting sampling and groundwater level measurements and other testing after the one year of the Bedrock Pilot Study period, throughout 2010. The results of additional sampling and other testing conducted from the first six months of the Bedrock Pilot Study were presented in a report entitled ***Bedrock Pilot Study Preliminary Findings Report, 52nd Street Superfund Site, OU1 Area*** submitted to ADEQ in April 2010. The summary and compilation of results of groundwater sampling and water level measurements obtained between January 2009 and September 2010 from select wells as part of the Bedrock Pilot Study was submitted to ADEQ in a transmittal letter ***52nd Street Superfund Site – Bedrock Pilot Study Data*** dated December 10, 2010.

2.0 OU1 GROUNDWATER EXTRACTION SYSTEM OPERATIONS

The OU1 groundwater remediation system consists of a series of on-site and off-site extraction wells that are piped via an underground forcemain to a centralized groundwater treatment system, the IGWTP, located on the ON Semiconductor facility. The groundwater is treated first by two packed column aeration towers (aka air strippers) connected in series. Secondary treatment of the groundwater is provided by two liquid phase granular activated carbon (GAC) treatment vessels connected in series. The air emissions from the air strippers are treated by a vapor phase GAC vessel prior to venting to the atmosphere. A process flow diagram for the IGWTP is shown on Figure 4. The OU1 extraction system started routine operations in July 1992. Prior to that, the Pilot Treatment Plant (PTP) removed a significant mass of VOCs from the Courtyard area. The PTP consisted of an air stripper with vapor phase GAC air emission controls. The PTP began treating groundwater from wells DM301 and DM302 in fall 1986. Extraction wells DM303 and DM304 were brought on-line on an intermittent basis in 1990. The mass of VOCs removed by the PTP from 1986 to 1992 is estimated to be 1,896 pounds based on historical chemical data and available totalized flow readings.

During 2010, 23 groundwater extraction wells were operated within the 52nd Street Superfund Site OU1 Area (see Figure 1 and Table 1). The OU1 extraction system consists of five (5) onsite extraction wells located within the Courtyard of the 52nd Street facility (DM301 through DM304) and the newly-installed extraction well located at the northwestern part of the facility (DM314), and nine (9) offsite extraction wells located along the OCC (DM305 through DM313). Three of the nine offsite wells, DM311, DM312 and DM313, are currently not operating as extraction wells but are used as monitor wells. With ADEQ approval, DM313 was taken offline in the summer of 1993, DM312 was taken offline in November 1995, and DM311 was taken offline in April 2004. VOC concentrations in these wells decreased to below maximum contaminant levels (MCLs), the lower threshold of Freescale's Poor Quality Groundwater Withdrawal Permit (PQGWWP), and pumping of the wells is not needed to maintain an adequate zone of capture. Also, since 1995, the groundwater level in the area has decreased to a level that precludes the sustained pumping of wells DM311, DM312 and DM313.

In addition to the OU1 system, Freescale is conducting a voluntary groundwater remediation in the Southwest Parking Lot (SWPL) area of the 52nd Street facility. Twelve extraction wells are located within the SWPL area (DM201, DM201-OB1, DM702, DM703, DM704, DM705, DM706, DM707, DM713, DM714, DM718, and DM724).

Except for short duration shutdowns for routine maintenance and site construction, extraction was conducted 24 hours a day, seven days a week in 2010. Water levels and extraction flow rates were monitored on a monthly basis. The average pumping rates for the five onsite wells, the six offsite wells, and the 12 voluntary SWPL extraction wells for each year of operation are shown in Table 2. A total of 123,475,672 gallons (378.88 acre-feet) of groundwater were extracted and treated by the OU1 system in 2010. The treated water was provided to ON Semiconductor for use in its manufacturing process at the 52nd Street facility. The OU1 system was operational for 93.5 percent of the year. Shut downs for routine and periodic maintenance accounted for the remaining 6.5 percent of the year. During operation, the four OU1 onsite extraction wells in the Courtyard area (DM301 through DM304) and the new extraction well DM314, pumped at a rate of approximately 27.9 gallons per minute (gpm) and contained groundwater flow in the alluvium and bedrock in the Courtyard to depths of over 200 feet below ground surface (bgs) into bedrock and created a hydraulic capture zone estimated to be over 1,500 feet wide in the area of the Courtyard. This is in contrast to 2009 when the Courtyard area wells were offline for an extended period of time due to the construction and testing of the Bedrock Pilot Study wells and, therefore, the combined average pumping rate for these onsite wells for 2009 was 9.3 gpm. The SWPL extraction wells, pumping at an average combined rate of 2.5 gpm, contained groundwater flow in the southern part of the facility. Offsite, the six operating OU1 extraction wells at the OCC (DM305 through DM310), pumping at an average combined rate of 220.8 gpm, contained groundwater flow in alluvium and bedrock at the OCC over an area greater than ½-mile wide and to a depth of greater than 400 feet below ground surface. Table 3 summarizes groundwater withdrawal at the OU1 wells on a monthly basis for 2010. Table 4 presents an annual summary of groundwater withdrawal by the OU1 wells from 1992 through 2010.

In 2010, the onsite (excluding SWPL wells) and offsite (at the OCC) OU1 extraction wells produced approximately 122.22 million gallons (375 acre feet) of groundwater. An additional 1.25 million gallons (3.8 acre feet) were produced by the SWPL wells. An estimated 793 pounds (65 gallons) (converted using an assumed specific gravity for TCE of 1.46) of VOCs were removed from the groundwater in the OU1 area during 2010. Of this, about 502 pounds were removed from groundwater pumped onsite, 280 pounds were from groundwater pumped offsite, 1.6 pounds were removed from the SWPL wells, and approximately 8.69 pounds were removed as free phase product or dense non-aqueous phase liquid (DNAPL) and DNAPL-containing groundwater from MP03-D as described below.

The DNAPL and high concentration groundwater is pumped from MP03-D (may also include MP03-C on occasion) into a 55-gallon drum. The 55-gallon drum is then transported to the IGWTP and stored within secondary containment. The contents of the drum are pumped into the solvent recovery system at the IGWTP. The contents are left in the solvent recovery tank and allowed to settle. Once the solvent has settled, it is decanted into a 55-gallon waste accumulation drum stored within secondary containment. When the decant process is complete, a valve is manually opened and the water is blended into the influent stream of the treatment system between the feed tanks (T-101 & T-102) and the inlet of the first transfer pumps. When the waste accumulation drum is full, it is transported offsite for disposal as a hazardous waste.

In 1994, Motorola initiated a program of periodic recovery of DNAPL from monitor well MP03-D, which is located onsite in the Courtyard. Monitor well MP03-D is screened in the bedrock at a depth of 162 feet below ground surface. Because previous sampling of MP03-D had revealed the presence of DNAPL, a program of weekly to biweekly bailing to recover DNAPL was started in May 1994. In 2010, an estimated 0.53 gallons (8.7 pounds) of DNAPL were recovered from MP03-D together with about 250 gallons of groundwater at saturated VOC concentrations of about 1,100 parts per million (ppm) (equivalent to 4.2 pounds of VOCs). These liquids were disposed of as hazardous waste together with the solvent waste from the IGWTP. Estimates of DNAPL removal at MP03-D are shown in Table 5. A summary of groundwater pumped, by year, and the calculated amount of VOCs removed, including the amount removed as DNAPL, is shown in Tables 5 and 6 and on Figures 5 and 6.

The OU1 area is generally underlain by a thin alluvial cover over a shallow bedrock surface. A contour map of bedrock elevation contours, based on the depth to bedrock map from the Final Remedy Remedial Investigation Report (FR RI) (Dames & Moore, 1992a) and modified from additional well completion data, is presented as Figure 7. Due to regional water level declines from the extended drought and because of the ongoing pumping at the 52nd Street facility and the OCC wells, water levels have generally lowered since the start of operations. The amount of saturated alluvium has decreased and areas of unsaturated alluvium and bedrock above the water table have increased in extent from prior years (see Figure 8). Most of the area underlying the 52nd Street facility and between the facility and the OCC wells has only a thin saturated alluvial thickness and greater unsaturated areas. The thickness of the saturated alluvium increases to the west of the OCC wells.

As a result of the gradual decline in saturated thickness, the average pumping rates are lower than when the OU1 system was first brought on-line in 1992. Prior analyses conducted by Clear Creek (GeoTrans, 2005) with the most recent OU1 groundwater model concluded that "the OU1 system will continue to maintain capture with current [extraction] rates or gradually reduced rates into the foreseeable future." In the near-term, the 2010 average flow rates were relatively stable when compared to the previous years average flow rates for the OCC well field. However, potential dewatering of the alluvial aquifer remains a long-term concern.

During operation of the IGWTP, the carbon unit air samples and influent/effluent groundwater quality are monitored. The carbon filters are changed when indicated by monitoring results. The carbon filters were replaced in May 2009. Freescale changed vendors for the IGWTP carbon filter so the VaporPac 10 was replaced by the RB-10 GVAC system. The carbon filters process is the same as before; the difference in names is just a result of the change in vendors. The air sample data are presented in Table 7 and the groundwater influent/effluent analytical data are given in Table 8. The air sample results were analyzed by EPA Method TO-15. The estimated VOC emissions from the VaporPac10 carbon unit were calculated and used to schedule carbon replacement. Estimated emissions of VOCs from the OU1 air controls ranged from approximately 0.008 to less than 0.93 pounds per day (Table 7) Manufacturing processes that emit less than 40 pounds per day are not required to implement air emissions controls (Maricopa County Rule 200, Section 302). Processes with less than 3 pounds per day of VOC emissions are exempted by the County from both treatment and permitting requirements [Maricopa County Rule 200, Section 303(c)(7)(j)]. EPA guidance also indicates that air controls are not required on air strippers operated under Superfund that have emissions less than 15 pounds per day (OSWER Directive 9355.0-28, June 1989). However, Freescale has agreed with ADEQ that air controls will not be removed without prior notice to the agencies.

As part of the Bedrock Pilot Study, one new extraction well and two new monitor wells were installed near the 52nd Street facility in late December 2008 – early January 2009. The start up of the bedrock extraction well and the additional Bedrock Pilot Study monitoring began on September 9, 2009 and will continue to be monitored as part of the ongoing OU1 operations. Clear Creek has been conducting sampling and groundwater level measurements and other testing as part of the Bedrock Pilot Study throughout 2010. The installation of the wells was presented in a separate letter report, ***OU1 Pilot Bedrock Well Installation, Motorola 52nd Street Superfund Site, OU1, DM314, DM614, and DM615, Phoenix, Arizona*** dated September 8, 2009 and submitted to ADEQ. A summary of the Bedrock Pilot Study is presented in Section 5.0 of this report.

With the pending closure of ON Semiconductor's 52nd Street manufacturing facility in 2011, Clear Creek, on behalf of Freescale, submitted a ***Final Evaluation Report - End Use Alternatives for Remediated Groundwater – Operable Unit No. 1, 52nd Street Superfund Site*** to ADEQ on December 22, 2010. Based on this analysis, as its preferred alternative, Freescale has proposed discharging treated water to the Grand Canal via the Old Crosscut Canal using underground pipelines from the IGWTP along 50th and Culver Streets (in City of Phoenix Right-of-Way), across the Brunson-Lee Elementary School property, and then to the Old Crosscut Canal. The previously approved discharge to the City of Phoenix sanitary sewer (Freescale/Clear Creek received ADEQ/EPA approval of the interim sanitary sewer discharge alternative as part of the ADEQ/EPA comments on the ***Evaluation of Remediated Groundwater End Use Options*** (June 10, 2009) in a letter dated July 14, 2009) would be used as an alternative for discharge of the treated water during maintenance and canal dry-up periods.

3.0 CONCEPTUAL SITE MODEL

3.1 OPERABLE UNIT NO. 1 SYSTEM

The locations of the monitor and extraction wells that comprise the OU1 monitoring network are shown on Figure 1. The sampling and analysis schedule of these wells is presented in Table 1. Cross sections through the OU1 area illustrating the alluvial-bedrock aquifer system are presented on Figures 2 and 3. These figures were constructed to illustrate, in cross section, the effect of the OU1 system. Figure 2, Section A-A', generally parallels the flow direction of the contaminant plume from the 52nd Street facility prior to OU1 pumping. Figure 3, Section B-B', is along the OU1 well system alignment and portions of the cross section are generally perpendicular to the flow direction of the plume. The locations of these cross sections have been modified from the baseline report and earlier OU1 Effectiveness Reports to incorporate newly-installed wells and to more clearly illustrate the hydraulic effects and capture zone of the OU1 system.

In addition to the OU1 groundwater well network, data from certain wells associated with the 56th Street and Earll Drive Water Quality Assurance Revolving Fund (WQARF) Site were considered in the OU1 evaluation. Data collected by Freescale as part of the 56th Street and Earll Drive investigation are provided to ADEQ on a semi-annual basis (Clear Creek Associates, 2010g, 2011b). New wells (DM-29 through DM-36) were installed in July – August 2005 as part of that program and several of these wells have been added to the figures for the OU1 report to provide additional information for this evaluation.

The ADEQ requested that Freescale Semiconductor install additional wells along the bank of the OCC to monitor both the alluvium and the bedrock aquifers in order to better delineate the depth of the Motorola 52nd Street Superfund Site plume. Clear Creek Associates reviewed possible locations for the new wells, considering current plume contamination data, groundwater flow information, and access issues. The location for the three new wells selected by Clear Creek and approved by ADEQ was along the east bank of the canal, between existing extraction wells DM307 and DM308 (Figure 1).

Freescale completed the three new wells (DM611, DM612 and DM613) in December 2007 to further define the plume and evaluate hydraulic capture in alluvium and bedrock. The alluvium well (DM 611) is completed just above the alluvium/bedrock contact and the bedrock wells are completed at differing depths within the bedrock, one well (DM612) approximately 120 feet into the bedrock, and the other well (DM613) approximately 300 feet into the bedrock.

Three new wells were installed in late December 2008 – early January 2009 as part of the Bedrock Pilot Study. Analytical test results from groundwater sampling in the third and fourth quarters of 2010 are provided in this report. A Bedrock Pilot Study findings report summarizing the first year of operations is scheduled to be submitted in April 2011.

3.2 HYDROGEOLOGY

Hydrogeologic data is typically used as the basis for a capture zone analysis including information on stratigraphy, hydraulic conductivity (values and distribution), hydraulic gradients (magnitude and direction), pumping/injection rates and locations, groundwater elevations, and groundwater quality (EPA 2008).

The OU1 area is located at the eastern margin of the western Salt River Valley. The Salt River Valley is a large geologic basin filled with sedimentary deposits. Based on data compiled by the Arizona Department of Water Resources (ADWR) for a regional groundwater model (Corkhill and others, 1993), the basin-fill deposits are characterized in most areas by (a) a lower unit consisting mainly of conglomerate and gravel, (b) a middle unit consisting predominantly of silt and clay, and (c) an upper unit consisting mainly of sand and gravel. ADWR defined these hydrogeologic units using data on particle-size and lithology, where available. The three units are characterized by unique hydraulic properties and were subdivided into three hydrogeologic units for modeling purposes. The three hydrogeologic units, in ascending order, are as follows: the Lower Alluvial Unit or LAU, the Middle Alluvial Unit or MAU, and the Upper Alluvial Unit or UAU.

Additional analysis conducted by Dr. Stephen Reynolds (Department of Geological Sciences, Arizona State University) and Doug Bartlett (Clear Creek Associates) of well boring logs, cores and cuttings in the 52nd Street Superfund Site area have shown that there are actually three kinds of unconsolidated sediments in the Site: Basin Fill, Salt River Gravels, and uppermost alluvium (Reynolds and Bartlett, 2002). Only the basin fill and uppermost alluvium units underlie the OU1 area and only the basin fill is saturated in the OU1 area. The ADEQ has developed stratigraphic nomenclature for the 52nd Street Superfund Site using Layers A through D. The ADEQ stratigraphic analysis is primarily applicable west of the OU1 area and is based on detailed lithologic studies conducted in the Operable Unit 2 (OU2) and Operable Unit 3 (OU3) portions of the Motorola 52nd Street site (OU2 and OU3 are located to the west-southwest of OU1). Layer A is the Salt River Gravels; saturated Salt River Gravels do not occur in the OU1 area. The entire OU1 area alluvium is considered a single layer, Layer B in the ADEQ stratigraphic nomenclature, or "Basin Fill" as discussed in the Reynolds and Bartlett (2002) report. Layer C includes Tertiary and Precambrian bedrock where shallow bedrock is encountered in the eastern part of the 52nd Street Superfund Site.

Layer D is a subunit of the deeper Basin Fill that occurs in the OU2 area. The stratigraphic analysis developed by ADEQ does not affect hydrogeologic interpretations presented in the report.

Two distinct geologic units have been described as the primary water bearing formations in the OU1 area of the 52nd Street Superfund Site. These include the unconsolidated alluvium (unconsolidated Basin Fill) and bedrock consisting of Precambrian metarhyolite and granite as well as Tertiary volcanics and indurated sediments. Previous investigations have demonstrated that groundwater and contaminants move between the alluvium and bedrock. Because these geologic units interact hydraulically and chemically, they have been classified in previous reports (Dames & Moore, 1993b) as the alluvial-bedrock aquifer system. Unlike alluvium, bedrock is not sufficiently permeable to yield usable quantities of water. Therefore, the alluvium and the bedrock are referred to as separate hydrologic units for convenience in this report.

The basin fill, the lowest and oldest alluvial unit, consists of slightly to moderately consolidated sandy and silty sediments and was deposited on top of the Tertiary and Precambrian bedrock units. In the western portion of the 52nd Superfund Site area, but absent from the actual OU1 area, the basin fill is overlain by very coarse, unconsolidated gravels, consisting of pebbles, cobbles, gravels, and boulders in a sandy matrix. This unit represents older channel deposits of the Salt River and is, therefore, named the Salt River Gravels. The youngest unit in the 52nd Street Superfund Site area is the uppermost alluvium and consists of silt, sand, and minor amounts of gravel. The three units together fill the Phoenix basin extending west from the Papago Park area, immediately to the east of the 52nd Street facility, deepening toward the west. To be consistent with prior reports, the term "alluvium" has been used in this and other documents to describe both shallow alluvium and basin fill.

In the OU1 area, the combined thickness of alluvium and basin fill varies from less than 20 feet at the 52nd Street facility to approximately 150 feet to the west of the facility at about 40th Street. The unit generally becomes thicker to the west. Cross-sectional views of the alluvial-bedrock aquifer system are shown in Figures 2 and 3. Section locations are shown on Figure1. Figures 7 and 8 show the bedrock contours and the saturated thickness of the alluvial aquifer based on December 2010 groundwater levels. Alluvium and basin fill are unconfined. The hydraulic conductivity of the basin fill in the OU1 area varies from 2 ft/day (0.0007 cm/sec) to approximately 50 ft/day (0.071 cm/sec) (Dames & Moore 1992a).

Bedrock underlying the basin fill has undergone several deformational events resulting in faulting, fracturing, rotation, and vertical and horizontal displacement. Two dominant fracture, fault, and lineament trends may be observed: a northwest-southeast trend, and a northeast-southwest trend. As a result of these deformational events, the bedrock geology in the OU1 area is complex and consists of Precambrian granite and metarhyolite units and Tertiary sedimentary (Camelshead formation and Tempe Beds formation) and volcanic units. The dual porosity model can be used to describe several of the bedrock units, primarily the Tertiary sedimentary units, in the OU1 area. The dual porosity model describes bedrock aquifer characteristics with hydraulic conductivity controlled by secondary porosity (fractures) and storage capacity determined by primary matrix porosity. Well yields in bedrock are low because the overall permeability of the primary porosity is low. While fractures have a higher permeability and can provide potential conduits for groundwater and contaminant migration, volumetrically fractures can only hold a small amount of water. Hydraulic conductivity in the bedrock is strongly influenced by the presence, frequency and interconnectedness of open fractures. Fracture densities measured in rock core samples from boreholes within the OU1 area range from 1 to more than 15 fractures per foot. However, many of the fractures have been healed with secondary mineralization. Measurements of hydraulic conductivity in bedrock vary from 1.4×10^{-3} ft/day (4.9×10^{-7} cm/sec) to 2.1 ft/day (7.5×10^{-4} cm/sec).

Due to cementation, the primary permeability of the bedrock matrix can be quite low. Contaminants migrating in fractures can diffuse out of a fracture and into the surrounding bedrock matrix. The extent of this diffusion is affected by the degree of cementation of the bedrock matrix, but the diffuse contaminants will act as a continuing source of contamination as the VOCs migrate into the groundwater within the bedrock fractures.

3.3 PRIMARY SOURCE AREAS AND CONTAMINANTS

The types and potential sources of contamination at the 52nd Street facility were investigated as part of the OU1 Remedial Investigation (RI) (Dames and Moore, 1987). Numerous potential source areas related to the then current and historical facility operations were investigated with soil, soil-gas and groundwater sampling. These investigations indicated that the primary sources were located in the Courtyard area. The RI was initiated upon the discovery of an inventory discrepancy for the underground bulk solvent storage tank located in the Courtyard. At the time of the discovery, the tank held 1,1,1-Trichloroethane (TCA) although in earlier years TCE was used and stored in the tank. Although losses from the tank contributed, the primary source of contamination was determined to be a drywell in the former bulk solvent handling area in the Courtyard. Historical releases in the former bulk solvent handling area migrated into the subsurface via the drywell. The drywell was abandoned in 1983 as part of the facility RI.

Except for the SWPL area, as described below, TCE is the primary contaminant in the OU1 area. Secondary contaminants include TCA, 1,1-Dichloroethene (DCE), 1,1-Dichloroethane (1,1–DCA), 1,2-Dichloroethane (1,2–DCA), cis-1,2-Dichloroethene (c-1,2-DCE), trans-1,2-Dichloroethene (t-1,2-DCE), Tetrachloroethene (PCE), and Vinyl Chloride (VC). Groundwater in both the alluvium and bedrock aquifers has been impacted by VOCs. The distribution of contamination observed in OU1 is described further in Section 4.4.

The OU1 area is a confirmed DNAPL site with free phase product observed in the fractured bedrock. As described in Section 2.0 of this report, MP03-D is periodically pumped to remove DNAPL. MP03-D is screened from approximately 155 feet to 170 feet below land surface and is located in the Courtyard near what is considered the primary solvent source. For the past few years, MP03-D has been pumped once or twice a month to recover DNAPL. In the fall of 2009, after the new bedrock extraction well and the four courtyard extraction wells were brought online, an increased amount of DNAPL was being recovered from MP03-D. In an attempt to maximize the recovery of DNAPL from this well, the pumping was increased from one or two days per month to three or four days per month. Additionally, MP03-C was also pumped several times for DNAPL recovery. Since January of 2010, the recovered DNAPL volumes have declined and pumping has reverted back to approximately twice per month. The temporary increase in DNAPL recovery observed in 2009 may have been caused by the disruption and restarting of the onsite pumping as part of the Bedrock Pilot Study. Another monitor well, MP11-D, is also located in close proximity to the primary source and is screened at approximately the same depth as MP03-D. Despite the close proximity of MP11-D to the Courtyard source, the concentrations in this well have remained relatively low, ranging from 3.9 ug/l to 79 ug/l since 1995. These differences highlight the extreme complexity of contaminant migration in the fractured bedrock aquifer.

A secondary TCA plume is located in the SWPL area of the 52nd Street facility. Upon discovery of the releases in the Courtyard area, the TCA bulk solvent handling activities were relocated to the SWPL area. Failure of a liner of a sump located in the AD building in the SWPL area led to the release of TCA into the shallow groundwater. Bulk solvent handling and ultimately the use of chlorinated solvents were discontinued at the 52nd Street facility subsequent to the discovery of the SWPL release.

4.0 CAPTURE EVALUATION

This section presents the evaluation of the effectiveness of the OU1 groundwater remedy at containing the VOC plume in the vicinity of the OCC. This evaluation was conducted consistently with EPA guidance (EPA 1994, 2008) to develop converging lines of evidence by applying multiple lines of evidence to evaluate the effectiveness of the OU1 system to establish a capture zone.

The remedial objective of OU1 is to create a hydraulic capture zone that contains contaminated groundwater at the 52nd Street Superfund Site east of the OCC. The dimensions of the capture area created by the extraction well system depend on the hydraulic conductivity of the aquifer, the thickness of the aquifer, the gradient of the water table, and the pumping rate of the wells. Evaluating hydraulic capture created by the OU1 system is complicated due to the variable thickness of alluvium, areas of bedrock above the water table, and contamination in both alluvium and bedrock units. Hydraulic capture created by the OU1 extraction wells was evaluated primarily by plotting water level elevations both in plan and section. Additional evaluations were conducted by calculating flow rates and capture zone width, and by performing groundwater modeling and reviewing concentration trends in key monitor wells. Apparent changes in water levels and hydrographs of selected wells were also evaluated.

The lines of evidence used to evaluate the extent of capture achieved onsite and offsite are discussed in the following subsections.

4.1 INTERPRETATION OF WATER LEVEL DATA

Water level contour maps are one of the primary tools used to demonstrate capture. Groundwater flow lines are perpendicular to groundwater elevation contours. Horizontal capture can be interpreted from water level contour maps by approximating the location of a bounding flow line (also termed a “capture zone”) within which all flow lines are directed towards the extraction wells (EPA, 2008). Outside this bounding line, groundwater will flow along its normal gradient.

Water level elevation contour maps for the OU1 area were prepared for the Baseline 1992 period and for December 2010. The water level data used to construct water level contour maps are included in Table 9. Hydrographs for extraction and monitor wells are presented in Appendix A to show groundwater level changes (and trends) over time for the OU1 wells.

Baseline 1992 Water Level Elevations

Water elevation contours for the Baseline 1992 period are plotted in plan view for the alluvial aquifer on Figure 9 and in cross section on Figure 10. Since in 1992, extraction was occurring only at wells DM301 through DM304 in the Courtyard and at wells in the SWPL area, Figure 10 illustrates the baseline condition (i.e., with no drawdown) at the OCC. During the Baseline period, the capture zone around the onsite extraction wells extended to an apparent width of over 1,000 feet in the alluvium in the Courtyard and a similar width in the SWPL area (Figure 9). With some localized exceptions related to a bedrock ridge in the vicinity of the 52nd Street facility, groundwater outside of the on-site capture zones generally flows to the west and southwest.

December 2010 Water Level Elevations

Water level elevations for December 2010 are plotted in plan view for the alluvial aquifer on Figure 11. Figure 12 shows water level elevations for December 2010 in cross section A-A'. These figures illustrate the lowering of the water table as a result of pumping in the extraction wells as well as the influence of pumping in the immediate vicinity of the extraction wells. Some of the groundwater level decline is a regional decline from the multi-year drought.

Consistent with EPA guidance (EPA 1994, 2008), hydraulic head observations from the extraction wells are used qualitatively in the overall capture zone analysis. The groundwater elevations for the extraction wells on the OCC were first corrected for well efficiency prior to posting and contouring of data on figures. A discussion of the well efficiency calculation is included as Appendix B.

Figure 11 shows groundwater level contours and flow directions in December 2010. Flow directions in December 2010 were generally similar to the Baseline period with one notable exception. The alluvial aquifer in the SWPL area is largely dewatered. The approximate areas of capture from the Courtyard and the SWPL extraction wells intersect on the eastern side of the 52nd Street facility (Figure 11) as in previous years. Also, the area along the southern part of the OCC has been dewatered and water levels have declined as part of the regional drought.

The capture zone created by the offsite wells encompasses the entire 52nd Street facility and captures all groundwater not captured by the onsite wells. In several places the capture zone intersects areas where the bedrock is above the water table. These areas of dry bedrock were drawn by overlaying bedrock elevation contours and groundwater elevation contours. The contour maps were constructed using available data and professional hydrogeologic judgment. However, since the areas between data points are interpolated, variability in elevation, particularly in the bedrock, could result in some flow through the dry areas as shown on Figure 11. Upgradient of the capture zone (toward the east), all groundwater in the alluvium within the capture zone will eventually be collected by the extraction wells for treatment. Prior to pumping the OCC extraction wells, the water table sloped toward the southwest. Since pumping began in 1992, the groundwater gradient west of the OCC has reversed direction and now flows eastward toward the extraction wells. The point at which the groundwater gradient reverses is about 750 feet west of the OCC as interpreted from water level measurements in groundwater monitor wells.

The influence of the extraction wells on water levels in bedrock is more difficult to document due to the inherent complexities of groundwater flow in a fractured rock environment and the limitations of the available groundwater monitoring well network. The alluvial aquifer and the bedrock groundwater system are in hydraulic communication, however, and pumping the OCC extraction wells does have an influence on bedrock groundwater. To evaluate the depth of capture, cross sections with contours of equal groundwater elevations were prepared. Water level elevations for December 2010 are shown at depth in multiport wells in Section A-A' on Figure 12. Well DM601 is the only active Westbay well in the area of the Courtyard. An upward vertical gradient is observed between the 200 foot port and the 135 foot port indicating that the influence of the on-site extraction system extends to depths in excess of the deepest bedrock port in DM601. An upward vertical gradient is also observed in well DM603 located inside the capture zone, but west of the OCC extraction wells indicating that the influence of the off-site system extends to depths in excess of the deepest port of DM603. An upward vertical gradient is not observed between the DM612 and DM613 well pair located along the OCC, likely due to the large vertical separation of the wells. However, the water level elevations observed in the OCC extraction wells are significantly lower than those observed in both DM612 and DM613. Additionally, the water level elevations observed in DM603, west of the OCC, are higher than DM612 and DM613. These data suggest that groundwater flow in this area would be upwards towards the extraction wells. Although a downward vertical gradient is observed in well DM606, located approximately midway between the on-site and off-site extraction well fields, it does not translate to the presence of contaminants either at DM606 or at lower elevations in bedrock as monitored by DM613 at the OCC. As discussed more in Section 4.4, the TCE levels in the deepest port of DM606 have, with the exception of a few outliers, always been below the aquifer water quality standard and DM613 has no detectable levels of TCE indicating that the depth of the VOC plume has been defined and it is not migrating beneath the off-site extraction wells.

Overall, evaluation of the water elevation contour maps and the water level elevations in cross-section indicate that the OU1 system is effective at establishing capture that contains the full width and depth of the observed plume at the OCC.

4.2 EVALUATION OF DRAWDOWN

The extent of hydraulic capture at depth in the bedrock can be estimated by examining the drawdown in monitoring wells. Although the extent of observed drawdown doesn't define the extent of capture, drawdown does reflect the area that is impacted by pumping and can be used to support the interpretation of capture using water level elevations. Changes in water level elevations in the OU1 area between the Baseline and December 2010 periods are presented in Table 9. Figures 13 through 15 show apparent drawdown (total water level decline) in the alluvial aquifer and bedrock for the Baseline to December 2010 period. Declines in water levels are interpreted as apparent drawdown (total water level decline) because it is not possible to distinguish with total accuracy the water level changes due to OU1 operation versus regional influences. Total (or apparent) drawdown refers to both drawdown from regional pumping and the multi-year drought and drawdown caused by OU1 pumping.

The apparent drawdown (total water level decline) in bedrock between the Baseline period and December 2010 is shown on Figure 14. Figure 13 illustrates that drawdown at depth is similar in magnitude to the drawdown observed in alluvium. Therefore, the influence of OU1 pumping and the capture zone in bedrock is expected to be similar to the capture zone in alluvium.

A comparison of Figures 10 and 12 near the area of the OCC pumping (Well DM307) shows the effects of drawdown in December 2010. The total head at DM307 has been reduced from 1136.94 feet in Spring 1992 to 1094.34 feet (elevation is corrected for well efficiency) in December 2010 for a total drawdown of 42.6 feet. The reduction in total head that occurs at the water table at DM307 is also seen at depth in the Westbay wells. This is seen by comparing head elevations in ports at depth in DM603 and DM606 on Figures 10 and 12, or by reviewing the change in water level elevation shown on Figure 15.

Figure 12 illustrates the effect of nearly continuous pumping at OU1 for more than 18 years in Section A-A'. Based on the interpretation of water levels measured in bedrock in new monitor wells DM612 and DM613, the OU1 extraction system creates a zone of capture to depths greater than the deepest monitoring port, which is about 400 feet below ground surface at the OCC. In December 2010, the capture zone is located between DM603 and DM607 and extends below the bottom of DM613.

The effect of the OU1 on water levels at depth is evident by comparing the changes in water level elevations between ports in Westbay wells DM603, DM605, and DM606 in response to pumping and shutdown. These wells include five or more measurement ports in the alluvium and bedrock extending to depths up to 370 feet bgs. The water level data (Table 9) indicate that the change in head in response to OU1 is roughly the same over the entire depth of each well. Wells DM603 and DM605, located within the capture zone just west of the OCC, experienced about 30 to 34 feet of apparent drawdown from the Baseline period through December 2010. The apparent drawdown at DM606, located about 1,200 feet east of the OCC, was about 18 to 21 feet over the same period. The uniform responses of these wells to OU1 pumping at depths up to 370 feet indicate that all three wells respond similarly at depth as at the water table, demonstrating that the effects of pumping at the extraction wells extend deep into bedrock. These wells are located within the hydraulic zone of capture shown in plan view in Figure 11 and in the vertical zone of capture shown on Figure 12. In addition, the Westbay well data from DM603 and DM605 indicate that groundwater is flowing vertically upward near the offsite extraction wells further supporting vertical capture in bedrock. Although DM606 is located far away from the extraction wells and does not show a vertically upward gradient within the well at its deepest ports, water that flows past the deep ports of this well is re-directed upwards, hydraulically down gradient from the well, as it moves nearer the extraction wells.

The apparent drawdown between the Baseline period and December 2010 is shown in cross section on Figure 15. The difference between drawdown caused by pumping at the OCC and regional drawdown is illustrated west of the OCC. Changes in water levels in wells that are far enough away to be unimpacted by OU1 pumping, or any other local pumping or recharge, are assumed to be caused by regional drawdown.

Evaluation of the apparent drawdown created by operation of the extraction wells along the OCC indicates that the area of significant drawdown is significantly larger than the width of the observed plume. This area of significant drawdown supports the interpreted water elevation contour maps and supports the conclusion that the OU1 remedy is effective at capturing the full width of the observed plume at the OCC.

4.3 CAPTURE ZONE CALCULATIONS

EPA guidance recommends that simple horizontal analyses be performed to evaluate an estimated flow rate to achieve capture and to estimate capture zone width from pumping. The assumptions for these calculations to be considered reliable are so simplifying that EPA recognizes that one or more of the assumptions will be violated at most sites. However, they still recommend that the analyses be conducted since they are easy to do and require the practitioner to perform a basic assessment of hydrogeologic data.

The simplifying assumptions for these calculations are:

- homogeneous, isotropic aquifer of infinite extent
- confined aquifer, uniform aquifer thickness
- fully penetrating extraction well(s)
- uniform regional horizontal hydraulic gradient
- steady-state flow
- negligible vertical gradient
- no net recharge, or net recharge is accounted for in the regional hydraulic gradient
- no other sources of water to the extraction well (e.g., flux from rivers or from other aquifers), except as represented by the "factor" in the estimated flow rate calculation

The conditions at OU1 are not consistent with most of these assumptions. Even though only the alluvial aquifer will be considered for this exercise, the aquifer is not homogeneous and isotropic. Nor is the aquifer of infinite extent; in fact, the saturated alluvium thins to zero thickness in a large area upgradient of the extraction wells. The aquifer is unconfined and the thickness at the extraction wells varies from zero to approximately 50 feet during pumping conditions (saturated thickness during non-pumping conditions is estimated to be a maximum of 75 feet). The pumping wells are fully penetrating, but also penetrate into the underlying bedrock up to 20 feet. The regional horizontal gradient as observed on the Baseline water level map (Figure 9) shows the gradient is steeper in the vicinity of the northern wells and flatter around the southern wells. Because of these conditions, it is difficult to estimate an average saturated thickness to use in this calculation because the depth to bedrock varies from 87 feet to 135 feet in the extraction wells and bedrock is above the water table immediately upgradient of the extraction wells. Therefore, a range of saturated thickness will be used.

Estimated Flow Rate Calculation

The estimated flow rate calculation including the input values is presented as Figure 16. Estimates were derived using a range of saturated thickness. It is estimated that if the OU1 system was not operating, the current average saturated thickness in the six active extraction wells would be 47 feet. Another estimate of the saturated thickness was derived by estimating the saturated thickness in a cross section that passes through the dry bedrock. The flow through this section should equal the flow to the extraction wells. The average saturated thickness for the cross section inside the capture zone using this estimating method was 6 feet. An assumed hydraulic conductivity value of 30 ft/day was used based on observed data and the calibrated value used in the most recent OU1 groundwater model (GeoTrans, 2005, Appendix A). Estimates for flow rates needed to capture the plume ranged from 68 gpm to 477 gpm with a best estimate of 136 gpm based on an average saturated thickness of 10 feet. This is reasonable because the alluvium in the area upgradient of the extraction wells is mostly dry. Therefore, the majority of the water is coming from around the dry zone with a small amount coming from the bedrock. If the average thickness of the area encompassed by the plume is estimated through the dry zone, an average saturated thickness of 10 feet is reasonable.

Calculation of Capture Zone Width

Consistent with EPA guidance (EPA, 2008), the capture zone width calculation uses the same assumptions as the estimated flow rate calculation, but assumes the pumping is from one centrally located well. The EPA guidance states that using the simplified assumption of a centrally located well will provide a capture zone width far upgradient of the pumping wells (Y_{max}) nearly identical to a capture zone width dividing the extraction well equally between multiple wells. Figure 17 presents the capture zone width calculation and a table of the input values. A range of values was calculated based on a range of saturated thicknesses. Assuming a saturated thickness of 45 feet, the maximum width of the capture zone is calculated to be 2,566 feet wide or about half of the observed width based on the contour map (Figure 11). The estimated capture zone width calculated using 10 feet of saturated thickness is 5,775 feet which is slightly larger than the width derived from the contour map (Figure 11). A saturated thickness of 10 feet better approximates the conditions observed in the OU1 area. Therefore, Clear Creek believes that the calculated capture zone width also supports a conclusion that the full width of the plume is contained at the OCC by the OU1 groundwater remedy.

Numerical Groundwater Model

EPA's guidance on specific calculations that can be performed to add additional lines of evidence of the extent of capture includes the use of numerical modeling (EPA, 2008). In 2005, as part of the Groundwater Remedial Alternatives Analysis (GRAA), Clear Creek Associates developed a groundwater flow model to simulate the OU1 groundwater extraction system and to evaluate the future of the ongoing remedy including impacts caused by various future scenarios including the possibility of continued drought and changes to the distribution of pumping. The model was constructed based on field data collected over many years and using the knowledge from several previous models of the site. A review of the predicted results and measured water levels for several discrete time periods and at several wells over time shows that the model is well calibrated and is suitable for predicting the impacts for various scenarios into the future. Graphs of predicted and observed water levels over time for three key wells, MP03-B, DM604 and DM502-119, are reproduced as Figure 18. The complete model documentation is presented in Appendix A of the GRAA (GeoTrans 2005) and will not be reproduced here. After the model was calibrated, several future scenarios were simulated including a scenario that continued then current (2003) conditions and OU1 pumping rates. The model predictions for this scenario after five years (2008) resulted in groundwater elevations similar to current conditions, although slightly lower (Figure 19). This is expected since regionally water levels have leveled off or even rose slightly over the last few years and the model inputs were developed to continue the gradual decline that has been observed for many years. The predicted capture zone and observed capture zone are shown together on Figure 20. This comparison shows that the model predicted capture zone and the capture zone derived from the observed water level map are nearly the same. Therefore, Clear Creek believes that the modeled capture zone also supports a conclusion that the full width of the plume is contained at the OCC by the OU1 groundwater remedy.

4.4 WATER QUALITY DISTRIBUTION

Water quality data were evaluated to assess the effectiveness of OU1 in capturing the plume of observed contamination at the OCC. This Section provides a comparison of the overall distribution of TCE between the Baseline 1992 observed conditions and the observed conditions from September 2010. A discussion of TCE concentration trends observed in key wells in the OU1 area is provided in Section 4.5. The effectiveness of OU1 has been evaluated using TCE. When other VOCs, including degradation products of TCE, are detected in groundwater, they are generally present in much lower concentrations than TCE. The full results of the water quality sampling for 2010, including the data validation efforts, are provided in the Semi-Annual Progress/PQGWWP reports (Clear Creek Associates 2010f, 2011a).

To evaluate the change in the overall distribution of TCE in and downgradient of the OU1 area, data collected during September 2010 were compared to Baseline data and historical water quality data. Data used in constructing plan and cross section views for the Baseline and September 2010 periods are presented in Table 10.

Water Quality Distribution

TCE concentrations in the alluvial aquifer are shown in plan view on Figures 21 and 22 for the Baseline period and September 2010, respectively. Contours of TCE concentrations are shown to illustrate the general distribution of TCE contamination in groundwater and to provide a means to compare observations between different periods. Comparison of Figures 21 and 22 illustrate that the overall distribution pattern of TCE in groundwater in alluvium for September 2010 is similar to Baseline conditions.

The Baseline TCE concentrations in the alluvium and bedrock are illustrated in both east-west and north south cross-sections. Cross Section A-A' (Figure 23) illustrates the observed Baseline TCE distribution at depth from the 52nd Street facility on the east to past the Grand Canal on the west. Cross-section B-B' (Figure 24) shows Baseline TCE concentrations in wells from south to north in the vicinity of the OCC. TCE concentrations measured in September 2010 are displayed for Section A-A' on Figure 25, and on Section B-B' on Figure 26. Comparison of Figures 23 and 25 (Section A-A') and Figures 24 and 26 (Section B-B') illustrate that the overall distribution pattern of TCE in groundwater in bedrock for September 2010 is similar to Baseline conditions although the extent of the plume has been reduced.

The areas with TCE concentrations in excess of 10, 100, and 1000 ug/l downgradient of the OU1 capture zone have significantly decreased over time. Decreasing concentration trends in down gradient sentinel wells are indicative of the establishment of a hydraulic capture zone. The areas with TCE concentrations in excess of 100 and 1000 ug/l in the alluvium at the Courtyard, the northern part of the OCC extraction well field and the bedrock within the OU1 area have not changed significantly. Except for the reduction in TCE concentrations observed at and downgradient of the OCC as a result of containing the plume, the 100 and 1,000 ug/l concentration contours in 2010 in the OU1 Area upgradient of the OCC are generally the same as Baseline. The persistence of the observed TCE contamination is attributed to the presence of DNAPL, the complexity of the fracture network, and the very low permeability of the bedrock groundwater system. This persistence of elevated TCE concentrations, despite over 24 years of remediation on-site and over 18 years of remediation off-site, indicates that attaining concentration reductions to established aquifer water quality levels is not practicable in the foreseeable future.

Noteworthy Water Quality Observations

Wells EW18 and DM125 (a multiport well) are located to the northwest of the 52nd Street facility. The TCE concentrations in EW18 have varied within a typical range of 10 ug/l to 25 ug/l since the well was installed in 1992 and had recently declined to 7.1 ug/l in 2009. However, TCE concentrations increased to 19.3 ug/l in 2010. DM125 is located between EW18 and the source location at the 52nd Street facility site. Since the alluvium ports in DM125 have always been relatively clean but concentrations in the bedrock ports were elevated, it was previously thought that the concentrations observed at EW18 were the result of contamination migrating out of bedrock near EW18. It is unclear if the increased TCE in EW18 is simply variability in the sampling results consistent with prior variability, potentially related to the temporary disruption of the onsite extraction system for the Bedrock Pilot Study, or related to the unknown source of PCE contamination, as discussed below. Continued monitoring of the TCE trend is warranted.

After a long history of non-detects, PCE has also recently been observed in EW18 and the observed PCE concentrations are increasing. PCE is not detected in the alluvium or bedrock ports at DM125. Figure 27 presents the PCE distribution in alluvial groundwater for September 2010. The historical source investigations indicate that PCE was not one of the primary solvents used in the historical operations at the Motorola facility. The source investigation is generally supported by the observed distribution of PCE in the OU1 area. These factors suggest that the PCE concentrations in EW18 could be from an unidentified source located upgradient to the east.

Monitoring well DM609 was installed in 2006 to better define the northern boundary of the 52nd Street plume. DM609 is screened in alluvium and has not shown any detections for TCE (all <0.5 ug/l). However, a PCE concentration of 4.6 ug/L was observed in DM609 in 2006 and has been steadily increasing through 2008, declining slightly to 8.4 ug/L in September 2009, but increasing again in 2010 to 11.5 ug/l. The fact that the nearest monitor wells to the north with several years of analytical data, DM-26 and DM-9 (monitor wells located in the 56th Street and Earll Drive WQARF site north of DM609 and not shown on Figure 27), did not show detections of PCE until several years after it was observed in EW18 indicates that the concentrations are coming from a source other than sources at the 56th Street and Earll Drive WQARF site. Unlike monitor well EW18, DM609 is located outside the capture zone. While the PCE contamination detected in EW18 will migrate to the OCC extraction wells, the PCE detected in DM609 and groundwater north of DM609 will continue to migrate in groundwater outside the northern boundary of the OU1 capture zone. This is evidenced by the recent detection of PCE in monitoring wells DM118, DM120 and DM607, located generally downgradient of DM609. The 146-foot port of monitor well DM607 has also shown low but increasing TCE concentrations. It is unclear if the TCE concentration increase is associated with the influx of PCE from the unknown source, or potentially some other factor. Graphs of TCE and PCE versus time for EW-18, DM609, DM-26, DM-9, DM120, DM118, DM602 and DM607-146 are presented as Figures 28 and 29. The distribution and concentration trends of PCE are consistent with the observed PCE contamination from the unidentified source being partially captured by OU1 with a portion of the PCE contamination migrating around the northern end of the OU1 capture zone.

The TCE concentration in DM602 had historically been below 5 ug/l; however, since 2002 TCE has been increasing. High concentrations of TCE are present in the bedrock at and upgradient of the OCC. With the reduced saturated thickness in the alluvium, a reduced amount of water exists to dilute the high TCE concentration groundwater that may be migrating out of bedrock into the overlying alluvium in the vicinity or upgradient of this well. DM602 is located inside the capture zone and the observed TCE concentrations are being contained by the OU1 groundwater remedy.

Three new wells were installed along the OCC to the west of DM606 in December 2007 (Figures 22, 25 and 26). Monitor well DM611 is completed in alluvium and shows relatively low TCE concentrations compared to the extraction wells. This is an indication that the concentrations observed in the extraction wells are influenced by the relatively higher concentrations in the shallow bedrock. DM612 is completed to a depth of 225 feet bgs and the data confirm the elevated TCE concentrations in the shallow bedrock. DM613 is completed to approximately 400 feet bgs (downgradient of and deeper than DM606-370) and has no detectable level of TCE (<0.5 ug/l) in 2010. This is an indication that the full depth of the plume is contained at the OCC including the contamination observed at the deepest port of DM606 upgradient of this location.

4.5 WATER QUALITY TRENDS

Water quality trends are another line of evidence used to evaluate capture. However, a well's location is a critical factor in evaluating whether the observed water quality trend supports a determination of capture. For example, extraction wells located at or near continuing sources may show constant to increasing concentration trends over time. A well located between the source zone and the capture zone may show an increasing concentration trend over time while contaminants migrate past the well towards the extraction wells. The observed increasing trend may eventually reverse to a declining trend as the source zone is depleted. However, for wells located down gradient of the capture zone, you would expect to see declining concentrations over time if the plume is being effectively captured.

The historical trends for TCE were examined to evaluate the effects of OU1 operation on water quality. The historical TCE concentrations for wells in the OU1 area are presented in Table 11. TCE concentration time series plots for the OU1 extraction and monitor wells are presented in Appendix C, to show groundwater level and TCE concentration changes (and trends) over time. The change in TCE concentrations from Baseline conditions to September 2010 are shown in plan view on Figure 30. TCE concentration trends for select monitoring wells are shown on Figures 30 and 31 and discussed below.

Extraction Well Data

Concentrations of TCE in onsite extraction wells remain elevated due to the presence of DNAPL observed in the Courtyard area. TCE concentration trends for the on-site extraction wells are shown on Figure 31. The relatively consistent high concentrations to generally increasing TCE concentrations observed in DM301, DM302, DM303 and DM304 support the conceptual site model as mass is slowly pulled from the bedrock towards the extraction wells. The changes in the high concentrations are the result of changes in pumping rates, but the concentrations have remained relatively high since the start of OU1.

Graphs of TCE over time for the OCC extraction wells are presented as Figure 32. In general, concentrations in the northern part of the well field are higher than in the central and southern portions. Bedrock is deepest in the middle of the well field (DM308, DM309 and DM310) and rises to the north and south. The wells at the south end (DM311, DM312 and DM313) were turned off as the concentrations in these wells declined to below the MCL. The wells to the north (DM305, DM306 and DM307) have shown more variable concentrations than the other extraction wells. The general trend in extraction well DM305 has been downward. The general trend in DM306 had been upward until 2002, then fluctuating until 2008, but has recently been downward to lower concentrations. TCE concentrations trends in DM307 had been upward until 2009 but were downward for 2010. Some of the variability seen in extraction well DM306 may be related to the well's structural issues and a thin saturated alluvial aquifer thickness that causes the well being operated on a cyclical basis. However, the overall trend suggests that the center of mass of the off-site plume may be being pulled to the south towards the center of extraction. The off-site extraction well data are also consistent with the conceptual site model of having a significant amount of mass in the low permeability bedrock aquifer that is extracted over time.

Source Area Wells

Historically, before the port went dry, high TCE concentrations were observed in the alluvial port of DM601-040. The deeper bedrock ports of DM601 also show very high concentrations of TCE (Table 11). The deepest port in DM601, DM601-200, has had relatively elevated but fluctuating TCE concentrations on the order of 100,000 ug/l continuously for more than 10 years. Concentrations recently decreased to 16,500 ug/L in September 2010. The shallower bedrock ports in DM601, DM601-135 and DM601-085, have shown increasing concentrations since approximately 1997 and

2002, respectively. Graphs of TCE versus time for the ports of DM601 are shown on Figure 30. DM601 is located immediately adjacent to extraction wells DM303, DM304, and DM314 and this slow response to pumping shows the extended time frames required for removing VOCs from the bedrock. The ongoing Bedrock Pilot study is providing more information on the interaction between the pumping wells and concentrations in the bedrock.

Wells Inside the Capture Zone

Well DM606 is a Westbay well located approximately midway between the facility and the OCC. Only the five bedrock ports are sampled since the alluvium port has been dry since 1998. The highest concentrations are observed in the middle depth at the 250-foot port with lower concentrations in the two ports above and the two ports below it. TCE concentrations in the 370-foot port, the deepest, have been below the MCL for many years with the few results above the MCL appearing to be outliers. Graphs of the concentrations over time for all the bedrock ports are shown on Figure 30 and show that the four lower ports (185-foot, 250-foot, 330-foot and 370-foot) have been relatively stable for several years while the shallowest port (102-foot) shows variable but increasing concentrations through 2007, and then decreasing concentrations more recently. The long water quality history of the deepest two ports in DM606 suggest that, despite having a slight downward hydraulic gradient between the ports, the transport pathway is incomplete at this location to allow for downward migration of contaminant. Although the data demonstrates that the vertical extent of contamination is defined at DM606, the data also demonstrate that the majority of the bedrock at that location contains very high concentrations of TCE even after 18 years of pumping at the OCC.

The TCE trends observed in the bedrock ports of DM603 suggest that TCE is slowly migrating upward in response to pumping at the OCC. Concentrations in the deepest port DM603-245 (at 245 feet) have steadily declined from a high of 9,000 ug/l in 1994 to 54.7 ug/l in 2010. The concentrations in the second deepest port DM603-205 (at 205 feet) were initially lower than those observed in DM603-245 (at 245 feet) but increased for the first few years of OCC pumping before starting a steady decline that parallels the decline observed in the 245-foot port (Figure 30). The concentrations observed in the 170-foot port DM603-170 have shown a similar trend with concentrations increasing for approximately the first four years of OCC pumping before starting a steady but fluctuating decline. DM603-170 has had generally stable to slightly increasing TCE concentrations since 2003. The concentrations in the interface port of DM603 (DM603-115) showed a steep decline after installation of the well and the OCC pumping started. Beginning in 1992, concentrations have gradually declined with concentrations fluctuating between 1 ug/L and 8 ug/L since 2003. The trends observed in the upper bedrock ports of this well show that the OU1 system pumping of the northern OCC extraction wells is pulling TCE mass upward from the deep bedrock fractures. However, the significant lag time since the start of remedial operations in 1992 for this trend to take effect – even for a well located in close proximity to the extraction wells – demonstrates the significant amount of time required to remove TCE from the bedrock.

DM605, a Westbay well with ports screened in alluvium (DM605-105) and bedrock (DM605-170, DM605-240, and DM605-290) is located downgradient of the OCC, but within the capture zone. DM605-105 is screened across the alluvium/bedrock interface and, thus, reflects some of the concentrations in the fracture zones of the upper bedrock. DM605-105 initially had high TCE concentrations during Baseline sampling, but quickly declined to below 50 ug/L and has since continued to gradually decline with some fluctuation. Except for a temporary spike in 2005, TCE concentrations in DM605-105 have been below 5 ug/l for the last several years, demonstrating that the extraction system is effective at containing the plume and supporting the interpretation that the plume inside the capture zone has separated from the observed downgradient plume. TCE concentrations in the shallow bedrock port of DM605, DM605-170, gradually rose until about 1999. Since 1999 concentrations have been gradually declining (see Figure 30 and Table 11). Concentrations in the deeper bedrock ports of DM605 have been below the detection limit for many years.

Downgradient Wells

Monitor wells DM120 and DM502 are located downgradient of the OU1 system. DM502 is a Westbay well with ports screened in the alluvium at 79 feet and 119 feet. Figure 30 shows that the TCE concentrations in these ports declined from the highs observed in 1994. Concentrations in this well have remained low and relatively stable for the last 10 years. After a small fluctuation a few years ago, concentrations had subsequently declined to below 5 ug/L. However, in 2010 TCE increased to 8.4.ug/l. DM120 is a conventional well screened in alluvium. The TCE concentration trend (see Figure 30 and Table 11) in this well was generally downward from 1992 through 2000 with concentrations dropping to below 5 ug/l, but then fluctuating up and down with a high of 17 ug/L in 2005 and a September 2010 result of 11.48 ug/L. It is possible, although unclear from the data, that the observed increases from 2003 to 2005 were related to OU1 shutdowns – either the 2003 shutdown, or earlier short-duration shutdowns.

After many years below the detection limit, PCE was detected in DM120 in 2007 and has been gradually increasing to 7.1 ug/L in September 2010. As discussed above, the PCE appears to be migrating around the north end of the OCC capture zone from an unknown source.

Monitor well DM607 is located between DM120 and the OU1 capture zone. TCE concentrations in DM607-146 have fluctuated, with no definite trend since it was installed in 2007. In September 2010, TCE results from DM607-146 increased to 4.89 ug/l in the alluvial port. PCE concentrations in DM607-146 were also observed to increase from 1 ug/L in September 2009 to 4.83 ug/L in September 2010.

Evaluation of Water Quality Trends

Although variability may be seen in individual wells, largely due to the movement of mass within the system in response to pumping and the complexities of groundwater flow and contaminant transport within fractured media, the overall trends are consistent with the conceptual site model. Constant to increasing concentration trends are observed in wells near the source zone and between the source zone and the OCC extraction wells due to the continuing source present in the bedrock aquifer. The overall concentration trends observed in down gradient sentinel monitor wells have been downward indicating the establishment of an effective capture zone. Recent variations in TCE concentrations in select wells, plus the likely influx of an additional unidentified source of PCE have complicated the capture evaluation. The available data indicate that there are data gaps in the north and northwestern portion of the OU1 area that should be analyzed further to support the overall evaluation of capture. A Work Plan will be developed to describe the investigations recommended to address the data gaps.

5.0 BEDROCK PILOT STUDY

The purpose of the Bedrock Pilot Study is to evaluate the permeability of the bedrock near the source area and ascertain the practicability of bedrock groundwater extraction and its potential to remove mass and enhance the extent of vertical capture in bedrock. The Bedrock Pilot Study began in March 2008 with the submittal of a draft work plan to ADEQ EPA and, with revisions, was approved in a letter from ADEQ and EPA dated September 4, 2008. Three new wells were installed in late December 2008 – early January 2009 as part of the Bedrock Pilot Study. Analytical test results from groundwater sampling in the third and fourth quarters of 2010 are provided in this report. A report from the first six months of the study, ***Bedrock Pilot Study Preliminary Findings Report, 52nd Street Superfund Site, OU1 Area,*** was submitted to ADEQ in April 2010. The summary and compilation of results of groundwater sampling and water level measurements obtained between January 2009 and September 2010 from select wells as part of the Bedrock Pilot Study was submitted to ADEQ in a transmittal letter ***52nd Street Superfund Site – Bedrock Pilot Study Data*** dated December 10, 2010. Data from the Bedrock Pilot Study has also been included in the semi-annual data submittals for the 52nd Street Superfund Site. A report summarizing the first year of operations is scheduled to be submitted to ADEQ in April 2011. Pursuant to the workplan completed for the Bedrock Pilot Study, two new bedrock monitor wells and one bedrock extraction well were installed in late 2009 near the courtyard, just north of the 50th Street truck gate. The locations of the new wells are shown on Figures 1 and 33. The boreholes were geophysically logged by Acoustic Optical Televiewer methods, three arm caliper logs and heat-pulse flow meter logs. Testing of the wells was conducted with a step-test and a 48-hour constant rate pumping test. A summary of the well installation, logging of the boreholes and initial sampling was prepared and submitted to the agencies in a letter report dated September 8, 2009.

The bedrock extraction well was connected to the IGWTP pipeline and continuous operations began on September 9, 2009. Additional water level measurements and groundwater samples have been collected as part of the Bedrock Pilot Study in accordance with the monitoring schedule prepared for the workplan. Figure 34 presents a graph of groundwater elevation versus time for the bedrock wells closest to DM314. The red vertical line on the graph shows when pumping was started in DM314. The graph shows that after DM314 started pumping the groundwater elevations in the monitor wells declined at different rates. Large downward spikes observed in some of measurements were caused by purging for sampling events in those wells. Upward spikes are the result of DM314 being shut off for maintenance. More detailed analysis of water level data is presented in the ***Bedrock Pilot Study Preliminary Findings Report.*** Due to the low production rate, DM314 cycles on and off when water level sensors in the well are triggered. The well pumps for approximately 30 minutes and then recovers for about two hours before the water level recovers and triggers the next pumping cycle. The well pumps at a rate of approximately 5 gpm when operating and in 2010 it averaged about 0.7 gpm for the whole on/off cycle. During 2010 operation, TCE concentrations in well DM314 ranged from 1,140 ug/L to 81,000 ug/L. The 1,140 ug/L TCE result is considered anomalous. From pumping at DM314 in 2010, an estimated 200 pounds of VOCs were recovered from approximately 308,425 gallons of groundwater. Analytical results from these new wells and pumping data from the new extraction well are provided in this report.

The water level elevations presented for Section A-A' on Figure 12 passes through the Bedrock Pilot study area. The water elevation data indicate that the installation and operation of DM314 has significantly increased the vertical extent of capture at the 52nd Street facility as compared to prior years. In the vicinity of DM314, the vertical extent of capture extends beneath the maximum extent of contamination as demonstrated by the water elevation and water quality data in DM615.

Initial TCE concentrations in bedrock wells, before DM314 started pumping, are presented in plan view on Figure 33 and in cross-section on Figure 36. The August/September TCE concentrations, representing conditions after approximately one year of DM314 operations, are presented in plan view and cross-section on Figures 37 and 38 respectively. A comparison of Figures 33 to Figure 35 shows that the areal TCE distribution did not change substantially after one year of pumping DM314. The most significant change in the plan view map comparison is the reduction observed in MP36-C from 350,000 ug/L in 2009 to 150,000 ug/L in 2010. A comparison of TCE concentrations shown on the cross-sections, Figures 36 and 38, shows significant reductions in several wells. In DM615, the TCE concentration declined from 1,500 ug/L to 4.28 ug/L. The TCE observed in DM614 declined from 610,000 ug/L in 2009 to 65,000 ug/L in 2010. In DM601 the TCE concentration in the deepest port (200 ft) showed a reduction from 78,000 ug/L in 2009 to 16,500 ug/L in 2010 while the next port above it (135 ft) showed an increase from 2,900 ug/L in 2009 to 18,100 ug/L in 2010. The increased TCE concentration observed in DM601-135 is probably due to an upward vertical gradient caused by pumping DM314.The Bedrock Pilot Study extraction well, DM314, has been in operation since September 2009. The average pumping rate in 2010 was less than one gallon per minute but due to the elevation concentrations observed in this well a significant amount of mass has been removed. Concentration trends observed in nearby bedrock monitoring wells are mixed and should continue to be monitored. More detailed analysis is presented in the ***Bedrock Pilot Study Preliminary Findings Report*** and additional analysis will be presented in a report summarizing the first year of operations which is scheduled to be submitted in April 2011.

6.0 SUMMARY AND CONCLUSIONS

With the pending closure of ON Semiconductor's 52nd Street manufacturing facility in later 2011, Freescale and Clear Creek will continue to work on selection of an end use option for beneficial end use of the treated groundwater from the OU1 IGWTP. Freescale/Clear Creek received ADEQ/EPA approval of the interim sanitary sewer discharge alternative as part of the ADEQ/EPA comments on the ***Evaluation of Remediated Groundwater End Use Options*** (June 10, 2009) in a letter dated July 14, 2009. The pipeline connecting the IGWTP to the City sanitary sewer was completed in 2010 and Freescale obtained its Industrial Wastewater permit from the City of Phoenix in early 2011. This discharge option will be available when the ON Semiconductor manufacturing facility closes or is not able to use the treated water and prior to construction of the longer term solution for end use remediation of treated groundwater.

On behalf of Freescale, Clear Creek submitted a ***Final Evaluation Report - End Use Alternatives for Remediated Groundwater – Operable Unit No. 1, 52nd Street Superfund Site*** to ADEQ on December 10, 2010. Based on this analysis, as its preferred alternative, Freescale has proposed discharging treated water to the Grand Canal via the Old Crosscut Canal using a pipeline from the IGWTP along 50th and Culver Streets (in City of Phoenix Right-of-Way), across the Brunson-Lee Elementary School property, and then to the Old Crosscut Canal. The previously approved discharge to City of Phoenix sanitary sewer would be used as an alternative for discharge of the treated water during maintenance and canal dry-up periods. Freescale and Clear Creek will continue working on the selected alternative end use and related property agreements, permitting, planning, and design.

The OU1 remedy had an operational uptime of 93.5 percent for 2010. Approximately 123.5 million gallons (379 acre feet) of contaminated groundwater were extracted at an average pumping rate of 251 gpm in 2010. The extracted water was treated and provided to ON Semiconductor for use in its manufacturing processes. The average flow rate in 2010 was slightly higher than the average flow rate in 2009. An estimated 793 pounds (65 gallons) of VOCs were removed from the groundwater and disposed of as hazardous waste. Included in this amount are 8.7 pounds (0.53 gallons) of VOCs that were extracted as DNAPL and as groundwater with high VOC concentrations from monitor well MP03-D in the bedrock onsite. Through 2010, approximately 3.19 billion gallons (9,786 acre feet) of water have been extracted and treated and an estimated 21,178 pounds (1,739 gallons) of VOCs have been recovered.

Groundwater contours resulting from operation of the OU1 system were used to define the zone of capture for 2010. The zone of capture derived from the interpretation of groundwater level data is estimated to contain the horizontal and vertical extent of contamination (Figures 12 and 20).

Total drawdown on the order of 20 to 30 feet has been measured in the alluvium and bedrock at or near the OCC. Observed drawdowns in the bedrock were of the same order of magnitude as drawdowns in the alluvium. Total drawdown refers to both regional decline from the multi-year drought and drawdown caused by OU1 pumping. Although total drawdown since the start of operations is over 30 feet in some wells near the OCC due to operations of the OU1 system and the regional water level decline, the amount of drawdown observed year to year is much smaller. In fact, increased water level elevations are observed in monitor wells near and west of the OCC. The increase of water level elevations is probably related to increased recharge in recent years and recent reductions in the regional groundwater pumping. Based on the general stability of the average flow rates, and the minimal drawdown observed year to year, potential dewatering of the alluvial aquifer remains a long-term issue, but is not an immediate concern. However, due to the observed increases in concentration in several monitor wells, evaluating how the pumping at the OCC can be operated to optimize capture should be further evaluated

As per EPA (2008) guidance, capture zone calculations were performed in addition to interpretation of groundwater level data. Although the assumptions for these calculations greatly simplify the hydrogeologic system, the calculations are useful to generally estimate the capture zone using a different assessment method. Estimated flow rates to capture the width of the observed plume were calculated per EPA guidance (EPA, 2008) and indicated that current pumping rates would be sufficient to maintain capture. A calculation of capture zone width was conducted using a range of saturated thicknesses. The calculated capture zone width using this method reasonably matches the width of the observed capture zone using water level data.

Groundwater modeling was conducted as part of the remedial alternatives analysis in 2005. The model was calibrated to 2003 and then the model was used to evaluate future scenarios. One scenario was to simulate 2003 pumping rates and other current conditions into the future. A comparison of the model-predicted capture zone after 5 years (year 2008) is nearly identical to the capture zone derived from interpretation of the 2008 water level data.

The overall pattern of TCE concentrations in groundwater remained consistent with the pattern observed in previous years. The reduction in TCE concentrations in the alluvium and bedrock at and downgradient of the OCC indicates that continuous pumping of the OU1 effectively captures the width and depth of the plume and has had a beneficial effect on water quality. However, the elevated and relatively stable VOC concentrations in the alluvium and bedrock in the Courtyard Area and at and upgradient of the OCC demonstrate the extended time frames required to see a reduction in TCE concentrations despite the mass that has been removed from over 24 years of remedial operations on-site and over 18 years of remediation off-site. Also, additional elevated TCE and PCE migrating around the north end of the OCC capture zone indicates contributions from another source.

Based on a review of available water level and water quality data, Clear Creek Associates concludes that the OU1 groundwater remedy is effective at containing the observed width and depth of the contaminant plume at the OCC. Multiple lines of evidence were evaluated to support the conclusion regarding the extent of capture. Water level elevation contour maps show that groundwater flow in an area wider and deeper than the observed plumes upgradient of the OCC is directed towards the extraction wells. The water elevation contour maps are supported by multiple lines of evidence including the observed extent of apparent drawdown, the calculated flow rate, the calculated capture zone width and numeric groundwater modeling. Additionally, the overall decreasing TCE concentration trends observed in the OCC extraction wells and wells downgradient of the estimated capture zone also support the conclusion that the OU1 system has established an effective capture zone in the vicinity of the OCC.

While the overall concentration trend observed in down gradient sentinel monitor wells has been downward, recent variations in TCE concentrations in select wells, plus the likely influx of an additional unidentified source of PCE have complicated the capture evaluation. The available data indicate that there are data gaps in the north and northwestern portion of the OU1 area that should be analyzed further to support the overall evaluation of capture. A Work Plan will be developed to describe the investigations recommended to address the data gaps.

Three new wells were installed in late December 2008 – early January 2009 as part of the Bedrock Pilot Study. Analytical test results from groundwater sampling in 2010 are provided in this report. The pumping of groundwater from the bedrock at DM314 has been effective in increasing the vertical extent of capture on-site and in removing mass and the well should continue to be operated as part of the OU1 system. Continued monitoring should also be conducted to further evaluate the long term effectiveness.

7.0 REFERENCES

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TABLES

TABLE 1

52nd STREET SUPERFUND SITE
OU1 GROUNDWATER MONITORING SCHEDULE AND SAMPLING SUMMARY 2010

Well Name	Well Type [a]	Depth of Sample Point (ft)	Geologic Unit [b]	Groundwater Monitoring Plan Sampling and Monitoring Schedule			Sampling and Monitoring Completed During 2010						
				Water Quality Sampling and Analysis		Water Levels [d]	Routine Water Quality Sampling and Analysis		Water Levels [d]	Additional Sampling Bedrock Pilot Study 2010 Q1	Additional Sampling Bedrock Pilot Study 2010 Q2	Additional Sampling Bedrock Pilot Study 2010 Q3	Additional Sampling Bedrock Pilot Study 2010 Q4
				Q1	Q3		2010 Q1	2010 Q3					
DM107	C	29	AB			Q			Q				
DM111	C	24	A			Q			Q - Dry				
DM112	C	23	AB			Q			Q - Dry				
DM114	C	61	A			Q			Q				
DM115	C	52	A			Q			Q - Dry				
DM117	C	38	A			Q			Q - Dry				
DM118	C	118	A		VOC	Q		VOC	Q				
DM119	WB	72	A		VOC	Q		VOC	Q				
		98	A		VOC	Q		VOC, VOCD	Q				
		137	AB		VOC	Q		VOC	Q				
		204	B		VOC	Q		VOC	Q				
		244	B			Q			Q				
		284	B			Q			Q				
DM120	C	140	A	VOC	VOC	Q	VOC	VOC	Q				
DM122A	C	62	A			Q			Q - Dry				
DM122B	C	96	AB		VOC	Q		VOC	Q				
DM124	C	40	A			Q			Q				
DM125	WB	44	A	VOC	VOC	Q	DRY	DRY	Q - DRY				
		76	AB	VOC	VOC	Q	VOC	VOC, VOCD	Q				
		125	B	VOC	VOC	Q	VOC	VOC	Q				
		155	B	VOC	VOC	Q	VOC	VOC	Q				
		185	B	VOC	VOC	Q	VOC	VOC	Q				
		270	B	VOC	VOC	Q	VOC	VOC	Q				
DM201	E	102	AB		VOC	Q		VOC	Q				
DM201-OB1	E	118	AB		VOC	Q		VOC	Q				
DM201-OB2	C	99	AB			Q			Q				
DM301	E	98	AB		VOC	Q		VOC	Q				
DM302	E	96	AB		VOC	Q		VOC	Q				
DM303	E	92	AB		VOC	Q		VOC	Q				
DM304	E	92	AB		VOC	Q		VOC	Q				
DM305	E	107	AB		VOC	Q		VOC	Q				
DM306	E	107	AB		VOC	Q		VOC	Q				
DM307	E	128	AB		VOC	Q		VOC	Q				
DM308	E	135	AB		VOC	Q		VOC	Q				
DM309	E	165	AB		VOC	Q		VOC	Q				
DM310	E	140	AB		VOC	Q		VOC	Q				
DM311	E, C	108	AB		VOC	Q		VOC	Q				
DM312	C	103	AB		VOC	Q		VOC	Q				
DM313	C	93	AB		VOC	Q		VOC	Q				
DM314[e]	E	190	B			Q			Q	VOC, VOCD	VOC	VOC	VOC
DM502	WB	79	A	VOC	VOC	Q	VOC	VOC	Q				
		119	AB		VOC	Q		VOC	Q				
		161	B		VOC	Q		VOC	Q				
		240	B			Q			Q				
		335	B			Q			Q				
DM503	C	88	AB		VOC-Biennial[c]	Q			Q				
DM601	WB	40	AB		VOC	Q		DRY	Q - DRY				
		85	B		VOC	Q		VOC	Q	VOC	VOC	VOC	VOC
		135	B		VOC	Q		VOC	Q	VOC	VOC	VOC	VOC
		200	B		VOC	Q		VOC	Q	VOC	VOC	VOC	VOC
DM602	C	120	AB	VOC	VOC, I	Q	VOC	VOC	Q				
DM603	WB	68	A	VOC	VOC	Q	DRY	DRY	Q - DRY				
		115	AB	VOC	VOC, I	Q	VOC	VOC, VOCD	Q				
		170	B	VOC	VOC	Q	VOC	VOC	Q				
		205	B	VOC	VOC	Q	VOC	VOC	Q				
		245	B	VOC	VOC	Q	VOC	VOC	Q				
DM604	C	130	AB	VOC	VOC, I	Q	VOC	VOC	Q				
DM605	WB	66	A	VOC	VOC	Q	DRY	DRY	Q - DRY				
		105	AB	VOC	VOC, I	Q	VOC, VOCD	VOC, VOCD	Q				
		170	B	VOC	VOC	Q	VOC	VOC	Q				
		240	B	VOC	VOC	Q	VOC	VOC	Q				
		290	B	VOC	VOC	Q	VOC	VOC	Q				
DM606	WB	45	AB		VOC	Q		DRY	Q - Dry				
		102	B		VOC	Q		VOC	Q				
		185	B		VOC	Q		VOC	Q	VOC			
		250	B		VOC	Q		VOC	Q	VOC			
		330	B		VOC	Q		VOC	Q				
		370	B		VOC	Q		VOC	Q				

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OU1 GROUNDWATER MONITORING SCHEDULE AND SAMPLING SUMMARY 2010

Well Name	Well Type [a]	Depth of Sample Point (ft)	Geologic Unit [b]	Groundwater Monitoring Plan Sampling and Monitoring Schedule: Water Quality Sampling and Analysis Q1	Water Quality Sampling and Analysis Q3	Water Levels [d]	Sampling and Monitoring Completed During 2010: Routine Water Quality Sampling and Analysis 2010 Q1	Routine Water Quality Sampling and Analysis 2010 Q3	Water Levels [d]	Additional Sampling Bedrock Pilot Study 2010 Q1	Additional Sampling Bedrock Pilot Study 2010 Q2	Additional Sampling Bedrock Pilot Study 2010 Q3	Additional Sampling Bedrock Pilot Study 2010 Q4
DM607	F	146	AB	VOC	VOC	Q	VOC, VOCD	VOC	Q				
		210	B	VOC	VOC	Q	VOC	VOC	Q				
		310	B	VOC	VOC	Q	VOC	VOC	Q				
		400	B	VOC	VOC	Q	VOC	VOC	Q				
DM609	C	93	A	VOC	VOC	Q	VOC	VOC	Q				
DM610	C	193	B	VOC	VOC	Q	VOC	VOC, VOCD	Q				
DM611	C	87	A	VOC	VOC	Q	VOC	VOC, VOCD	Q				
DM612	C	218	B	VOC	VOC	Q	VOC, VOCD	VOC	Q				
DM613	C	395	B	VOC	VOC	Q	VOC	VOC	Q				
DM614[e]	C	250	B			Q		VOC, VOCD	Q	VOC	VOC	VOC(2)	VOC
DM615[e]	C	375	B			Q			Q	VOC	VOC, VOCD	VOC(2)	VOC, VOCD
DM701	C	80	AB			Q			Q				
DM702	E	70	AB		VOC	Q		VOC	Q				
DM703	E	70	AB		VOC	Q		VOC	Q				
DM704	E	70	AB		VOC	Q		VOC	Q				
DM705	E	70	AB		VOC	Q		VOC	Q				
DM706	E	70	AB		VOC	Q		VOC, VOCD	Q				
DM707	E	70	AB		VOC	Q		VOC	Q				
DM713	E	48	AB		VOC	Q		VOC	Q				
DM714	E	48	AB		VOC	Q		VOC	Q				
DM715	C	48	AB			Q			Q				
DM716	C	48	AB			Q			Q				
DM718	E	49	AB		VOC	Q		VOC	Q				
DM720	C	48	AB			Q			Q				
DM721	WB	45	AB			Q			Q				
		65	B			Q			Q				
		125	B			Q			Q				
		185	B			Q			Q				
		260	B			Q			Q				
		280	B			Q			Q				
DM722	WB	47	AB			Q			Q				
		100	B			Q			Q				
		145	B			Q			Q				
		190	B			Q			Q				
		240	B			Q			Q				
		280	B			Q			Q				
DM723	C	75	AB		VOC	Q		VOC	Q				
DM724	E	75	AB		VOC	Q		VOC	Q				
DM725	C	75	AB			Q			Q				
DM726	C	75	AB		VOC	Q		VOC	Q				
DM727	C	75	AB			Q			Q				
DM728	C	75	AB			Q			Q				
DM729	WB	50	AB		VOC	Q		VOC	Q				
		145	B			Q			Q				
		195	B			Q			Q				
		255	B			Q			Q				
		285	B			Q			Q				
DM733	C	70	AB		VOC	Q		VOC	Q				
DM735	C	75	AB		VOC	Q		VOC	Q				
EW18	C	96	AB	VOC	VOC	Q	VOC	VOC	Q				
MP03-B	MP	73	A			Q			Q - Dry				
MP03-C	MP	134	B							VOC, WL		VOC, WL	
MP03-D	MP	162	B			Q			Q	VOC		VOC	
MP09-B	MP	66	AB			Q			Q				
MP09-C	MP	135	B							VOC, WL		VOC, WL	
MP09-D	MP	169	B			Q			Q	VOC		VOC	
MP11-B	MP	46	AB		VOC	Q		VOC	Q				
MP11-C	MP	130	B							VOC, VOCD, WL		VOC, VOCD, WL	
MP11-D	MP	162	B		VOC	Q		VOC	Q	VOC(5), VOCD		VOC, VOCD	
MP13-B	MP	46	AB		VOC	Q		VOC	Q				
MP13-D	MP	175	B		VOC	Q		VOC	Q				
MP16-A	MP	42	A			Q			Q				
MP16-B	MP	55	AB		VOC	Q		VOC	Q				
MP16-C	MP	139	B			Q			Q				
MP16-D	MP	170	B		VOC	Q		VOC, VOCD	Q				
MP20-A	MP	61	A		VOC	Q		VOC	Q				
MP20-B	MP	81	B		VOC-Biennial[c]	Q		VOC(2)	Q				
MP25-A	MP	41	AB			Q			Q				

TABLE 1

52nd STREET SUPERFUND SITE
OU1 GROUNDWATER MONITORING SCHEDULE AND SAMPLING SUMMARY 2010

Well Name	Well Type [a]	Depth of Sample Point (ft)	Geologic Unit [b]	Groundwater Monitoring Plan Sampling and Monitoring Schedule			Sampling and Monitoring Completed During 2010						
				Water Quality Sampling and Analysis		Water Levels [d]	Routine Water Quality Sampling and Analysis		Water Levels [d]	Additional Sampling Bedrock Pilot Study 2010 Q1	Additional Sampling Bedrock Pilot Study 2010 Q2	Additional Sampling Bedrock Pilot Study 2010 Q3	Additional Sampling Bedrock Pilot Study 2010 Q4
				Q1	Q3		2010 Q1	2010 Q3					
MP25-D	MP	260	B			Q			Q				
MP28-A	MP	50	AB			Q			Q				
MP30-A	MP	63	A			Q			Q				
MP30-B	MP	78	AB		VOC	Q		VOC	Q				
MP30-C	MP	126	B							VOC, WL		VOC, WL	
MP30-D	MP	175	B		VOC	Q		VOC	Q	VOC		VOC	
MP36-A	MP	44	A			Q			Q				
MP36-B	MP	74	AB			Q			Q				
MP36-C	MP	134	B			Q			Q	VOC	VOC	VOC	VOC
MP36-D	MP	169	B			Q			Q	VOC	VOC	VOC, VOCD	VOC
WT-K	C	50	A		VOC, I	Q		VOC, I	Q				
AZNGD-1	P	35	AB		I	Q		I	Q				
LANGMADE	P	69	B			Q			Q				

Notes:

This table presents the monitor and extraction wells and the OU1 Groundwater Monitoring Schedule as per the Groundwater Monitoring Plan, 52nd Street Superfund Site, Operable Unit 1 for Freescale Semiconductor, Inc. – April 2009 with amendments, and approved by ADEQ on September 14, 2009 and a summary of the Water Quality Sampling and Analysis and measurement of Water Levels as actually obtained during the reporting period. Sampling conducted as part of the routine monitoring is indicated in the summary portion of the table. Additional sampling as part of the Bedrock Pilot Study is noted in this table by quarter and the water quality and water level data results are presented in tables in this report and discussed in the text.

[a] WB = Westbay well, C = conventional well, MP = multi-port (cluster) well, PC = private conventional well, E = extraction well, PZ = piezometer, F = Flute well. Wells DM311, DM312, and DM313 were constructed as extraction wells but are currently being used as monitoring wells. Use of privately-owned conventional wells in the sampling program is contingent upon access.

[b] Geologic unit definitions were modified in January 1996 to reflect current interpretations of the location of the alluvium/bedrock interface: A = Alluvium, AB = Alluvium/Bedrock Interface, B = Bedrock.

[c] Biennial sampling takes place on odd number years, i.e. 2009, 2011, 2013, etc.

[d] Q = Quarterly, additional water level measurements will be obtained during each sampling event prior to purging the well

[e] Wells DM314, DM614, and DM615 are currently being evaluated as part of the bedrock pilot study and were sampled as part of that evaluation. They will be added to the ongoing monitoring schedule at the conclusion of the bedrock pilot study.

Q1 Quarter: Q1 is January – March, Q2 is April – June, Q3 is July – September, Q4 is October – December

VOC Volatile Organic Compounds by EPA Method 8260B

VOCD Duplicate Sample - Volatile Organic Compounds by EPA Method 8260B

(2) Number in parentheses indicates total number of particular samples taken for time period where more than one sample was taken.

I Inorganic Compounds includes: Arsenic (by EPA 200.8), Boron (by EPA 200.7), and Nitrate (by EPA 300.0)

DRY Well or well port was dry so water level and water sample could not be obtained.

WL Water Level

TABLE 2

AVERAGE PUMPING RATES FOR OU1 WELLS BY YEAR
(in gallons per minute)

Year	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*
Onsite wells	45	39	45	38	41	43	42	46	43	43.6	41.4	43.0	31	34.2	33.7	28.8	23.0	9.3	27.9
Offsite Wells on OCC	450-500	550	540	518	433	388	342	338	311	285	229	287	198	256	262.6	237.1	218.7	235.5	220.8
SWPL Wells	3.7	4.8	3.2	2.8	2.6	2.8	2.8	2.3	1.9	2.6	1.9	1.7	1.3	2.2	2.0	1.9	2.2	2.1	2.5

TABLE 3

SUMMARY OF OU1 GROUNDWATER WITHDRAWAL FOR 2010

Well	January	February	March	April	May	June	July	August	September	October	November	December	2010 Total	2010 Total
Onsite Wells	GALLONS	GALLONS	GALLONS	GALLONS	GALLONS	GALLONS	GALLONS	GALLONS	GALLONS	GALLONS	GALLONS	GALLONS	GALLONS	ACRE-FEET
DM301	139,821	144,340	153,480	131,207	151,495	155,201	148,061	175,394	179,622	195,193	139,040	79,785	1,792,639	5.50
DM302	413,013	380,919	397,452	381,513	437,034	419,313	382,649	390,939	401,871	420,264	323,465	275,312	4,623,744	14.19
DM303	510,702	548,701	581,405	555,613	599,113	509,258	453,795	511,545	492,768	474,465	529,116	292,660	6,059,141	18.59
DM304	101,126	87,413	86,396	82,193	91,424	80,253	72,243	75,566	69,730	75,356	60,953	52,169	934,822	2.87
DM314	30,987	26,415	30,233	31,572	35,167	31,637	27,609	28,479	17,004	***	27,128	22,194	308,425	0.95
Month Totals	**1,195,649**	**1,187,788**	**1,248,966**	**1,182,098**	**1,314,233**	**1,195,662**	**1,084,357**	**1,181,923**	**1,160,995**	**1,165,278**	**1,079,702**	**722,120**	**13,718,771**	**42.10**
Quarter Totals		**Q1 Total**	**3,632,403**		**Q2 Total**	**3,691,993**		**Q3 Total**	**3,427,275**		**Q4 Total**	**2,967,100**		
Offsite Wells	GALLONS	GALLONS	GALLONS	GALLONS	GALLONS	GALLONS	GALLONS	GALLONS	GALLONS	GALLONS	GALLONS	GALLONS	GALLONS	ACRE-FEET
DM305	357,335	340,072	365,259	353,224	276,061	327,595	240,578	320,722	315,668	350,884	286,113	251,072	3,784,583	11.61
DM306	102,961	97,870	106,007	112,717	125,396	115,839	101,330	116,658	117,725	124,606	93,267	76,482	1,290,858	3.96
DM307	1,021,105	948,236	991,155	980,435	1,054,982	946,300	871,849	1,010,668	920,986	979,925	758,897	657,477	11,142,015	34.19
DM308	1,169,188	1,081,911	1,109,877	1,195,265	1,327,729	1,160,964	1,093,036	1,266,008	1,289,860	1,354,568	1,028,112	871,567	13,948,085	42.80
DM309	3,509,799	3,056,101	3,549,300	3,932,200	4,354,999	3,980,301	3,371,499	3,833,501	4,122,500	4,335,200	3,212,100	2,661,399	43,918,899	134.76
DM310	2,836,172	2,711,491	2,870,820	3,061,899	3,354,761	3,018,831	2,578,513	2,944,646	3,138,149	3,292,314	2,500,936	2,112,383	34,420,915	105.62
DM311	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE
DM312	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE
DM313	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE
Month Totals	**8,996,560**	**8,235,681**	**8,992,418**	**9,635,740**	**10,493,928**	**9,549,830**	**8,256,805**	**9,492,203**	**9,904,888**	**10,437,497**	**7,879,425**	**6,630,380**	**108,505,355**	**332.94**
Quarter Totals		**Q1 Total**	**26,224,659**		**Q2 Total**	**29,679,498**		**Q3 Total**	**27,653,896**		**Q4 Total**	**24,947,302**		
SWPL/AD Wells	GALLONS	GALLONS	GALLONS	GALLONS	GALLONS	GALLONS	GALLONS	GALLONS	GALLONS	GALLONS	GALLONS	GALLONS	GALLONS	ACRE-FEET
DM201	7,211	6,169	6,533	6,436	6,896	6,647	6,984	7,439	7,066	7,235	5,825	4,350	78,791	0.24
DM201OB1	81,321	68,523	68,813	65,304	57,435	58,116	69,888	81,773	69,730	76,104	45,357	27,155	769,519	2.36
DM702	12,076	10,655	11,664	11,944	13,007	11,657	11,553	12,776	12,121	12,537	8,932	6,115	135,037	0.41
DM703	2,511	2,200	2,482	2,518	2,991	2,851	2,602	2,815	2,628	2,740	2,373	1,934	30,645	0.09
DM704	4,368	3,796	4,168	4,253	4,831	4,544	4,431	4,765	4,393	4,578	3,743	3,047	50,917	0.16
DM705	744	599	672	680	848	854	807	883	815	787	714	488	8,891	0.03
DM706	1,371	1,088	1,152	1,285	1,933	2,279	2,146	2,262	1,909	1,853	1,519	1,061	19,858	0.06
DM707	4,416	3,902	4,544	4,828	5,914	5,109	4,723	5,039	4,989	5,229	4,002	4,122	56,817	0.17
DM713	1,269	988	1,374	2,079	3,190	3,577	2,888	2,456	2,029	1,828	1,404	1,282	24,364	0.07
DM714	5	3	10	1,217	4,632	3,574	1,118	26	10	15	4	7	10,621	0.03
DM718	5	5	40	698	1,199	1,098	870	870	1,208	1,597	1,201	1,013	9,804	0.03
DM724	4,680	4,190	4,690	4,969	6,130	5,475	4,607	5,244	4,700	4,749	3,764	3,084	56,282	0.17
Month Totals	**119,977**	**102,118**	**106,142**	**106,211**	**109,006**	**105,781**	**112,617**	**126,348**	**111,598**	**119,252**	**78,838**	**53,658**	**1,251,546**	**3.84**
Quarter Totals		**Q1 Total**	**328,237**		**Q2 Total**	**320,998**		**Q3 Total**	**350,563**		**Q4 Total**	**251,748**		
Quarter Totals		**Gallons Total**	**30,185,299**		**Gallons Total**	**33,692,489**		**Gallons Total**	**31,431,734**		**Million Gallons Total**	**28,166,150**		
		Million Gallons Total	**30.19**		**Million Gallons Total**	**33.69**		**Million Gallons Total**	**31.43**		**Million Gallons Total**	**28.17**		
		Acre-feet	**92.62**		**Acre-feet**	**103.38**		**Acre-feet**	**96.45**		**Acre-feet**	**86.43**	**GALLONS**	**ACRE-FEET**
												2010 Totals	**123,475,672**	**378.88**

NOTES:
DM-303 flow meter error code reset on 2/26/10 at 0930. Flow amount for 2/1 to 2/26 was estimated based on average flow rate.
DM-307 totalizer zeroed itself out on 8/4. Used average flow rate for well to estimate date zeroed out and flow reading prior to zeroing. Totalizer replaced.
DM-307 totalizer replaced on 9/16. Reading when changed out was 1350633. New totalizer at zero on 9/16.
DM-303 flowmeter malfunctioned on 9/24. Used average flow rate for well to estimate flow amount for month. Flowmeter being replaced.
*** DM-314 reading anomalous on 11/1; totalizer reading dropped. Meter read again on 11/9 and was 201,266 consistent with normal flow from well. Will continue to monitor meter and will repair or replace if needed.
DM-303 flowmeter found to have recorded flow from 12/21 to 12/31 while IGWTP was down. Used typical average flow rate for well to estimate flow amount for month.

SWPL/AD Wells refers to extraction wells (DM201, DM201-OB1, DM702, DM703, DM704, DM705, DM706, DM707, DM713, DM714, DM718, and DM724) in the Southwest Parking Lot and Building A-D area, located in the southwestern portion of the former Motorola 52nd Street facility.
Quarter: Q1 is January – March, Q2 is April – June, Q3 is July – September, Q4 is October – December

SOURCE: GPI Environmental, Inc. 2011

TABLE 4

SUMMARY OF ANNUAL OU1 GROUNDWATER WITHDRAWAL BY WELL

Well	Pre 1992 Total Gallons	1992 Total Gallons	1993 Total Gallons	1994 Total Gallons	1995 Total Gallons	1996 Total Gallons	1997 Total Gallons	1998 Total Gallons	1999 Total Gallons	2000 Total Gallons	2001 Total Gallons	2002 Total Gallons	2003 Total Gallons	2004 Total Gallons	2005 Total Gallons	2006 Total Gallons	2007 Total Gallons	2008 Total Gallons	2009 Total Gallons	2010 Total Gallons
Onsite Wells	7,700,000																			
DM301		2,607,710	3,528,199	6,414,963	3,574,392	3,793,716	7,118,541	6,168,939	5,997,898	5,986,056	5,351,892	4,068,356	3,280,094	3,458,441	2,498,349	2,154,761	1,940,828	1,636,984	581,021	1,792,639
DM302		2,901,786	2,501,335	6,145,921	4,497,700	4,589,214	4,205,204	4,006,081	7,188,611	7,363,763	7,067,199	6,126,101	4,708,633	4,668,278	6,516,902	5,321,537	4,448,456	3,632,763	1,631,746	4,623,744
DM303		3,472,222	2,698,809	7,440,684	8,771,429	8,426,841	5,760,110	6,093,977	7,081,131	6,676,719	6,230,677	5,936,261	4,788,392	6,399,118	7,220,163	8,064,855	7,721,427	6,305,637	1,923,414	6,059,141
DM304		2,423,469	1,777,265	4,893,616	1,764,342	3,806,925	4,590,907	4,410,022	3,376,547	1,601,978	2,675,956	3,329,693	1,769,539	1,596,401	1,221,798	819,614	611,231	527,135	383,114	934,822
DM314																			132,438	308,425
Offsite Wells																				
DM305		11,297,376	13,164,923	25,754,920	23,210,692	20,426,948	18,431,261	15,727,810	13,311,559	11,212,831	8,816,040	8,091,680	4,926,388	5,614,504	5,151,077	4,378,357	3,735,211	3,924,737	4,003,285	3,784,583
DM306		10,393,586	13,480,881	24,500,902	11,294,529	9,485,223	9,213,321	8,394,157	5,916,962	2,636,607	2,314,617	3,196,199	2,598,961	1,900,972	1,672,003	1,399,494	1,192,862	1,301,697	1,246,651	1,290,858
DM307		12,287,415	31,595,814	40,734,592	33,417,870	34,598,845	28,550,979	24,826,853	26,821,698	24,620,768	20,622,301	17,815,406	13,433,739	15,748,364	19,789,029	17,306,359	13,763,026	12,699,989	12,578,251	11,142,015
DM308		9,013,605	13,340,455	32,453,153	31,929,810	33,547,465	35,066,224	23,561,982	21,447,301	16,679,017	19,211,541	19,566,297	14,343,693	15,531,207	17,213,974	15,026,403	12,487,119	14,266,531	14,129,331	13,948,085
DM309		21,209,913	21,590,473	47,843,920	37,572,250	45,980,680	39,127,940	34,331,480	45,731,785	46,541,469	41,753,346	30,223,537	30,326,302	33,047,739	46,879,717	52,468,864	53,329,780	47,556,770	48,609,689	43,918,899
DM310		27,696,793	32,692,891	67,059,573	50,014,058	55,039,693	56,075,067	51,879,384	52,505,190	49,587,023	43,660,541	26,006,282	30,584,707	32,073,849	40,009,221	37,062,620	36,734,925	35,219,972	36,651,098	34,420,915
DM311		16,836,735	12,813,858	31,117,679	14,916,153	17,174,342	11,104,208	10,298,274	6,415,485	4,510,648	2,974,915	2,993,034	691,151	118,172	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE
DM312		6,444,515	4,388,308	12,455,125	9,423,812	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE
DM313		1,454,082	658,246	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE	OFFLINE
SWPL/AD Wells		1,964,286	2,527,995	1,593,075	1,367,276	1,343,084	1,450,972	1,366,081	1,178,834	961,328	1,258,271	876,741	559,252	659,090	1,113,057	978,740	947,431	1,157,306	1,052,669	1,251,546
Total Gallons Pumped	**7,700,000**	**130,003,493**	**156,759,452**	**308,408,123**	**231,754,313**	**238,212,976**	**220,694,734**	**191,065,040**	**196,973,001**	**178,378,207**	**161,937,296**	**128,229,587**	**112,010,851**	**120,816,135**	**149,285,290**	**144,981,604**	**136,912,296**	**128,229,521**	**122,922,707**	**123,475,672**

SUMMATION OU1 SYSTEM TOTAL GALLONS: 3,188,750,298

NOTES:
The pilot treatment plant began treating groundwater from wells DM301 and DM302 in 1986.
Well DM314 went online in December 2009
SWPL/AD Wells refers to extraction wells (DM201, DM201-OB1, DM702, DM703, DM704, DM705, DM706, DM707, DM713, DM714, DM718, and DM724) in the Southwest Parking Lot and Building A-D area, located in the southwestern portion of the former Motorola facility.

TABLE 5

ESTIMATES OF DNAPL REMOVED AT MP03-D

Year	Product Recovered (ml)	Volume Product Recovered (Gallons)	Groundwater Extracted (Gallons)	VOCs Removed as TCE (Pounds)
1994	500	0.13	167	3.1
1995	6977	1.84	753	29.4
1996	1616	0.43	702	11.6
1997	3000	0.79	664	15.7
1998	2280	0.60	622	13.0
1999	2300	0.61	360	10.7
2000	3140	0.83	526	14.9
2001	2280	0.60	448	11.4
2002	4290	1.13	329	16.8
2003	5375	1.42	464	21.6
2004	1190	0.31	328	6.8
2005	2160	0.57	424	10.8
2006	2110	0.56	428	10.7
2007	2240	0.59	497	11.8
2008	1530	0.40	381	8.4
2009	13235	3.50	458	46.8
2010	1990	0.53	250	8.7
TOTALS	56213	15	7801	252

ml = milliliters

Notes:

1. VOCs recovered from the volume of water pumped from MP03-D are estimated based on the solubility limit of TCE in water (1,100,000 ug/l).
2. VOCs removed includes Volume Product Recovered and recovery from Groundwater Extracted
3. Pounds of VOCs = Gallons H_2O pumped * VOCs (1,100,000 ug/L solubility limit of TCE in water) * 1e-6 g/ug * 2.205e-3 lb/g * 3.78 L/gal

TABLE 6

ESTIMATES OF GROUNDWATER AND VOC REMOVAL FROM OPERABLE UNIT NO. 1

Year	Groundwater Extracted (million gallons)	VOCs Removed as TCE (gallons)	VOCs Removed as TCE (pounds)
PTP	7.7	156	1,896
1992	130	187	2,276
1993	157	133	1,620
1994	308	160	1,947
1995	232	97	1,180
1996	238	99	1,211
1997	221	75	913
1998	191	56	691
1999	197	65	788
2000	178	72	872
2001	162	63	766
2002	128	58	712
2003	112	55	674
2004	121	79	959
2005	149	62	760
2006	145	92	1,123
2007	137	74	897
2008	128	50	605
2009	123	41	495
2010	123	65	793
TOTALS	3,188	1,739	21,178

Notes:

1. Before 1992, the Pilot Treatment Plant (PTP) removed a significant mass of VOCs from the Courtyard area. The PTP began treating groundwater from wells DM301 and DM302 in Fall 1986 and from DM303 and DM304 in Spring 1990. The mass of VOCs removed by the PTP is estimated based on historical chemical data and available totalized flow readings. VOCs recovered from MP03-D are also included in this table.

2. Pounds of VOCs = Gallons H_2O pumped * VOCs (ug/L) * 1e-6 g/ug * 2.205e-3 lb/g * 3.78 L/gal

TABLE 7

IGWTP VAPOR CARBON UNIT
(RB-10 VGAC)
AIR SAMPLE RESULTS
(by EPA Method TO-15)

Sample Date	Operating Days	Influent (ppbv)						Effluent (ppbv)						Effluent VOCs
		TCE	PCE	DCE	TCA	cis-12DCE	VC	TCE	PCE	DCE	TCA	cis-12DCE	VC	(lbs/day)
01/08/10	226	470.0	6.3	18.0	34.0	9.6	5.1	1.20	0.50	45.00	0.50	29.00	1.50	0.170
02/12/10	261	1100.0	19.0	46.0	60.0	20.0	5.1	10.00	7.60	51.00	4.00	36.00	0.50	0.260
03/12/10	289	1300.0	48.0	100.0	180.0	51.0	9.9	66.00	4.10	50.00	41.00	33.00	0.88	0.514
04/08/10	316	620.0	20.0	35.0	54.0	18.0	4.9	200.00	0.50	29.00	75.00	20.00	0.71	0.923
05/11/10	**0**	**Carbon changeout performed in vapor phase unit - new RB10 unit from Siemens installed and put online**												
06/11/10	31	440.0	11.0	29.0	51.0	12.0	5.1	0.50	0.50	0.50	0.50	0.50	0.60	0.008
07/16/10	66	1200.0	21.0	48.0	81.0	29.0	0.94	0.50	0.50	43.0	0.50	0.50	0.50	0.100
08/16/10	97	590.0	14.0	38.0	51.0	18.0	0.51	0.50	0.50	43.0	0.50	8.80	0.50	0.118
09/13/10	125	270.0	9.7	30.0	44.0	14.0	0.50	0.50	0.50	42.0	0.50	23.00	0.51	0.147
10/15/10	157	440.0	14.0	26.0	54.0	14.0	5.1	0.50	0.50	43.0	1.8	28.0	0.50	0.164
11/12/10	185	140.0	4.9	11.0	19.0	4.9	4.9	4.40	0.50	42.0	8.6	26.0	0.51	0.189
12/15/10	218	420.0	12.0	16.0	32.0	11.0	0.5	6.10	0.50	13.0	18.0	8.1	0.50	0.120

NOTES:

TCE	Trichloroethene
PCE	Tetrachloroethene
DCE	1,1-Dichloroethene
TCA	1,1,1-Trichloroethane
cis-12DCE	cis-1,2-Dichloroethene
VC	Vinyl chloride
VOC	Volatile Organic Compounds
ppbv	parts per billion by volume
lbs/day	pounds per day

Source: GPI Environmental, Inc. 2011

TABLE 8

IGWTP INFLUENT AND EFFLUENT WATER QUALITY RESULTS 2010
by EPA Method 8260
(in ug/L)

Sample Date	01/08/10	01/08/10	01/22/10	02/12/10	02/12/10	02/26/10	03/12/10	03/12/10	03/26/10	04/08/10	04/08/10	04/22/10	05/07/10	05/07/10	05/20/10	06/11/10	06/11/10	06/21/10
Sample ID	**T101-T102**	**TO D.I.**	**TO D.I.**	**T101-T102**	**TO D.I.**	**TO D.I.**	**T101-T102**	**TO D.I.**	**TO D.I.**	**T101-T102**	**TO D.I.**	**TO D.I.**	**T101-T102**	**TO D.I.**	**TO D.I.**	**T101-T102**	**TO D.I.**	**TO D.I.**
Compounds																		
1,1,1-Trichloroethane	71	<0.50	<0.50	48	<0.50	<0.50	53	<0.50	<0.50	50	<0.50	<0.50	52	<0.50	<0.50	57	<0.50	<0.50
1,1,2,2-Tetrachloroethane		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50
1,1,2-Trichloroethane		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50
1,1-Dichloroethane	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50
1,1-Dichloroethene	29	<0.50	<0.50	23	<0.50	<0.50	22	<0.50	<0.50	23	<0.50	<0.50	24	<0.50	<0.50	26	<0.50	<0.50
1,2-Dichlorobenzene		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50
1,2-Dichloroethane	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50
1,2-Dichloropropane		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50
1,3-Dichlorobenzene		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50
1,4-Dichlorobenzene		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50
Benzene		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50
Bromodichloromethane		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50
Bromoform		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0
Bromomethane		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0
Carbon Tetrachloride		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50
Chlorobenzene		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50
Chloroethane		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0
Chloroform		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50
Chloromethane		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0
cis-1,2-Dichloroethene	13	<0.50	<0.50	9.9	<0.50	<0.50	9.4	<0.50	<0.50	12	<0.50	<0.50	11	<0.50	<0.50	11	<0.50	<0.50
cis-1,3-Dichloropropene		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50
Dibromochloromethane		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50
Dichlorodiflouromethane		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50
Ethylbenzene		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50
m,p-Xylenes		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0
Methylene Chloride		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0
o-Xylene		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50
Tetrachloroethene	23	<0.50	<0.50	18	<0.50	<0.50	19	<0.50	<0.50	19	<0.50	<0.50	16	<0.50	<0.50	20	<0.50	<0.50
Toluene		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50
trans-1,2-Dichloroethene	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50
trans-1,3-Dichloropropene		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50
Trichloroethene	690	<0.50	<0.50	750	<0.50	<0.50	840	<0.50	<0.50	530	<0.50	<0.50	520	<0.50	<0.50	500	<0.50	<0.50
Trichlorofluoromethane		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50
Vinyl chloride	1.1	<0.50	<0.50	0.67	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50

NOTES:
T101 - T102 = influent water quality
TO D.I. = treated water quality

SOURCE: GPI Environmental, Inc. 2011

TABLE 8

IGWTP INFLUENT AND EFFLUENT WATER QUALITY RESULTS 2010
by EPA Method 8260
(in ug/L)

Sample Date	07/16/10	07/16/10	07/30/10	08/13/10	08/13/10	08/26/10	09/13/10	09/13/10	09/27/10	10/15/10	10/15/10	10/28/10	11/12/10	11/12/10	11/24/10	12/15/10	12/15/10
Sample ID	T101-T102	TO D.I.	TO D.I.	T101-T102	TO D.I.	TO D.I.	T101-T102	TO D.I.	TO D.I.	T101-T102	TO D.I.	TO D.I.	T101-T102	TO D.I.	TO D.I.	T101-T102	TO D.I.
Compounds																	
1,1,1-Trichloroethane	54	<0.50	<0.50	69	<0.50	<0.50	63	<0.50	<0.50	72	<0.50	<0.50	58	<0.50	<0.50	32	<0.50
1,1,2,2-Tetrachloroethane		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50
1,1,2-Trichloroethane		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50
1,1-Dichloroethane	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<2.5	<0.50
1,1-Dichloroethene	23	<0.50	<0.50	26	<0.50	<0.50	25	<0.50	<0.50	31	<0.50	<0.50	23	<0.50	<0.50	11	<0.50
1,2-Dichlorobenzene		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50
1,2-Dichloroethane	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<2.5	<0.50
1,2-Dichloropropane		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50
1,3-Dichlorobenzene		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50
1,4-Dichlorobenzene		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50
Benzene		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50
Bromodichloromethane		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50
Bromoform		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0		<1.0
Bromomethane		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0		<1.0
Carbon Tetrachloride		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50
Chlorobenzene		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50
Chloroethane		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0		<1.0
Chloroform		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50
Chloromethane		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0		<1.0
cis-1,2-Dichloroethene	11	<0.50	<0.50	11	<0.50	<0.50	12	<0.50	<0.50	13	<0.50	<0.50	9.7	<0.50	<0.50	8.5	<0.50
cis-1,3-Dichloropropene		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50
Dibromochloromethane		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50
Dichlorodiflouromethane		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50
Ethylbenzene		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50
m,p-Xylenes		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0		<1.0
Methylene Chloride		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0		<1.0	<1.0		<1.0
o-Xylene		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50
Tetrachloroethene	19	<0.50	<0.50	18	<0.50	<0.50	19	<0.50	<0.50	20	<0.50	<0.50	15	<0.50	<0.50	18	<0.50
Toluene		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50
trans-1,2-Dichloroethene	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<2.5	<0.50
trans-1,3-Dichloropropene		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50
Trichloroethene	670	<0.50	<0.50	810	<0.50	<0.50	510	<0.50	<0.50	550	<0.50	<0.50	1100	**0.55**	<0.50	380	<0.50
Trichlorofluoromethane		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50	<0.50		<0.50
Vinyl chloride	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<2.5	<0.50

NOTES:
T101 - T102 = influent water quality
TO D.I. = treated water quality

SOURCE: GPI Environmental, Inc. 2011

TABLE 9

WATER LEVEL DATA FOR GROUNDWATER CONTOUR MAPS

Well	Geologic Unit	Baseline 1992		December 2010		Change in Water Level (in feet) Baseline to December 2010
		Date	Water Level Elevation (in feet amsl)	Date	Water Level Elevation (in feet amsl)	
AZNGD-1	A	4/2/1992	1217.86	12/8/2010	1216.23	-1.63
AZNGD-2A	A	4/2/1992	1205.39	(a)	(a)	NC
AZNGD-2B	B	4/2/1992	1221.54	(a)	(a)	NC
DM107	I	4/2/1992	1181.08	12/1/2010	1171.21	-9.87
DM111	A	4/2/1992	1181.66	12/1/2010	Dry	NC
DM112	A	11/9/1992	1171.88	12/1/2010	Dry	NC
DM114	A	4/2/1992	1183.08	12/1/2010	1162.28	-20.80
DM115	A	4/2/1992	1144.30	12/1/2010	Dry	NC
DM117	A	5/27/1992	1179.03	12/1/2010	Dry	NC
DM118	A	4/2/1992	1141.42	12/1/2010	1118.83	-22.59
DM119-072	A	4/14/1992	1128.01	12/3/2010	1106.17	-21.84
DM119-098	A	4/14/1992	1128.03	12/3/2010	1106.33	-21.70
DM119-137	I	4/14/1992	1128.05	12/3/2010	1106.38	-21.67
DM119-204	B	4/14/1992	1130.26	12/3/2010	1110.32	-19.94
DM119-244	B	4/14/1992	1135.77	12/3/2010	1111	-24.77
DM119-284	B	4/14/1992	1135.20	12/3/2010	1110.84	-24.36
DM120	A	4/2/1992	1112.00	12/1/2010	1091.77	-20.23
DM122-A	A	4/2/1992	1092.33	12/1/2010	Dry	NC
DM122-B	I	4/2/1992	1093.17	12/1/2010	1077.65	-15.52
DM123-056	I	4/16/1992	1108.25	(a)	(a)	NC
DM123-085	B	(a)	(a)	(a)	(a)	NC
DM123-135	B	(a)	(a)	(a)	(a)	NC
DM123-195	B	(a)	(a)	(a)	(a)	NC
DM123-250	B	(a)	(a)	(a)	(a)	NC
DM123-285	B	11/10/1992	1107.53	(a)	(a)	NC
DM124	A	4/2/1992	1136.60	12/1/2010	1134.48	-2.12
DM125-044	A	(a)	(a)	12/6/2010	Dry	NC
DM125-076	I	(a)	(a)	12/6/2010	1154.98	NC
DM125-125	B	(a)	(a)	12/6/2010	1154.84	NC
DM125-155	B	(a)	(a)	12/6/2010	1154.54	NC
DM125-185	B	(a)	(a)	12/6/2010	1154.46	NC
DM125-270	B	(a)	(a)	12/6/2010	1154.32	NC
DM201	I	5/8/1992	1153.63	12/1/2010	1105.6	-48.03
DM201-OB1	I	4/10/1992	1149.20	12/1/2010	1155.4	6.20
DM201-OB2	I	4/10/1992	1150.74	12/1/2010	1154.02	3.28
DM301	A	5/27/1992	1182.69	12/1/2010	1157.96	-24.73
DM302	A	5/27/1992	1177.91	12/1/2010	1149.91	-28.00
DM303	A	5/22/1992	1178.64	12/1/2010	1149.86	-28.78
DM304	A	5/22/1992	1174.47	12/1/2010	1157.96	-16.51
DM305*	A	5/22/1992	1148.69	12/8/2010	1093.17	-55.52

TABLE 9

WATER LEVEL DATA FOR GROUNDWATER CONTOUR MAPS

Well	Geologic Unit	Baseline 1992		December 2010		Change in Water Level (in feet) Baseline to December 2010
		Date	Water Level Elevation (in feet amsl)	Date	Water Level Elevation (in feet amsl)	
DM306	A	5/22/1992	1142.30	12/8/2010	1109.89	-32.41
DM307*	A	5/22/1992	1136.94	12/8/2010	1094.34	-42.60
DM308*	A	5/22/1992	1135.90	12/8/2010	1064.26	-71.64
DM309*	A	5/22/1992	1132.81	12/8/2010	1084.58	-48.23
DM310*	A	5/22/1992	1132.51	12/8/2010	1092.53	-39.98
DM311	A	5/22/1992	1132.07	12/8/2010	1097.27	-34.80
DM312	A	5/22/1992	1131.59	12/8/2010	1102.22	-29.37
DM313	A	3/17/1992	1131.40	12/8/2010	1106.55	-24.85
DM314	B	(b)	(b)	12/2/2010	1093.95	NC
DM502-079	A	5/6/1992	1103.10	12/6/2010	1086.47	-16.63
DM502-119	I	5/6/1992	1103.60	12/6/2010	1086.48	-17.12
DM502-161	B	5/6/1992	1103.96	12/6/2010	1087.77	-16.19
DM502-240	B	5/6/1992	1104.60	12/6/2010	1087.66	-16.94
DM502-335	B	5/6/1992	1104.53	12/6/2010	1087.86	-16.67
DM503	A	4/2/1992	1108.42	12/1/2010	1092.09	-16.33
DM601-040	I	5/19/1992	1180.20	12/7/2010	Dry	NC
DM601-085	B	5/19/1992	1181.05	12/7/2010	1158.84	-22.21
DM601-135	B	5/19/1992	1181.26	12/7/2010	1153.59	-27.67
DM601-200	B	5/19/1992	1181.13	12/7/2010	1159.31	-21.82
DM602	I	4/2/1992	1147.89	12/1/2010	1118.05	-29.84
DM603-068	A	5/11/1992	1137.69	12/6/2010	Dry	NC
DM603-115	I	5/11/1992	1137.51	12/6/2010	1103.88	-33.63
DM603-170	B	5/11/1992	1137.53	12/6/2010	1103.8	-33.73
DM603-205	B	5/11/1992	1137.41	12/6/2010	1104.01	-33.40
DM603-245	B	5/11/1992	1137.57	12/6/2010	1104.59	-32.98
DM604	I	4/2/1992	1133.70	12/1/2010	1099.61	-34.09
DM605-066	A	5/7/1992	1130.14	12/6/2010	Dry	NC
DM605-105	I	5/7/1992	1129.81	12/6/2010	1099.47	-30.34
DM605-170	B	5/7/1992	1130.79	12/6/2010	1099.28	-31.51
DM605-240	B	5/7/1992	1133.77	12/6/2010	1102.07	-31.70
DM605-290	B	5/7/1992	1133.72	12/6/2010	1102.16	-31.56
DM606-045	I	5/13/1992	1160.79	12/6/2010	Dry	NC
DM606-102	B	5/13/1992	1160.91	12/6/2010	1142.53	-18.38
DM606-185	B	5/13/1992	1159.00	12/6/2010	1140.29	-18.71
DM606-250	B	5/13/1992	1158.57	12/6/2010	1139.7	-18.87
DM606-330	B	5/13/1992	1156.13	12/6/2010	1135.53	-20.60
DM606-370	B	5/13/1992	1155.20	12/6/2010	1134.17	-21.03
DM607-146	A	(b)	(b)	12/3/2010	1105.37	NC
DM607-210	B	(b)	(b)	12/3/2010	1106.4	NC
DM607-310	B	(b)	(b)	12/3/2010	1106.73	NC

TABLE 9

WATER LEVEL DATA FOR GROUNDWATER CONTOUR MAPS

Well	Geologic Unit	Baseline 1992		December 2010		Change in Water Level (in feet) Baseline to December 2010
		Date	Water Level Elevation (in feet amsl)	Date	Water Level Elevation (in feet amsl)	
DM607-400	B	(b)	(b)	12/3/2010	1106.62	NC
DM609	A	(b)	(b)	12/1/2010	1162.34	NC
DM610	B	(b)	(b)	12/1/2010	1163.45	NC
DM611	A	(b)	(b)	12/1/2010	1101.04	NC
DM612	B	(b)	(b)	12/1/2010	1102.16	NC
DM613	B	(b)	(b)	12/1/2010	1101.49	NC
DM614	B	(b)	(b)	12/1/2010	1159.05	NC
DM615	B	(b)	(b)	12/1/2010	1162.17	NC
DM701	I	4/2/1992	1146.44	12/1/2010	1136.15	-10.29
DM702	I	4/13/1992	1165.58	12/1/2010	1155.29	-10.29
DM703	I	4/13/1992	1161.24	12/1/2010	1135.65	-25.59
DM704	I	4/13/1992	1162.24	12/1/2010	1126.78	-35.46
DM705	I	4/13/1992	1168.42	12/1/2010	1136.91	-31.51
DM706	I	4/13/1992	1168.68	12/1/2010	1135.49	-33.19
DM707	I	4/13/1992	1163.64	12/1/2010	1139.57	-24.07
DM713	I	4/13/1992	1175.93	12/1/2010	1154.43	-21.50
DM714	I	4/13/1992	1176.59	12/1/2010	1162.19	-14.40
DM715	I	4/13/1992	1176.98	12/1/2010	1163.72	-13.26
DM716	I	4/13/1992	1174.29	12/1/2010	1161.99	-12.30
DM718	I	4/1/1992	1176.15	12/1/2010	1158.08	-18.07
DM720	I	4/13/1992	1174.22	12/1/2010	1171.15	-3.07
DM721-045	I	(b)	(b)	12/3/2010	1162	NC
DM721-065	B	(b)	(b)	12/3/2010	1162.83	NC
DM721-125	B	(b)	(b)	12/3/2010	1163.65	NC
DM721-185	B	(b)	(b)	12/3/2010	1163.64	NC
DM721-260	B	(b)	(b)	12/3/2010	1163.47	NC
DM721-280	B	(b)	(b)	12/3/2010	1163.27	NC
DM722-047	B	(b)	(b)	12/3/2010	1154.67	NC
DM722-100	B	(b)	(b)	12/3/2010	1156.56	NC
DM722-145	B	(b)	(b)	12/3/2010	1157.28	NC
DM722-190	B	(b)	(b)	12/3/2010	1158.37	NC
DM722-240	B	(b)	(b)	12/3/2010	1158.97	NC
DM722-280	B	(b)	(b)	12/3/2010	1159.15	NC
DM723	I	(b)	(b)	12/1/2010	1176.59	NC
DM724	I	(b)	(b)	12/1/2010	1143.91	NC
DM725	I	(b)	(b)	12/1/2010	1170.76	NC
DM726	I	(b)	(b)	12/1/2010	1166.94	NC
DM727	I	(b)	(b)	12/1/2010	1171.45	NC
DM728	I	(b)	(b)	12/1/2010	1168.15	NC
DM729-050	I	(b)	(b)	12/3/2010	1160.57	NC

TABLE 9

WATER LEVEL DATA FOR GROUNDWATER CONTOUR MAPS

Well	Geologic Unit	Baseline 1992		December 2010		Change in Water Level (in feet) Baseline to December 2010
		Date	Water Level Elevation (in feet amsl)	Date	Water Level Elevation (in feet amsl)	
DM729-145	B	(b)	(b)	12/3/2010	1159.71	NC
DM729-195	B	(b)	(b)	12/3/2010	1159.62	NC
DM729-255	B	(b)	(b)	12/3/2010	1159.73	NC
DM729-285	B	(b)	(b)	12/3/2010	1159.83	NC
DM730	I	3/30/1992	1161.71	Abandoned	Abandoned	NC
DM731	I	4/13/1992	1163.82	Abandoned	Abandoned	NC
DM732	I	4/13/1992	1160.32	Abandoned	Abandoned	NC
DM733	I	3/30/1992	1158.68	12/1/2010	1150.11	-8.57
DM734-045	I	(b)	(b)	Abandoned	Abandoned	NC
DM734-110	B	(b)	(b)	Abandoned	Abandoned	NC
DM734-162	B	(b)	(b)	Abandoned	Abandoned	NC
DM734-200	B	(b)	(b)	Abandoned	Abandoned	NC
DM734-240	B	(b)	(b)	Abandoned	Abandoned	NC
DM734-280	B	(b)	(b)	Abandoned	Abandoned	NC
DM735	I	(b)	(b)	12/1/2010	1152.13	NC
DM-23	I	(b)	(b)	10/11/2010	1137.97	NC
DM-26	I	(b)	(b)	10/8/2010	1159.01	NC
DM-27	I	(b)	(b)	10/11/2010	1125.61	NC
DM-28	I	(b)	(b)	10/7/2010	1103.67	NC
DM-30	I	(b)	(b)	10/12/2010	1098.39	NC
DM-34	A	(b)	(b)	10/27/2010	1134.89	NC
EW18	A	4/28/1992	1167.71	12/1/2010	1150.1	-17.61
LANGMADE	B	4/27/1992	1153.89	12/1/2010	1154.21	0.32
MP03-B	A	5/29/1992	1181.62	12/2/2010	1161.54	-20.08
MP03-D	B	5/29/1992	1183.40	12/2/2010	1162.46	-20.94
MP09-B	I	4/20/1992	1182.03	12/2/2010	1161.32	-20.71
MP09-D	B	4/2/1992	1183.52	12/2/2010	1162.69	-20.83
MP11-B	I	4/2/1992	1183.68	12/2/2010	1172.61	-11.07
MP11-D	B	4/2/1992	1183.71	12/2/2010	1167.04	-16.67
MP13-B	I	4/2/1992	1186.18	12/2/2010	1171.63	-14.55
MP13-D	B	(a)	(a)	12/2/2010	1173.61	NC
MP16-A	A	4/2/1992	1164.07	12/2/2010	1157.76	-6.31
MP16-B	I	4/2/1992	1165.20	12/2/2010	1158.51	-6.69
MP16-C	B	(a)	(a)	12/2/2010	1153.44	NC
MP16-D	B	3/12/1992	1163.42	12/2/2010	1153.46	-9.96
MP20-A	A	3/19/1992	1186.34	12/2/2010	1182.24	-4.10
MP20-B	B	4/2/1992	1187.42	12/2/2010	1183.21	-4.21
MP25-A	I	4/2/1992	1187.09	12/2/2010	Dry	NC
MP25-B	B	4/2/1992	1187.44	(a)	(a)	NC
MP25-D	B	4/2/1992	1189.31	12/2/2010	1179.84	-9.47

TABLE 9

WATER LEVEL DATA FOR GROUNDWATER CONTOUR MAPS

Well	Geologic Unit	Baseline 1992		December 2010		Change in Water Level (in feet) Baseline to December 2010
		Date	Water Level Elevation (in feet amsl)	Date	Water Level Elevation (in feet amsl)	
MP28-A	I	(a)	(a)	12/1/2010	1173.79	NC
MP28-B	B	4/2/1992	1186.78	(a)	(a)	NC
MP28-D	B	4/2/1992	1186.67	(a)	(a)	NC
MP30-A	A	(a)	(a)	12/2/2010	1163.59	NC
MP30-B	I	4/2/1992	1184.45	12/2/2010	1163.59	-20.86
MP30-D	B	4/2/1992	1185.11	12/2/2010	1166.27	-18.84
MP36-A	A	4/2/1992	1183.62	12/2/2010	Dry	NC
MP36-B	I	4/2/1992	1181.75	12/2/2010	1160.82	-20.93
MP36-C	B	4/2/1992	1183.32	12/2/2010	1161.25	-22.07
MP36-D	B	4/2/1992	1182.95	12/2/2010	1162.49	-20.46
WT-K	A	(b)	(b)	12/1/2010	1194.2	NC

(a) – not sampled or measurement error
(b) – not yet installed
amsl - above mean sea level
NC – Not calculable- Measurement not collected in one of the time periods
* Groundwater elevations and drawdown in extraction wells DM305 and DM307 through DM310 have been corrected for well efficiency - see Appendix B
Geologic Unit - A - Alluvium; B - Bedrock; I - Interface of Alluvium and Bedrock

TABLE 10

TCE CONCENTRATIONS FOR WELLS COMPLETED IN THE OU1 AREA BASELINE AND SEPTEMBER 2010

Well	Geologic Unit	Baseline Period March - May 1992		Sampling Period September 2010*		Baseline to September 2010
		1992 Sampling Date	TCE Concentration (in ug/l)	2010 Sampling Date	TCE Concentration (in ug/l)	Change in TCE Concentration (in ug/L)
AZNGD-1	A	4/14/1992	<0.2	NS	NS	NC
AZNGD-2A	A	4/14/1992	<0.2	NS	NS	NC
AZNGD-2B	B	4/14/1992	<0.2	NS	NS	NC
DM107	I	3/11/1992	12	NS	NS	NC
DM111	A	4/14/1992	10	NS	NS	NC
DM112	I	DRY	NS	NS	NS	NC
DM114	A	NS	NS	NS	NS	NC
DM115	A	4/13/1992	54	NS	NS	NC
DM117	A	4/15/1992	43	NS	NS	NC
DM118	A	4/6/1992	<0.2	9/22/2010	6.81	6.61
DM119-072	A	4/15/1992	<0.2	9/14/2010	<0.5	ND
DM119-098	A	4/16/1992	<0.2	9/14/2010	0.52	0.32
DM119-137	I	4/15/1992	<0.2	9/14/2010	<0.5	ND
DM119-204	B	4/16/1992	<0.2	9/14/2010	<0.5	ND
DM119-244	B	4/16/1992	<0.2	NS	NS	NC
DM119-284	B	4/16/1992	<0.2	NS	NS	NC
DM120	A	4/9/1992	58	9/17/2010	11.4	-46.6
DM122-A	A	4/8/1992	0.7	NS	NS	NC
DM122-B	I	4/8/1992	<0.2	9/17/2010	<0.5	ND
DM123-056	I	4/20/1992	<0.2	NS	NS	NC
DM123-085	B	4/20/1992	<0.2	NS	NS	NC
DM123-135	B	4/17/1992	<0.2	NS	NS	NC
DM123-195	B	4/17/1992	<0.2	NS	NS	NC
DM123-250	B	4/17/1992	<0.2	NS	NS	NC
DM123-285	B	4/17/1992	<0.2	NS	NS	NC
DM124	A	4/9/1992	3.9	NS	NS	NC
DM125-076	I	NS	NS	9/16/2010	2.52	NC
DM125-125	B	NS	NS	9/16/2010	12.5	NC
DM125-155	B	NS	NS	9/16/2010	78.7	NC
DM125-185	B	NS	NS	9/16/2010	15.3	NC
DM125-270	B	NS	NS	9/16/2010	<0.5	NC
DM201	I	4/16/1992	54	9/27/2010	26.5	-27.5
DM201-OB1	I	4/24/1992	100	9/27/2010	62.5	-37.5
DM201-OB2	I	4/24/1992	240	NS	NS	NC
DM301	I	5/27/1992	2700	9/15/2010	332	-2368
DM302	I	5/27/1992	2600	9/15/2010	1200	-1400
DM303	I	5/22/1992	1300	9/15/2010	1750	450
DM304	I	5/22/1992	2400	9/15/2010	203	-2197
DM305	I	5/22/1992	3600	9/28/2010	353	-3247
DM306	I	5/22/1992	1700	9/28/2010	375	-1325
DM307	I	5/22/1992	3800	9/28/2010	1980	-1820
DM308	I	5/22/1992	1400	9/28/2010	175	-1225
DM309	I	5/22/1992	750	9/28/2010	39.6	-710.4

TABLE 10

TCE CONCENTRATIONS FOR WELLS COMPLETED IN THE OU1 AREA BASELINE AND SEPTEMBER 2010

Well	Geologic Unit	Baseline Period March - May 1992		Sampling Period September 2010*		Baseline to September 2010
		1992 Sampling Date	TCE Concentration (in ug/l)	2010 Sampling Date	TCE Concentration (in ug/l)	Change in TCE Concentration (in ug/L)
DM310	I	5/22/1992	250	9/28/2010	20.2	-229.8
DM311	I	5/22/1992	240	9/28/2010	0.52	-239.48
DM312	I	5/22/1992	31	9/28/2010	0.6	-30.4
DM313	I	6/22/1992	<0.5	9/28/2010	3.65	3.15
DM314	B	NS	NS	9/29/2010	81700	NC
DM502-079	A	5/6/1992	55	9/15/2010	8.4	-46.6
DM502-119	I	5/7/1992	47	9/15/2010	2.11	-44.89
DM502-161	B	5/6/1992	15	9/15/2010	<0.5	-14.5
DM502-240	B	5/6/1992	4.1	NS	NS	NC
DM502-335	B	5/6/1992	0.6	NS	NS	NC
DM503	I	4/8/1992	<0.2	NS	NS	NC
DM601-040	I	4/3/1992	3500	NS	NS	NC
DM601-085	B	5/19/1992	220	9/20/2010	2360	2140
DM601-135	B	5/19/1992	140	9/20/2010	18100	17960
DM601-200	B	5/20/1992	58000	9/20/2010	16500	-41500
DM602	I	5/28/1992	<5.0	9/20/2010	321	320.5
DM603-068	A	5/12/1992	0.5	NS	NS	NC
DM603-115	I	5/29/1992	960	9/20/2010	5.7	-954.3
DM603-170	B	5/12/1992	4300	9/20/2010	6810	2510
DM603-205	B	5/12/1992	5400	9/20/2010	810	-4590
DM603-245	B	5/12/1992	8300	9/20/2010	54.7	-8245.3
DM604	I	4/15/1992	2700	9/20/2010	8.95	-2691.05
DM605-066	A	5/11/1992	1.8	NS	NS	NC
DM605-105	I	4/1/1992	650	9/15/2010	1.89	-648.11
DM605-170	B	5/8/1992	2.6	9/15/2010	3.58	0.98
DM605-240	B	5/8/1992	<0.2	9/15/2010	<0.5	ND
DM605-290	B	5/8/1992	<0.2	9/15/2010	<0.5	ND
DM606-045	I	4/2/1992	180	NS	NS	NC
DM606-102	B	4/2/1992	440	9/16/2010	208	-232
DM606-185	B	5/14/1992	6100	9/16/2010	1430	-4670
DM606-250	B	5/13/1992	390	9/16/2010	2230	1840
DM606-330	B	5/13/1992	10.9	9/16/2010	53.8	42.9
DM606-370	B	5/22/1992	2.6	9/16/2010	1.22	-1.38
DM607-146	I	NS	NS	9/21/2010	4.89	NC
DM607-210	B	NS	NS	9/21/2010	4.66	NC
DM607-310	B	NS	NS	9/21/2010	<0.5	NC
DM607-400	B	NS	NS	9/21/2010	<0.5	NC
DM609	A	NS	NS	9/20/2010	<0.5	NC
DM610	B	NS	NS	9/20/2010	<0.5	NC
DM611	A	NS	NS	9/15/2010	247	NC
DM612	B	NS	NS	9/24/2010	1140	NC
DM613	B	NS	NS	9/24/2010	<0.5	NC
DM614	B	NS	NS	9/29/2010	65600	NC

TABLE 10

TCE CONCENTRATIONS FOR WELLS COMPLETED IN THE OU1 AREA BASELINE AND SEPTEMBER 2010

Well	Geologic Unit	Baseline Period March - May 1992		Sampling Period September 2010*		Baseline to September 2010
		1992 Sampling Date	TCE Concentration (in ug/l)	2010 Sampling Date	TCE Concentration (in ug/l)	Change in TCE Concentration (in ug/L)
DM615	B	NS	NS	9/29/2010	4.28	NC
DM701	I	4/7/1992	<0.2	NS	NS	NC
DM702	I	5/8/1992	<100	9/27/2010	105	5
DM703	I	5/8/1992	180	9/27/2010	61.2	-118.8
DM704	I	5/26/1992	48	9/27/2010	37	-11
DM705	I	5/26/1992	20.3	9/27/2010	18.3	-2
DM706	I	5/26/1992	18	9/27/2010	1.66	-16.34
DM707	I	5/26/1992	<40	9/27/2010	41.3	1.3
DM713	I	5/26/1992	<50	9/27/2010	22.3	-27.7
DM714	I	5/22/1992	110	9/27/2010	14.5	-95.5
DM715	I	3/17/1992	30	NS	NS	NC
DM716	I	3/9/1992	50	NS	NS	NC
DM718	I	5/22/1992	79	9/27/2010	11.3	-67.7
DM720	I	3/16/1992	35	NS	NS	NC
DM722-047	B	11/10/1992	3.3	NS	NS	NC
DM722-100	B	11/10/1992	47.6	NS	NS	NC
DM722-145	B	11/10/1992	4.8	NS	NS	NC
DM722-190	B	11/6/1992	37.9	NS	NS	NC
DM722-240	B	11/5/1992	5.8	NS	NS	NC
DM722-280	B	11/5/1992	0.5	NS	NS	NC
DM723	I	10/25/92(a)	NS	9/23/2010	118	NC
DM724	I	11/07/92(a)	NS	9/27/2010	80.2	NC
DM726	I	11/05/92(a)	NS	9/23/2010	3.92	NC
DM728	I	11/30/93(a)	NS	NS	NS	NC
DM729-050	I	01/10/94(a)	NS	9/7/2010	2.49	NC
DM730	I	3/11/1992	32	NS	NS	NC
DM731	I	3/11/1992	3	NS	NS	NC
DM732	I	3/2/1992	12	NS	NS	NC
DM733	I	3/10/1992	0.2	9/22/2010	<0.5	0.3
DM734-045	I	10/23/93(a)	NS	NS	NS	NC
DM734-110	B	10/23/93(a)	NS	NS	NS	NC
DM734-200	B	10/23/93(a)	NS	NS	NS	NC
DM734-280	B	10/23/93(a)	NS	NS	NS	NC
DM735	I	NS	NS	9/22/2010	1.72	NC
DM-23	A	NS	NS	10/11/2010	4.7	NC
DM-26	I	NS	NS	10/8/2010	110	NC
DM-27	I	NS	NS	10/11/2010	94	NC
DM-28	I	NS	NS	10/7/2010	38	NC
DM-30	I	NS	NS	10/12/2010	120	NC
DM-34	A	NS	NS	10/27/2010	<0.5	NC
EW18	I	4/28/1992	23	9/17/2010	19.3	-3.7
LANGMADE	B	4/29/1992	34	NS	NS	NC
MP03-B	A	5/29/1992	9800	NS	NS	NC

TABLE 10

TCE CONCENTRATIONS FOR WELLS COMPLETED IN THE OU1 AREA BASELINE AND SEPTEMBER 2010

Well	Geologic Unit	Baseline Period March - May 1992		Sampling Period September 2010*		Baseline to September 2010
		1992 Sampling Date	TCE Concentration (in ug/l)	2010 Sampling Date	TCE Concentration (in ug/l)	Change in TCE Concentration (in ug/L)
MP03-C	B	NS	NS	8/26/2010	782000	NC
MP03-D	B	4/24/1992	870000	8/27/2010	958000	88000
MP09-B	I	4/21/1992	6600	NS	NS	NC
MP09-C	B	NS	NS	8/26/2010	7080	NC
MP09-D	B	4/22/1992	5600	8/25/2010	6080	480
MP11-B	I	4/23/1992	1100	9/14/2010	586	-514
MP11-D	B	4/21/1992	36	9/14/2010	16	-20
MP13-B	I	4/21/1992	2700	9/13/2010	1750	-950
MP13-C	B	NS	NS	NS	NS	NC
MP13-D	B	NS	NS	9/14/2010	2.74	NC
MP16-A	A	3/11/1992	15	NS	NS	NC
MP16-B	I	4/13/1992	13	9/8/2010	21.5	8.5
MP16-C	B	3/13/1992	1.4	NS	NS	NC
MP16-D	B	3/3/1992	1.8	9/10/2010	10.6	8.8
MP20-A	A	4/8/1992	<0.2	9/8/2010	<0.5	ND
MP20-B	B	4/7/1992	<0.2	9/30/2010	<0.5	ND
MP20-C	B	NS	NS	NS	NS	NC
MP25-A	I	10/26/1992	<0.2	NS	NS	NC
MP25-B	B	4/9/1992	0.4	NS	NS	NC
MP25-D	B	4/9/1992	5.4	NS	NS	NC
MP28-A	I	NS	NS	NS	NS	NC
MP30-B	I	4/14/1992	56	9/9/2010	60.9	4.9
MP30-D	B	4/10/1992	15	9/10/2010	32.2	17.2
MP36-C	B	4/22/1992	14000	12/9/2010	159000	145000
MP36-D	B	5/28/1992	180000	12/9/2010	195000	15000
WT-K	A	NS	NS	9/23/2010	<0.5	NC
WT-L	A	NS	NS	NS	NS	NC

NOTES:
* unless otherwise noted
A negative value in the calculated Change in TCE column indicates a decrease in concentrations.
NS - not sampled
NC - not calculable
NA - not applicable
ND - not detected in either sample
Sampling Zone Geologic Units: A - Alluvium, B - Bedrock, I - Alluvium/Bedrock Interface
(a) - Date well was completed
(b) - Extraction well
The detection limit (DL) was used in the calculation of change in concentration if the result of one of the samples was detected.

TABLE 11

HISTORICAL TCE CONCENTRATIONS (in μg/l) FOR WELLS IN THE OU1 AREA
(Quarterly, Baseline - 2010)

Well Name	92Q3	92Q4	93Q1	93Q2	93Q3	93Q4	94Q1	94Q2	94Q3	94Q4	95Q1	95Q2	95Q3	95Q4	96Q1
AZNGD-1		<0.2		0.3		0.7		<0.5		1.6		4			
AZNGD-2A		0.3		<0.2		1.2		0.8		1.4					
AZNGD-2B		<0.2		<0.2		1		<0.5		<0.5					
AZSLD		<0.2		<0.2		1.3		<2.5		<0.5		2.1			
DM101-045		<0.2	<0.2							<0.5					
DM101-055	<2			<0.2		<0.2		<0.5						<0.5	
DM101-130	0.3	0.2	0.3	<0.2		0.4		<0.5							
DM107		48.6		16	42	31	26	21	27	24		8.6		9.9	
DM111	9.3	26.7	12		9.9	22	31	45	58	39	110	20		2.4	
DM114		1.2		0.6		1.2		<0.5		5.8		2.4		<1	
DM115	30	61	16												
DM117	26	98	150	43		78	140	86	56	37	37	53	11.4	13	21
DM118		<0.2		<0.2		0.6		<0.5		1.5		0.8			
DM119-072		<0.2		<0.2		<0.2		<0.5		<0.5					
DM119-137		<0.2		<0.2		<0.2		0.5		<0.5		<0.5			
DM119-204		<0.2													
DM119-284				<0.2		<0.2		0.6		<0.5		<0.5			
DM120		54.5		34		22		22		14		15		8.4	
DM122-A		<0.2		0.4		1.6		<0.5		<0.5					
DM122-B		<0.2		<0.2		<0.2		<0.5		<0.5		<0.5			
DM123-056		<0.2		<0.2		<0.2		<0.5		<0.5		<0.5			
DM123-085															
DM123-135		<0.2		<0.2		0.5		<0.5		<0.5		<0.5			
DM123-285		<0.2		<0.2		<0.2		<0.5		<0.5					
DM124		2.8		5.3		3.5		4.2		4.6		3.9			
DM125-044				0.3	1.3	<0.5		<0.5	2.4	<0.5	<0.5				
DM125-076				2.1	0.7	<0.5		<0.5	3.1	<0.5	<0.5	<0.5		0.9	
DM125-125				1100	740	51		140	490	360	33	42		42	
DM125-155				77	38	23		64	64	67	73	73		93	
DM125-170					16										
DM125-185				38		26		22	19	16	18	19		30	
DM125-270				24	9	<0.5		2.1	1.3	<0.5	<0.5	<0.5		<0.5	
DM201	92	80	140	140	140	180	310	250	350	220		160		210	
DM201-OB1	<50	70	98	100	80	220	220	160	210	120		<50		120	
DM201-OB2	480	400	310	420	410	350	270	260	300	180		58		69	
DM201-OB3	53	71	70	83	78	86	77								
DM301	1200	1700	1000	1400			2000	1200	720	530	650	680		490	
DM302	1800	730	2300	2700			2300	2700	2500	2300	2400	2200		2200	
DM303	780	870	870	1100			1300	1400	1300	1100	1700	1300		1400	
DM304	2200	1300	1200	1700			1000	370	1100	260	340	330		320	
DM305	3600	2300	2100	1800		3200	2000	1400	1500	1400	2000	1400		1500	
DM306	3000	780	410	200		1900	1100	280	87	130	62	180			110
DM307	2400	1000	590	330		970	400	340	320	250	210	240		240	
DM308	1600	560	230	140		450	160	120	110	100	98	140		110	
DM309	580	910	630	510		380	300	200	170	130	120	160		100	
DM310	270	610	500	450		310	250	290	200	140	110	130		83	
DM311	130	55	33	38		37	27	47	65	64	95	89		38	
DM312	18	4	2	1.9		12	2.7	<2.5	1.3	<0.5	<0.5	0.5		<0.5	
DM313	<1	<0.5	<0.5	0.7					1.5	<0.5	<0.5	1.3		<0.5	
DM314															
DM502-079		70		170		200		280		230		200		130	
DM502-119		34		70		180		240		210		160		130	
DM502-161		2.7		17		16		15		11		11		9.9	
DM502-240		1.4		3.9		2.4		2.2		2.9		2.6		2.6	
DM502-335		0.3		<0.2		<0.2		1.1		<0.5		<0.5		1.7	
DM503		<0.2		<0.2		0.3		<0.5		1.8		<0.5		1.4	
DM601-040	7.5	52	13	190	830	<50	<5	<5	<5	<5	110	1.1		<0.5	
DM601-085	290	190	160	140	98	100	87	110	120	78	85	120		71	
DM601-115		560													
DM601-135	170	110	96		130	150	78	110	140	96	110	150	180	150	110
DM601-175		1.8													
DM601-200	73000	71000	46000	58000	48000	35000	47000	48000	2300	40000	51000	51000	36000	48000	81000
DM602	1.1	<0.5	<0.5	2.3	1.4	0.9	<0.5	<0.5	2.6	40	3.4	3.5		2.3	
DM603-068	6.2	2.5	3.9	<0.5	1.7	<0.5	<0.5	13	5.8	2	2.6	1	11	0.9	21
DM603-115	870	75	63	54	49	37	42	37	110	18	20	20	26	19	24
DM603-170	12000	3500	9200	16000	8900	14000	16000	13000	13000	8100	15000	20000	16000	14000	13000
DM603-205	10000	3050	11000	14000	1300	16000	12000	14000	13000	13000	9300	10000	8800	6600	9500
DM603-245	10000	8100		8300	6600	6200	8600	6800	5000	3400	4600	4200	5100	5100	4600
DM604	780	260	64	66	21	31	63	11	12	2.6	<0.5	11		6.8	
DM605-066	7.8	90	80	47	27	23	31		13	4	2.7	2.3	1.4	0.7	1.9
DM605-105	1100	1700	1200	680	280	170	290		260	60	43	45	39	51	37

Notes:
Year and Quarter: last two digits of the year with Quarter (Q) designation.
Q1 = January through March
Q2 = April through June
Q3 = July September
Q4 = October through December

TABLE 11

HISTORICAL TCE CONCENTRATIONS (in μg/l) FOR WELLS IN THE OU1 AREA (Quarterly, Baseline - 2010)

Well Name	Year and Quarter														
	92Q3	92Q4	93Q1	93Q2	93Q3	93Q4	94Q1	94Q2	94Q3	94Q4	95Q1	95Q2	95Q3	95Q4	96Q1
DM605-170	0.98	0.2	2.3	3.7	2.5	3.6	8.4		7.1	9.5	9.7	10	10	4.6	12
DM605-240	<0.5	<0.5	6800	<0.5	0.6	<0.5	6.1		1.2	3.2	1.3	1.7	<0.5	0.5	2.4
DM605-290	<0.5	<0.5	<0.5	<0.5	1.8	<0.5	3.7		2.7	7.5	<0.5	1.4	<0.5	3.9	1.4
DM606-045	3900	28	30	25	4.1	8	30	24	26	<5	21	18	14	10	24
DM606-102	380	350	310	340	240	210	290	390	200	250	280	320	250	290	310
DM606-185	11000	10000	7900	9400	7100	9700	7500	8000	5200	5100	6000	6300	4800	7400	5500
DM606-250	990	1800	1900	3100	1800	2300	3000	3700	3300	2900	4400	4300	3200	4300	3600
DM606-330	15	17	11	15	12	13	20	29	22	28	38	41	44	5.8	70
DM606-355		<2													
DM606-370	<5	3.6	<5	<12.5	<12.5	<0.5	<10		<10	28	<2.5	<10	<10	<5	<5
DM607-146															
DM607-210															
DM607-310															
DM607-400															
DM609															
DM610															
DM611															
DM612															
DM613															
DM614															
DM615															
DM701		<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	1.3	<0.5	<0.5		2.2	<0.5	<0.5	
DM702	110	90	130	100	140	170	110	81	94	81		180		140	
DM703	270	230	260	290	320	200	240	230	240	200		170		150	
DM704	230	180	200	300	310	130	260	240	250	63		160		77	
DM705	45	41	31.7	30	37	42	43	43	38	44		44		14	
DM706	17	13.1	8	6.6	6.6	8.4	6.8	6.5	8.6	7		8.2		4.1	
DM707	48	<40	24	93	100	170	240	130	140	100		82		84	
DM713	<50	<50	<50	<50	25	63	<50	61	74	55		110		86	
DM714	<50	<100	25	<20	58	33	<50	<50	<50	26		88		17	
DM715	13	<20	15	10	17	51	27	28	23	18		19		9.8	
DM716	30	<100	40	30	50	42	<50	36	7000	81		24		18	
DM717	33	0.2	37	24	28	35	49	39	600	73		23		13	
DM718	<40	<50	32	44	34	48	57	33	28	25		<10		23	
DM719	48	38	290	28	46	40	60	50	43	72		61		24	
DM720	21	<20	22	7	10	20	18	16	22	19		18		13	
DM721-045		<40	<10	3	<10	<40	<50	<50	<50	<100		<100		<50	
DM721-065		48.1	60	90	90	64	120	91	96	72		63		100	
DM721-125		140	180	230	220	200	330	160	290	200					
DM721-185		120	110	110	140	160	210	180	270	220		360		320	
DM721-260		180	130	160	170	160	260	160	170	170					
DM721-280		160	110	150	220	180	280	140	190	94		250		270	
DM722-047		120	120	34	160	47	130	43	110	66		14		22	
DM722-100		260	220	240	120	110	100	78	70	69		65		65	
DM722-145		33.1	39	61	41	38	42	30	36	32					
DM722-190		51.2	61	43	47	6.3	65	56	58	58		31		58	
DM722-240		6.8	4.2	7.1	4.5	2.6	6.1	2.9	5.2	5.2					
DM722-280		1.2	<0.2	1	0.4	<0.2	1.6	<0.5	0.8	1.8		0.8		<0.5	
DM723		390	430	220	270	180	520	500	440	330		270		240	
DM724		410	360	240	400	120	290	200	300	200		450		190	
DM725		7	7	7.2	2.9	2.3	6.7	6.1	2.6	5.7		3.9		4.2	
DM726		67	45	69	39	62	53	35	50	39		39		42	
DM727						8.6	8.3	6.4	7.1	6.6		7.2			8200
DM728						56	43	45	42	39		36		23	
DM729-050							16	12	22	16		19		19	
DM729-145							3.7	1.3	0.8	1.5					
DM729-195							<0.5	<0.5	<0.5	<0.5		<0.5		12	
DM729-255							<0.5	<0.5	<0.5	<0.5					
DM729-285							2	<0.5	<0.5	<0.5		<0.5		6.7	
DM730	7.9	6.3	5.4	4.3	1.6	4.1	6.8	4.8	5.1	5.6		5.5		14	15
DM731	2.1	2.2	1.9	3.2	3.6	4.9	4.4	5.5	4.3	4.4		13			17
DM732	5.4	1.6	4.5	4.5	1.8	2.4	3.7	3.4	3	3.2		3.6			
DM733	0.6	0.5	0.6	0.9	<0.2	0.5	1.6	0.6	<0.5	<0.5		<0.5		1.4	
DM734-045						1.4	2.8	1.1	2.4	2.2		1.4		<0.5	
DM734-110						1.3	2.8	0.8	<0.5	1.3		1.7		1.6	
DM734-162						2	2.5	2.1	3.9	4					
DM734-200						<0.2	1.5	<0.5	<0.5	<0.5		<0.5		<0.5	
DM734-240						0.8	1.6	<0.5	<0.5	1					
DM734-280						1.9	1.5	<0.5	<0.5	<0.5		1		<0.5	
DM735															
EW18	23		12.2		13		14		26		8.4		21		9.6

Notes:
Year and Quarter: last two digits of the year with Quarter (Q) designation.
Q1 = January through March
Q2 = April through June
Q3 = July September
Q4 = October through December

TABLE 11

HISTORICAL TCE CONCENTRATIONS (in μg/l) FOR WELLS IN THE OU1 AREA
(Quarterly, Baseline - 2010)

Well Name	Year and Quarter														
	92Q3	92Q4	93Q1	93Q2	93Q3	93Q4	94Q1	94Q2	94Q3	94Q4	95Q1	95Q2	95Q3	95Q4	96Q1
LANGMADE		<0.2		<0.2		<0.2		0.6		<0.5					
Morgan															
MP03-B	<10000	<5000	<5000	<2500	9100	5800	58000	<2500	<2500	<2500	1300	1800	1100	1400	1300
MP03-D	1000000	2600000	760000		110000	1000000	1700000	1100000	1100000	820000	360000	2500000	240000	630000	940000
MP05-B										<2500					
MP09-B	2300	11000	1200	12000	5900	6000	6800	6500	7300	5500	5600	4700	6400	11000	8200
MP09-D	2800	4700	8600	4400	4700	7300	3300	2900	3500	2500	2000	3800	3500	4400	3200
MP11-B	3500	790	640	1000	650	640	950	1200	790	960	650	700		580	
MP11-D	94	800	19	21	130	20	19	20	210	120	310	15		27	
MP13-B		3000		2600		3300		3000		2400		2800		970	
MP13-C															
MP13-D		3.5		14		0.7		<0.5		<0.5		3.4		1.3	
MP16-A	20	20.9	12.1	20	18	20	1900	19	20	540			20		
MP16-B	17.2	17.6	41.5	29	11	18	110	19	21	19		21		21	
MP16-C	4	26.2	6.2	1.6	2.8	0.3	63	1.2	510	8.9					
MP16-D	4.9	0.8	1.8	3.4	11	2.7	9700	0.6	0.8	1.7		1.1		2.7	
MP20-A	<0.2	3.3	<0.2	<0.2		1.5		<0.5		11		11			
MP20-B	<0.2	0.3	<0.2	<0.2		16		<0.5		<0.5		1.2			
MP20-C															
MP25-A		<0.2	1.5	0.3		2.1		<0.5		<0.5		<0.5			
MP25-B	0.3	0.4	<0.2	<0.2		<0.2		<0.5		<0.5		<0.5		1.5	
MP25-D	14.2	3.7	4	2.9		<0.2		1.8		0.8		0.9			
MP28-A		<0.2	<0.2	<0.2	0.3	<0.2		<0.5		<0.5		1.4		5.8	
MP28-B	0.9	4.6	<0.2	14		<0.2		<0.5		210		<0.5			
MP28-D	<0.2	0.4	<0.2	3.1		<0.2		<0.5		<0.5					
MP30-A	<0.2	0.4	0.4	0.3	<0.2	0.4		190		5.2				1.2	
MP30-B	56	88	120	120		92		49		50		80		66	
MP30-D	21.5	19.9	34.7	38		29		40		28		11			
MP36-A	370	18	69	200	65	11	250	3900	3100	330	220	130	140	92	42
MP36-B	130000	800	1300	770	3200	1900	1400	1900	930	1300	1800	2300	1300	1400	2200
MP36-C	19000	41000	36000	49000	22000	38000	59000	57000	65000	66000	60000	81000	46000	7500	76000
MP36-D	130000	240000	210000	220000	240000	150000	160000	160000	43000	100000	150000	91000	200000	130000	120000
MP37-C	90	120	14.4	40	14	33	21	56	670	20	56	13		14	
PZ01			130												
PZ02			110			120						350		370	
PZ03					220										
PZ04			81		87	170						400		220	
PZ05			<0.2			<2									
PZ06			35		80	2100						510		330	
PZ07			270		82	120					64	170	350	130	35
PZ08															
PZ09			0.4		0.4	18						<10		4.4	
PZ10					140	1200					54	<100	130	65	120
SW-1															
WT-K															
WT-L															

Notes:
Year and Quarter: last two digits of the year with Quarter (Q) designation.
Q1 = January through March
Q2 = April through June
Q3 = July September
Q4 = October through December

TABLE 11

HISTORICAL TCE CONCENTRATIONS (in μg/l) FOR WELLS IN THE OU1 AREA
(Quarterly, Baseline - 2010)

Well Name	Year and Quarter														
	96Q2	96Q3	96Q4	97Q1	97Q2	97Q3	97Q4	98Q2	98Q4	99Q2	99Q4	00Q2	00Q4	01Q1	01Q2	01Q4
AZNGD-1			<0.5				<0.5		<0.5		<0.5		<0.5			<0.5
AZNGD-2A											<0.5					<0.5
AZNGD-2B											<0.5					<0.5
AZSLD			13				0.7									
DM101-045																
DM101-055							<0.5									
DM101-130																
DM107	6.2				14		6.6									
DM111																
DM114	<0.5		<5		<0.5		0.8									
DM115																
DM117	27	12	5	19	32	14	6.2									
DM118			<0.5				<0.5				0.98					1.2
DM119-072																
DM119-137			<5				<0.5				<0.5					2.3
DM119-204																
DM119-284			<0.5				<0.5				<0.5					<0.5
DM120	8.5		5.4		6.2		5.8		5.5		2.9		2.6			3.7
DM122-A																
DM122-B			<0.5				<0.5		<0.5		<0.5		<0.5			<0.5
DM123-056																
DM123-085																
DM123-135			<0.5				<0.5									
DM123-285																
DM124			3.9				0.7									
DM125-044																
DM125-076	<0.5		<0.5			0.8	21	0.9	<0.5	1.8	0.95		1.7		1.1	0.77
DM125-125	18		190			990	630	450	540	450	350	200	140		11	5.9
DM125-155	120		120			53	90	85	49	92	3.4	94	100		89	93
DM125-170																
DM125-185	1.1		2.8			<1	2.4	<2.5	<2.5	<2.5	<5	<5	<12		0.84	0.83
DM125-270	0.8		<0.5			<2.5	1	<0.5	<0.5	1.8	<0.5	<0.5	<0.5		<0.5	<0.5
DM201	210		240		140				21		58		73			34
DM201-OB1	100		79		57		95				43		46			63
DM201-OB2	160		200		86		100									
DM201-OB3																
DM301	780		1000		2100		520		770		220		470			640
DM302	1900		1200		810		1800		1400		2500		3300			2800
DM303	1000		2700		1400		2000		1300		1000		1300			2000
DM304	180		190		130		180		160		400		260			750
DM305	1800		1900		2100		970		2000		1600		1800			1300
DM306	54		57		100		150		470		1300		2500			3200
DM307	250		270		210		440		170		210		390			280
DM308	100		110		77		120		100		100		84			150
DM309	95		95				110		66		48		51			56
DM310	78		55		55		57		46		36		34			35
DM311	21		16		14.3		6.5		4.6		4.4		3.4			3.1
DM312	1		0.8		<0.5		0.8		1.1		0.88		0.91			0.61
DM313	1.2		0.9		0.6		0.8		1.2		1		12	27		26
DM314																
DM502-079	90		82		45		26		24		21		12			7.1
DM502-119	98		29		38		5.5		5		3.3		5.7		8.4	6.5
DM502-161	12		19		10		8.6		6.8		5.5		0.63			<0.5
DM502-240	2.3		4		2.3		1.5		1.5		0.99		0.72			<0.5
DM502-335	<0.5		<0.5		<0.5		<0.5		0.51		<0.5		<0.5			<0.5
DM503	<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<1			<0.5
DM601-040	5.6		0.9		1.9		0.9	<0.5		5.2						
DM601-085	110		150		130		110	190	120	160	180	190	250		190	220
DM601-115																
DM601-135	190	300	220	270	210	700	370	390	300	610	540	860	840		1000	1300
DM601-175																
DM601-200	92000	72000	80000	130000	170000	170000	120000	130000	79000	140000	<2.5	140000	120000		190000	130000
DM602	2.9		3		1.8		1.5	1.3	1.2	1.3	1.2	1.1	1.3		4	3
DM603-068																
DM603-115	13	12	88	12	15	11	9.3	7.6	15	12	5.5	12	9.1		7.1	14
DM603-170	14000	11000	22000	11000	18000	13000	8800	13000	11000	11000	9500	8800	8900		11000	9300
DM603-205	6900	7500	7100	4400	5100	4300	3400	3000	2900	2900	2400	1700	1900		1900	2000
DM603-245	3600	3400	3300	2000	2100	1900	1400	610	880	720	570	510	350		280	280
DM604	11		9.1		13		7.2	5.7	5.5	6.2	4.7	6.7	6		4.6	4.6
DM605-066	<0.5	2	3.2	<0.5												
DM605-105	35	33	32	27	28	26	14	12	7.5	13	12	8.8	6.9		5.7	2.4

Notes:
Year and Quarter: last two digits of the year with Quarter (Q) designation.
Q1 = January through March
Q2 = April through June
Q3 = July September
Q4 = October through December

TABLE 11

HISTORICAL TCE CONCENTRATIONS (in μg/l) FOR WELLS IN THE OU1 AREA
(Quarterly, Baseline - 2010)

Well Name	Year and Quarter															
	96Q2	96Q3	96Q4	97Q1	97Q2	97Q3	97Q4	98Q2	98Q4	99Q2	99Q4	00Q2	00Q4	01Q1	01Q2	01Q4
DM605-170	12	12	12	13	15	15	16	14	14	18	18	15	18		17	17
DM605-240	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	0.5	<0.5		<0.5	<0.5	<0.5	<0.5		<0.5	<0.5
DM605-290	1.1	<0.5	4.8	<0.5	<0.5	1.1	<0.5	0.58	2.7	0.58	<0.5	0.72	0.62		<0.5	<0.5
DM606-045	21	23	24	7	15	5.2	<2.5		7.2							
DM606-102	200	5.6	1000	230	290	290	270		210		18		110	120		130
DM606-185	4500	4900	5500	5600	5800	4100	5000		4400		3000		2000			2300
DM606-250	3700	3400	4200	3100	3400	3700	4000		2800		2200		2000			2100
DM606-330	60	120	100	78	85	66	58		10		75		79			61
DM606-355																
DM606-370	<5	<5	5.7	1.5	<2.5	<2.5	<2.5		<2.5		<2.5		1.9		25	1.1
DM607-146																
DM607-210																
DM607-310																
DM607-400																
DM609																
DM610																
DM611																
DM612																
DM613																
DM614																
DM615																
DM701	6.4		<0.5		0.9		<0.5		<0.5		<0.5		<0.5			<0.5
DM702	220		200		190		18		150		210		120		96	84
DM703	110		100		95		22		92		98		66			46
DM704	96		150		92		170		52		69		54			52
DM705	29		47		36		35		26		28		37			30
DM706	2.9		5.4		4.1		0.9		2		3.8		3.9			2.7
DM707	93		59		53		70		31		58		39			76
DM713	59		52		<25		35		24		31		25		32	30
DM714	18		9.2		16		27		9		2.1		1.2			<0.5
DM715	8.8		36		1.8		2.1									
DM716	660		16		8.6											
DM717																
DM718	84		13		8		4		6.7		11		26			20
DM719	250															
DM720	27		13		9.2		8.7									
DM721-045	<50		<25		<120		<10									
DM721-065	120		56		84		80									
DM721-125																
DM721-185	230		190		230		92									
DM721-260																
DM721-280	220		350		180		57									
DM722-047	45		39		16		<0.5									
DM722-100	83		61		85		50									
DM722-145																
DM722-190	30		38		25		19									
DM722-240																
DM722-280	<0.5		<0.5		1.1		0.5									
DM723	230		170		140		290		73		59		110			120
DM724	260		540		400		570		280		280		210			180
DM725	2.6		2		4.8		2.8									
DM726	51		48		31		86		19		17		11			15
DM727	440	19	11		14	11	11									
DM728	20		26		32		23		20		9.8		8.6			4
DM729-050	17		12		35		34		46		<0.5		53			58
DM729-145																
DM729-195	<0.5		<0.5		<0.5		0.5									
DM729-255																
DM729-285	2		<0.5		<0.5		<0.5									
DM730	8.3	10	4.8	7.1	6.4	2.4	2.4	5.1	59	31	8.7	9.1	17		25	
DM731	19	10	20	21		12	18	16	10	15	15	9.7	8.7		14	
DM732	4	2.7	2.8	2.4		5.4	16	5.5	27	11	8.6	6.8	6.7		6.1	
DM733	1.3		0.9	0.7	<0.5		0.8	0.71	0.63	0.63	0.55	0.65	0.56		2.8	0.62
DM734-045	<0.5		0.7		1.1		0.8				1.7					
DM734-110	1.3		3.9		1.5		0.9				1.6					
DM734-162																
DM734-200	<0.5		<0.5		<0.5		<0.5				<0.5					
DM734-240																
DM734-280	<0.5		<0.5		<0.5		<0.5				<0.5					
DM735																
EW18		13		14		21.6		16				16	22	24		18

Notes:
Year and Quarter: last two digits of the year with Quarter (Q) designation.
Q1 = January through March
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Q4 = October through December

TABLE 11

HISTORICAL TCE CONCENTRATIONS (in µg/l) FOR WELLS IN THE OU1 AREA
(Quarterly, Baseline - 2010)

Well Name	Year and Quarter															
	96Q2	96Q3	96Q4	97Q1	97Q2	97Q3	97Q4	98Q2	98Q4	99Q2	99Q4	00Q2	00Q4	01Q1	01Q2	01Q4
LANGMADE																
Morgan																
MP03-B	3300	1700	3200	<5000	23000	4200	4000									
MP03-D	410000	880000	13000000	1500000	1700000	250000	600000									
MP05-B																
MP09-B	7300	470	9100	10000	11000	9500	10000									
MP09-D	5200	18	3800	5600	8400	13000	9000									
MP11-B	810		890		250		1100		200		470		150			260
MP11-D	3.9		25		5.5		7.9		10		16		34			60
MP13-B	18		97		420		1100		1600		1500		1800			370
MP13-C																
MP13-D	2.7		22		4.5		5.8		2.3		0.64		1.3			2
MP16-A																
MP16-B	18		15		19		20		11		16		9.1			9.9
MP16-C																
MP16-D	8.2		7		5.4		1.4		2.3		1.4		0.69			<0.5
MP20-A			<0.5						<0.5		<0.5		<0.5			<0.5
MP20-B			<0.5				6.1		<0.5		<0.5		<0.5			<0.5
MP20-C																
MP25-A																
MP25-B			<0.5				2.8									
MP25-D			94				4.3		<0.5				<0.5			<0.5
MP28-A							<0.5		<0.5		<0.5		<0.5			<0.5
MP28-B			6.1				<0.5									
MP28-D																
MP30-A																
MP30-B	84		120		73		36		84		45		33			65
MP30-D			21				19		18		3.6		1.7			13
MP36-A	13	34	21	44	25	24	37									
MP36-B	1100	1800	1100	1000	330	1400	2200									
MP36-C	80000	1600	70000	140000	130000	180000	44000									
MP36-D	200000	240000	120000	270000	150000	210000	120000									
MP37-C	9.7		7.2		<2.5		<2.5									
PZ01			28		52											
PZ02	110		230		110		240									
PZ03			4.2													
PZ04	210		180		90		70									
PZ05			1.3													
PZ06	38		37		18		170									
PZ07	1	34	46	110	10	27	16									
PZ08			21													
PZ09	88		<5		1.5		1.5									
PZ10	<2.5	20	6.8	64	44	13	1.7									
SW-1																
WT-K				<0.5	<0.5	<0.5	<0.5		<0.5		<0.5		<0.5			<0.5
WT-L				<0.5	<0.5	<0.5	<0.5		<0.5				<0.5			<0.5

Notes:
Year and Quarter: last two digits of the year with Quarter (Q) designation.
Q1 = January through March
Q2 = April through June
Q3 = July September
Q4 = October through December

OU1 Effectiveness Report
2010 Operations
March 2011

TABLE 11

HISTORICAL TCE CONCENTRATIONS (in μg/l) FOR WELLS IN THE OU1 AREA
(Quarterly, Baseline - 2010)

Well Name	Year and Quarter															
	02Q1	02Q2	02Q3	02Q4	03Q1	03Q3	04Q1	04Q3	05Q1	05Q3	06Q1	06Q2	06Q3	06Q4	07Q1	07Q2
AZNGD-1			<0.5			<0.5		<0.5		<0.5			<0.5			
AZNGD-2A						<0.5				<0.5						
AZNGD-2B						<0.5				<0.5						
AZSLD																
DM101-045																
DM101-055																
DM101-130																
DM107																
DM111																
DM114																
DM115																
DM117																
DM118						1.5				2.3			2.4			
DM119-072																
DM119-137						<0.5				<0.5						
DM119-204																
DM119-284						<0.5				<0.5						
DM120			4.2			7.6		13		17			14			
DM122-A																
DM122-B			<0.5			<0.5		0.57		<0.5			<0.5			
DM123-056																
DM123-085										<0.5						
DM123-135										<0.5						
DM123-285																
DM124																
DM125-044																
DM125-076	0.73	0.88	0.54	0.62	<0.5	0.81	1	1	0.97	0.63	0.74		1.2		<0.5	
DM125-125	8.2	7.4	6.3	11	5.9	7.3	8.9	7.2	14	11	20		16		21	
DM125-155	88	94	110	170	90	90	130	140	110	97	93		92		140	
DM125-170																
DM125-185	0.65	1.3	1.1	1.8	1.2	1.3	1.8	2	1	1	1.2		1.2		2.8	
DM125-270	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		2.4	
DM201			71			70		58		23			59			
DM201-OB1			74			54		59		50			66			
DM201-OB2																
DM201-OB3																
DM301			580			680		3900		400			1900			
DM302			2300			2700		3900		1800			4200			
DM303			1800			2800		2200		2600			4200			
DM304			1200			880	1500	1500		<25			990			
DM305	1300	1100	970	1200		960	1000	860		590			660			
DM306		3800	2200	2300		2000		2400		1300			1700			
DM307	100	570	470	380		730		1100		1300			1400			
DM308		200	160	220		270		210		190			340			
DM309		58	52	49		92		49		43			44			
DM310		39	34	32		39		30		26			25			
DM311		2	2.8	2.4		1.9		1.1		0.88			0.83			
DM312		0.59	<0.5	<0.5		<0.5		0.51		0.7			0.91			
DM313		5.4	1	0.91		1.1		2.6		4			1.4			
DM314																
DM502-079			5.9			15		11		9.2			9			
DM502-119			14			18		16		8.2			5			
DM502-161			<0.5			<0.5		<0.5		<0.5			<0.5			
DM502-240			<0.5			<0.5		<0.5		<0.5			<0.5			
DM502-335			<0.5			<0.5		<0.5		<0.5			<0.5			
DM503			<0.5			<0.5		<0.5		<0.5			<0.5			
DM601-040																
DM601-085	230		210		370	560	870	890	1200	1600	3000		3000		4000	
DM601-115																
DM601-135	810		670		860	1400	1400	1500	1400	1500	2000		2300		2500	
DM601-175																
DM601-200	86000		86000		100000	140000	160000	110000	96000	99000	170000		100000		92000	
DM602	9	8	6.7	7.5	8.1	29	16	25	50	78	98		150		150	
DM603-068																
DM603-115	4.8	7.4	4.5	6	2	4.5	7.2	4.9	6.7	6.5	6.2		4.8		4.7	
DM603-170	7600	8500	6200	9600	5800	5200	8400	7700	6800	9000	8200		11000		8200	
DM603-205	1600	1600	1100	1300	1200	1400	1500	1400	1300	1000	2100		2500		1900	
DM603-245	180	230	120	230	170	170	110	100	110	130	75		81		78	
DM604	4.4	6.3	6.5	6.2	5.4	9.7	8.4	5.3	6.2	5.9	5.1		3.9		4	
DM605-066																
DM605-105	1.2	2.7	2.8	7.7	8.5	1.3	4.2	3.1	2.9	6.3	5.8		2.1		3.5	

Notes:
Year and Quarter: last two digits of the year with Quarter (Q) designation.
Q1 = January through March
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Q4 = October through December

TABLE 11

HISTORICAL TCE CONCENTRATIONS (in µg/l) FOR WELLS IN THE OU1 AREA
(Quarterly, Baseline - 2010)

Well Name	Year and Quarter															
	02Q1	02Q2	02Q3	02Q4	03Q1	03Q3	04Q1	04Q3	05Q1	05Q3	06Q1	06Q2	06Q3	06Q4	07Q1	07Q2
DM605-170	17	16	10	22	15	15	15	13	10	11	11		11		8.6	
DM605-240	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		<0.5	
DM605-290	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		<0.5	
DM606-045																
DM606-102		110	490			990		1100		860			1400			
DM606-185		1700	990			1200		1100		850			2100			
DM606-250		890	1200			1900		2000		1800			2400			
DM606-330		61	51			58		45		50			48			
DM606-355																
DM606-370		1.1	0.52			1.1		0.9		1.4			0.91			
DM607-146											1.3	2.5			2.1	2.4
DM607-210											1.8	1.8			2.4	2.5
DM607-310											<0.5	<0.5			<1	0.56
DM607-400											<0.5	<0.5			<1	<0.5
DM609														<0.5	<0.5	<0.5
DM610														<0.5	<0.5	<0.5
DM611																
DM612																
DM613																
DM614																
DM615																
DM701			<0.5			<0.5		<0.5		<0.5			<0.5			
DM702			73			270		310					95			
DM703			79			72		80		68			89			
DM704			55			64		52		43			46			
DM705			27			44		25		32			16			
DM706			5.4			4		2		1.2			2.9			
DM707			150			56		75		43			110			
DM713			23			35		45		43			39			
DM714			3.8			1.7		0.9		21			1.8			
DM715																
DM716																
DM717																
DM718			5.5			9.1		7.6		15			13			
DM719																
DM720																
DM721-045																
DM721-065																
DM721-125																
DM721-185																
DM721-260																
DM721-280																
DM722-047																
DM722-100																
DM722-145																
DM722-190																
DM722-240																
DM722-280																
DM723			180			170		92		210			290			
DM724			280			230		150		78			140			
DM725																
DM726			17			24		20		13			11			
DM727																
DM728			1.2			2.7		2.8		1.6			2.3			
DM729-050			44			24				12			11			
DM729-145																
DM729-195																
DM729-255																
DM729-285																
DM730																
DM731																
DM732																
DM733	0.68		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		<0.5	
DM734-045																
DM734-110																
DM734-162																
DM734-200																
DM734-240																
DM734-280																
DM735			<0.5		<0.5	2.2	1.7	0.82	2	1.8	0.62		0.65		<0.5	
EW18	25	25	24	26	24	25	23	18	16	12	15	13		16		15

Notes:
Year and Quarter: last two digits of the year with Quarter (Q) designation.
Q1 = January through March
Q2 = April through June
Q3 = July September
Q4 = October through December

TABLE 11

HISTORICAL TCE CONCENTRATIONS (in μg/l) FOR WELLS IN THE OU1 AREA
(Quarterly, Baseline - 2010)

Well Name	Year and Quarter															
	02Q1	02Q2	02Q3	02Q4	03Q1	03Q3	04Q1	04Q3	05Q1	05Q3	06Q1	06Q2	06Q3	06Q4	07Q1	07Q2
LANGMADE																
Morgan																
MP03-B																
MP03-D																
MP05-B																
MP09-B																
MP09-D																
MP11-B			250			260		870		680			1000			
MP11-D			79			69		26		21			15			
MP13-B			2000			1800	2400	2100		1600			2800			
MP13-C										2.2						
MP13-D			1.6			3.4		1.7		2			0.87			
MP16-A																
MP16-B			11			9.3		8.8		8.4			8.1			
MP16-C																
MP16-D			1.1			<0.5		0.54		<0.5			0.62			
MP20-A			<0.5			<0.5		<0.5		<0.5			<0.5			
MP20-B			<0.5			<0.5		<0.5		<0.5			<0.5			
MP20-C										<0.5						
MP25-A																
MP25-B										<0.5						
MP25-D			<0.5			<0.5		<0.5		<0.5			<0.5			
MP28-A			<0.5					<0.5								
MP28-B																
MP28-D																
MP30-A																
MP30-B			59			68		54		56			47			
MP30-D			14			16		17		18			18			
MP36-A																
MP36-B																
MP36-C																
MP36-D																
MP37-C																
PZ01																
PZ02																
PZ03																
PZ04																
PZ05																
PZ06																
PZ07																
PZ08																
PZ09																
PZ10																
SW-1																
WT-K			<0.5			<0.5		<0.5		<0.5			<0.5			
WT-L			<0.5			<0.5		<0.5		<0.5			0.54			

Notes:
Year and Quarter: last two digits of the year with Quarter (Q) designation.
Q1 = January through March
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Q3 = July September
Q4 = October through December

TABLE 11

HISTORICAL TCE CONCENTRATIONS (in µg/l) FOR WELLS IN THE OU1 AREA
(Quarterly, Baseline - 2010)

Well Name	Year and Quarter													
	07Q3	07Q4	08Q1	08Q2	08Q3	08Q4	09Q1	09Q2	09Q3	09Q4	10Q1	10Q2	10Q3	10Q4
AZNGD-1	<0.5						<0.5							
AZNGD-2A	<0.5													
AZNGD-2B	<0.5													
AZSLD														
DM101-045														
DM101-055														
DM101-130														
DM107														
DM111														
DM114														
DM115														
DM117														
DM118	4.7								4.9				6.81	
DM119-072									1.2				<0.5	
DM119-137	<0.5								<0.5				<0.5	
DM119-204									<0.5				<0.5	
DM119-284	<0.5													
DM120	10				9.5				8.5		10		11.4	
DM122-A														
DM122-B	<0.5				<0.5				<0.5				<0.5	
DM123-056														
DM123-085	<0.5													
DM123-135	<0.5													
DM123-285														
DM124														
DM125-044														
DM125-076	3.8		2.4		2				1		2.6		2.52	
DM125-125	10		11		13				8.2		11		12.5	
DM125-155	140		160		160				97		110		78.7	
DM125-170														
DM125-185	2.1		2.3		5.2				3.4		7.1		15.3	
DM125-270	<0.5		<0.5		<0.5				<0.5		<0.5		<0.5	
DM201	53				39				29				26.5	
DM201-OB1	140				70					30			62.5	
DM201-OB2														
DM201-OB3														
DM301	560				470				920				332	
DM302	3400				2000				1100				1200	
DM303	4000				2800				1000				1750	
DM304	1500				1000				990				203	
DM305	760				530				500				353	
DM306	2600				520				520				375	
DM307	1400				1700				2600				1980	
DM308	200				280				280				175	
DM309	79				52				40				39.6	
DM310	22				25				20				20.2	
DM311	1.2				<0.5				<0.5				0.52	
DM312	0.82				0.64				<0.5				0.6	
DM313	1.2				0.61				0.56				3.65	
DM314							81000			66000	74000	77000	1140	67000
DM502-079	12				3.8				8.6		12		8.4	
DM502-119	3.6				3				2.3				2.11	
DM502-161	<0.5				<0.5				<0.5				<0.5	
DM502-240	<0.5				<0.5									
DM502-335	<0.5				<0.5									
DM503	<0.5						<0.5		<0.5					
DM601-040														
DM601-085	1400		3800		2800				3100	3600	2400	2500	2400	2780
DM601-115														
DM601-135	1800		1900		2300				2800	6200	14000	14000	14200	13800
DM601-175														
DM601-200	120000		87000		74000				77000	35000	29000	29000	20800	18500
DM602	130		220		250				280		270		321	
DM603-068														
DM603-115	6.3		4		5.4				3.7		5.5		5.7	
DM603-170	6800		8400		7200				8000		8300		6810	
DM603-205	1500		1500		1200				990		1400		810	
DM603-245	78		78		53				42		60		54.7	
DM604	4		3.8		4.9				5.5		8.3		8.95	
DM605-066														
DM605-105	2.3		2		1.2				2.8		0.95		1.89	

Notes:
Year and Quarter: last two digits of the year with Quarter (Q) designation.
Q1 = January through March
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Q4 = October through December

TABLE 11

HISTORICAL TCE CONCENTRATIONS (in μg/l) FOR WELLS IN THE OU1 AREA (Quarterly, Baseline - 2010)

Well Name	Year and Quarter													
	07Q3	07Q4	08Q1	08Q2	08Q3	08Q4	09Q1	09Q2	09Q3	09Q4	10Q1	10Q2	10Q3	10Q4
DM605-170	6.7		5.2		6.2				4.6		4.4		3.58	
DM605-240	<0.5		<0.5		<0.5				<0.5		0.61		<0.5	
DM605-290	<0.5		<0.5		<0.5				<0.5		<0.5		<0.5	
DM606-045														
DM606-102	1200				650				360				208	
DM606-185	1200				1200				1300		880		1430	
DM606-250	1600				2100				1900		2200		2230	
DM606-330	47				47				54				53.8	
DM606-355														
DM606-370	1.5				1.2				1.2				1.22	
DM607-146	3.4	0.64	3		2.5				1.4		4.3		4.89	
DM607-210	2.6	1.2	2.4		2.9				3.4		4.4		4.66	
DM607-310	0.93	1	1		0.71				<0.5		<0.5		<0.5	
DM607-400	0.56	0.74	0.83		0.75				<0.5		<0.5		<0.5	
DM609	<0.5		<0.5		<0.5				<0.5		<0.5		<0.5	
DM610	<0.5		<0.5		<0.5				<0.5		<0.5		<0.5	
DM611		15	22	34	39				120		140		247	
DM612		2400	2600	2900	1800				1600		1500		1140	
DM613		<0.5	<0.5	<0.5	<0.5				<1	<1	<0.5		<0.5	
DM614							610000			170000	100000	91000	71400	70600
DM615							1500			5.8	1.1	0.78	11.1	0.91
DM701	<0.5				<0.5									
DM702	190				98				76				105	
DM703	67				72				71				61.2	
DM704	38				38				46				37	
DM705	20				16				20				18.3	
DM706	2.4				2.1				1.7				1.66	
DM707	85				69				36				41.3	
DM713	25				29				36				22.3	
DM714	<0.5				22				28				14.5	
DM715														
DM716														
DM717														
DM718	24				20				21				11.3	
DM719														
DM720														
DM721-045														
DM721-065														
DM721-125														
DM721-185														
DM721-260														
DM721-280														
DM722-047														
DM722-100														
DM722-145														
DM722-190														
DM722-240														
DM722-280														
DM723	140				160				72				118	
DM724	41				67				63				80.2	
DM725														
DM726	10				7.7				4.2				3.92	
DM727														
DM728	2.3				3.4									
DM729-050	6.4				3.7				4.6				2.49	
DM729-145														
DM729-195														
DM729-255														
DM729-285														
DM730														
DM731														
DM732														
DM733	<0.5		<0.5		<0.5				<0.5				<0.5	
DM734-045														
DM734-110														
DM734-162														
DM734-200														
DM734-240														
DM734-280														
DM735	<0.5		<0.5		0.5				<0.5				1.72	
EW18		17		9.4		14			7.1		7.7		19.3	

Notes:
Year and Quarter: last two digits of the year with Quarter (Q) designation.
Q1 = January through March
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Q3 = July September
Q4 = October through December

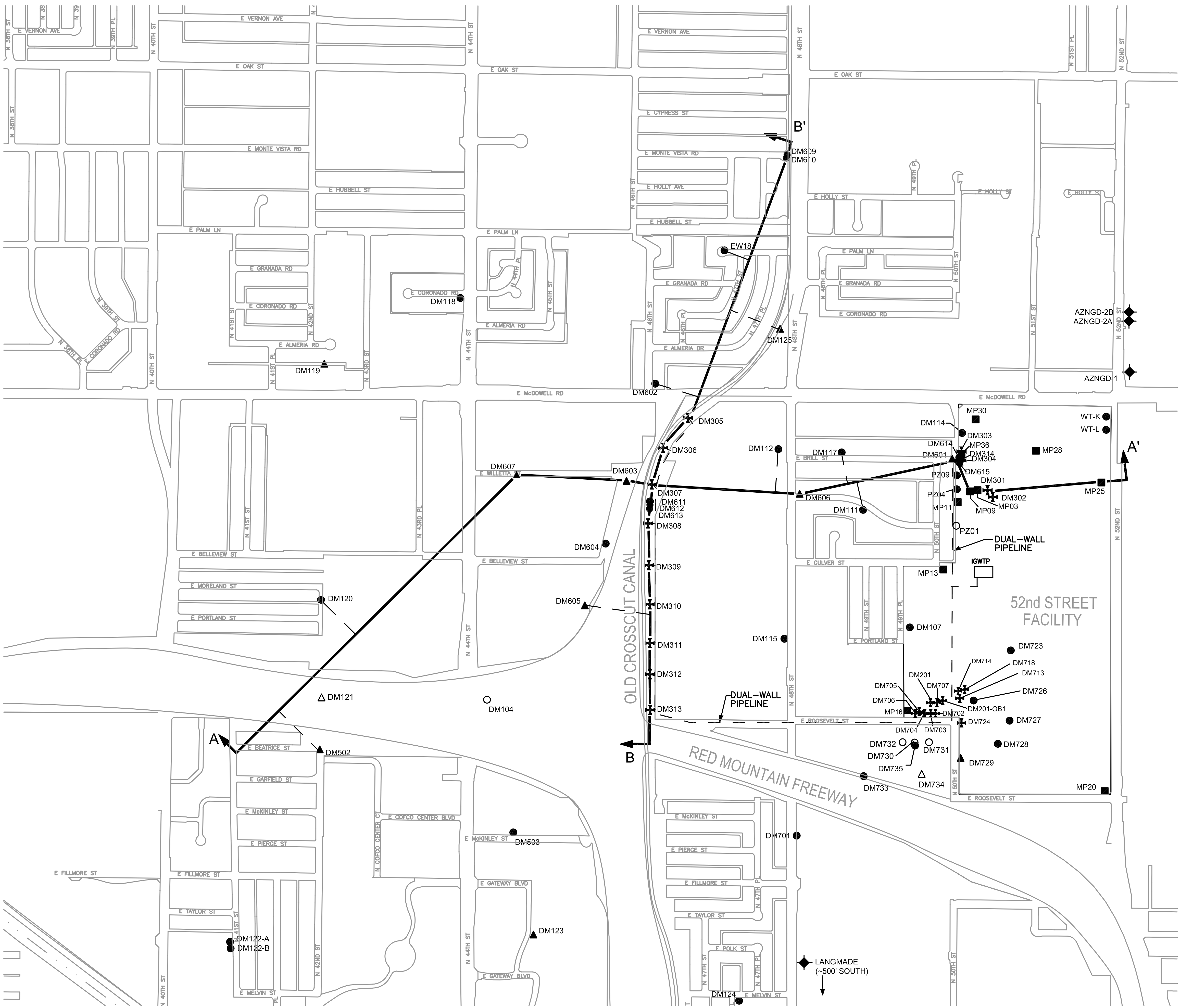
TABLE 11

HISTORICAL TCE CONCENTRATIONS (in µg/l) FOR WELLS IN THE OU1 AREA
(Quarterly, Baseline - 2010)

Well Name	Year and Quarter													
	07Q3	07Q4	08Q1	08Q2	08Q3	08Q4	09Q1	09Q2	09Q3	09Q4	10Q1	10Q2	10Q3	10Q4
LANGMADE														
Morgan	<1													
MP03-B														
MP03-D											310000		958000	
MP05-B														
MP09-B														
MP09-D								7700			5300		6080	
MP11-B	650				340				890				586	
MP11-D	16				13			230	21		88		23	
MP13-B	1400				1500				1800				1750	
MP13-C														
MP13-D	1				1.4				1.6				2.74	
MP16-A														
MP16-B	7.4				7.7				6.7				21.5	
MP16-C														
MP16-D	3				1.8				1.5				11.5	
MP20-A	<0.5				0.42				<0.5				<0.5	
MP20-B	<0.5				<0.19				<0.5				10.9	
MP20-C														
MP25-A														
MP25-B														
MP25-D	<0.5				<0.5									
MP28-A														
MP28-B														
MP28-D														
MP30-A														
MP30-B	43				45				30				60.9	
MP30-D	18				23			40	17		26		27.4	
MP36-A														
MP36-B														
MP36-C								300000		130000	200000	200000	151000	159000
MP36-D								190000		120000	210000	220000	224000	195000
MP37-C														
PZ01														
PZ02														
PZ03														
PZ04														
PZ05														
PZ06														
PZ07														
PZ08														
PZ09														
PZ10														
SW-1														
WT-K	<0.5				<0.5				<0.5				<0.5	
WT-L	<0.5				<0.5									

Notes:
Year and Quarter: last two digits of the year with Quarter (Q) designation.
Q1 = January through March
Q2 = April through June
Q3 = July September
Q4 = October through December

FIGURES



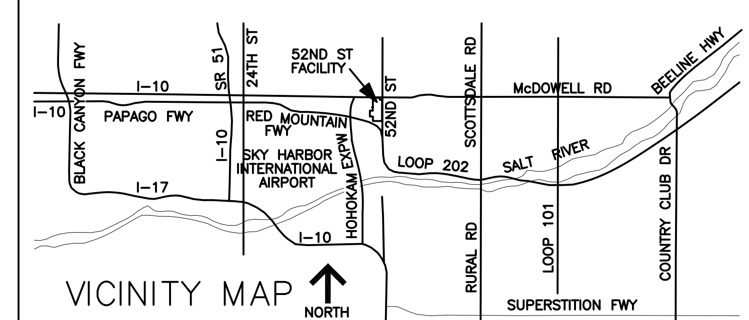
OU1-1.DWG 2-23-11

LEGEND:

SYMBOL	WELL TYPE
▲	WESTBAY
●	CONVENTIONAL
■	MP (MULTIPORT)
✚	EXTRACTION
◆	PRIVATE
● DM 602	NAME OF WELL
○ △	ABANDONED WELL
- - -	WELL PROJECTED ONTO CROSS SECTION

NOTES:

1. FOR MORE DETAILED INFORMATION ON WELLS, REFER TO MI52 QUARTERLY AND SEMI-ANNUAL REPORTS AND THE 1992 MI52 FR RI REPORT.
2. THE MI52 OPERABLE UNIT NO. 1 GROUNDWATER EXTRACTION AND TREATMENT SYSTEM INCLUDES FIVE (5) ONSITE EXTRACTION WELLS (DM301 TO DM304 AND DM314), NINE (9) OFFSITE EXTRACTION WELLS (DM305–DM313), CONVEYANCE DUAL-WALLED PIPING, AND THE INTERGRATED GROUNDWATER TREATMENT PLANT (IGWTP). WELLS DM311, DM312, AND DM313 ARE CURRENTLY USED AS MONITOR WELLS ONLY. ADDITIONAL EXTRACTION WELLS ARE LOCATED IN THE SOUTHWEST PARKING LOT (SWPL) AREA.
3. SECTIONS A–A' AND B–B' ARE SHOWN ON FIGURES 2 AND 3 RESPECTIVELY. THESE SECTIONS WERE MODIFIED FROM PREVIOUS OU1 EFFECTIVENESS REPORTS TO INCLUDE NEW WELLS AND DATA FROM THOSE WELLS.



VICINITY MAP

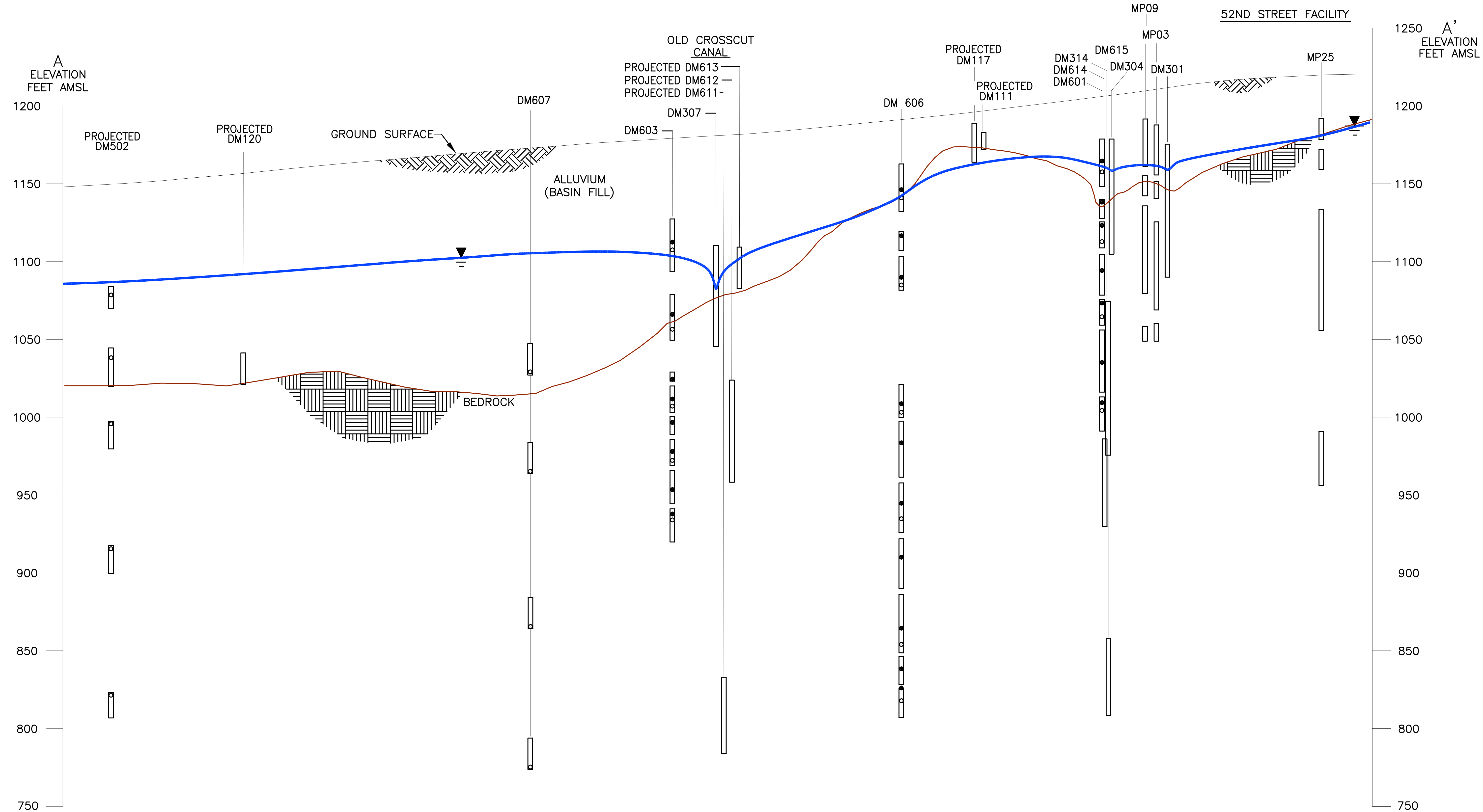
0 400 800 1600
SCALE IN FEET

OU1 WELL LOCATION MAP

Figure 1

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2010 OPERATIONS
MARCH 2011



LEGEND:

- DM 502 — NAME OF WELL
- GROUND SURFACE
- BEDROCK CONTACT
- 2010 WATER TABLE
- MONITOR ZONE
- MEASUREMENT PORT
- PUMPING PORT
- MONITOR ZONE

NOTES:

1. LOCATION OF SECTION A–A' IS SHOWN ON FIGURE 1.
2. LOCATIONS OF WELLS ARE SHOWN ON FIGURE 1. SOME WELLS IN CLOSE PROXIMITY TO SECTION A–A' HAVE BEEN PROJECTED. APPROXIMATE PROJECTED DISTANCE MAY BE DETERMINED FROM FIGURE 1.
3. THE SPECIFIC DEPTHS/LOCATIONS OF MEASUREMENT AND PUMPING PORTS, AND MONITOR ZONES ARE PROVIDED IN THE MI52 1992 FR RI REPORT AND OTHER RELATED DOCUMENTS. THE ENTIRE WELL CONSTRUCTION IS NOT SHOWN ON THIS FIGURE.
4. THE WATER TABLE WAS PLOTTED USING DECEMBER 2010 DATA.
5. WATER LEVELS FOR WELL DM307 WAS ADJUSTED FOR WELL EFFICIENCY. REFER TO APPENDIX B OF THIS REPORT.

HORIZONTAL SCALE
0 600
IN FEET

VERTICAL EXAGGERATION
10X

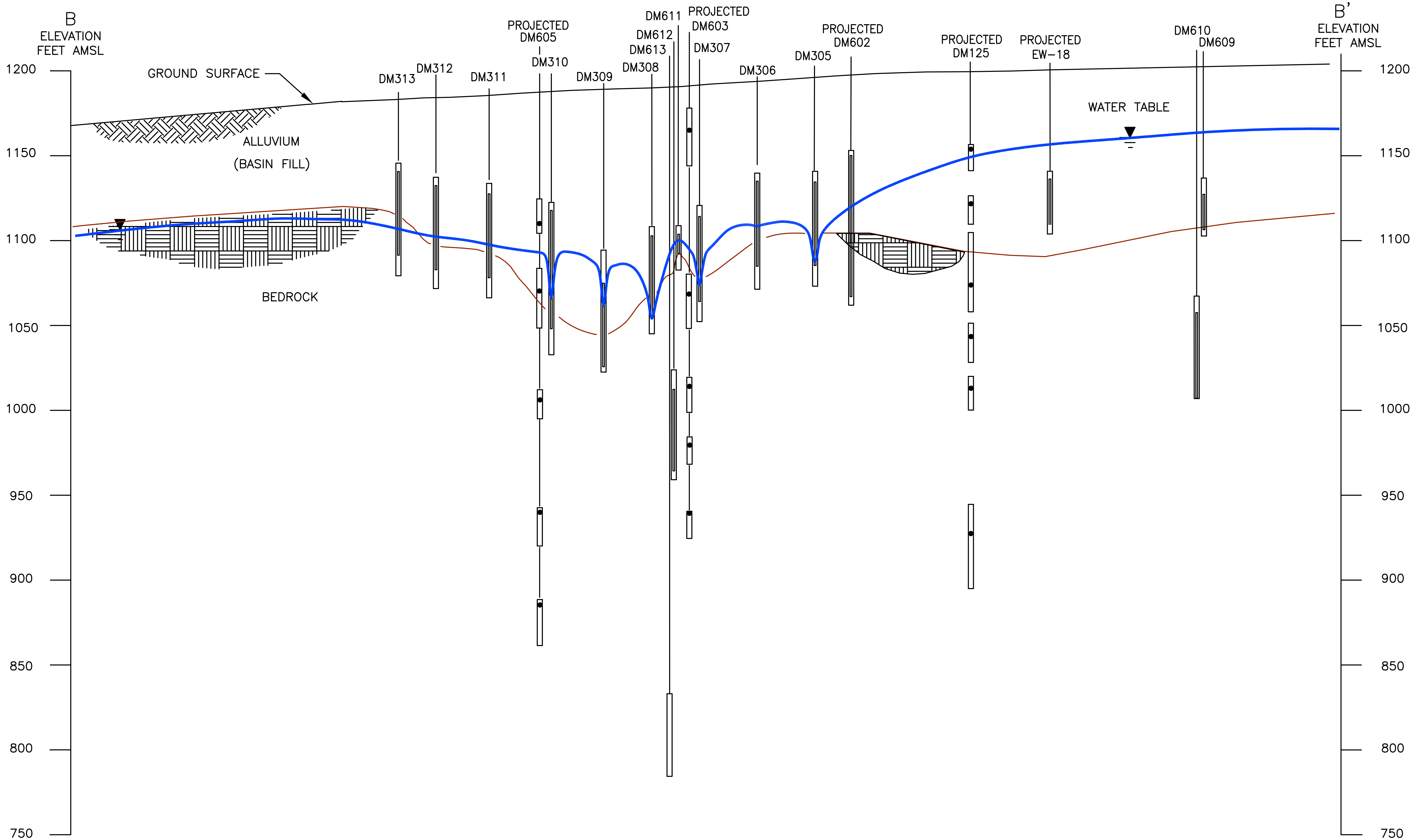
SECTION A-A'

Figure 2

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2010 OPERATIONS
MARCH 2011

OU1-2010-2.DWG 2-25-11



LEGEND:

- DM125 — NAME OF WELL
- GROUND SURFACE
- BEDROCK CONTACT
- 2010 WATER TABLE
- MONITOR ZONE
- MEASUREMENT PORT
- MONITOR ZONE
- WELL SCREEN

NOTES:

1. LOCATION OF SECTION B–B' IS SHOWN ON FIGURE 1.
2. LOCATIONS OF WELLS ARE SHOWN ON FIGURE 1. SOME WELLS IN CLOSE PROXIMITY TO SECTION B–B' HAVE BEEN PROJECTED. APPROXIMATE PROJECTED DISTANCE MAY BE DETERMINED FROM FIGURE 1.
3. THE SPECIFIC DEPTHS/LOCATIONS OF MEASUREMENT AND PUMPING PORTS, AND MONITOR ZONES ARE PROVIDED IN THE MI52 1992 FR RI REPORT AND OTHER RELATED DOCUMENTS. THE ENTIRE WELL CONSTRUCTION IS NOT SHOWN ON THIS FIGURE.
4. THE WATER TABLE WAS PLOTTED USING DECEMBER 2010 DATA.
5. WATER LEVELS FOR WELLS DM305, DM307, DM308, DM309, AND DM310 ADJUSTED FOR WELL EFFICIENCY. REFER TO APPENDIX B OF THIS REPORT.

HORIZONTAL SCALE

0 600 1200

IN FEET

VERTICAL EXAGGERATION 10X

SECTION B-B'

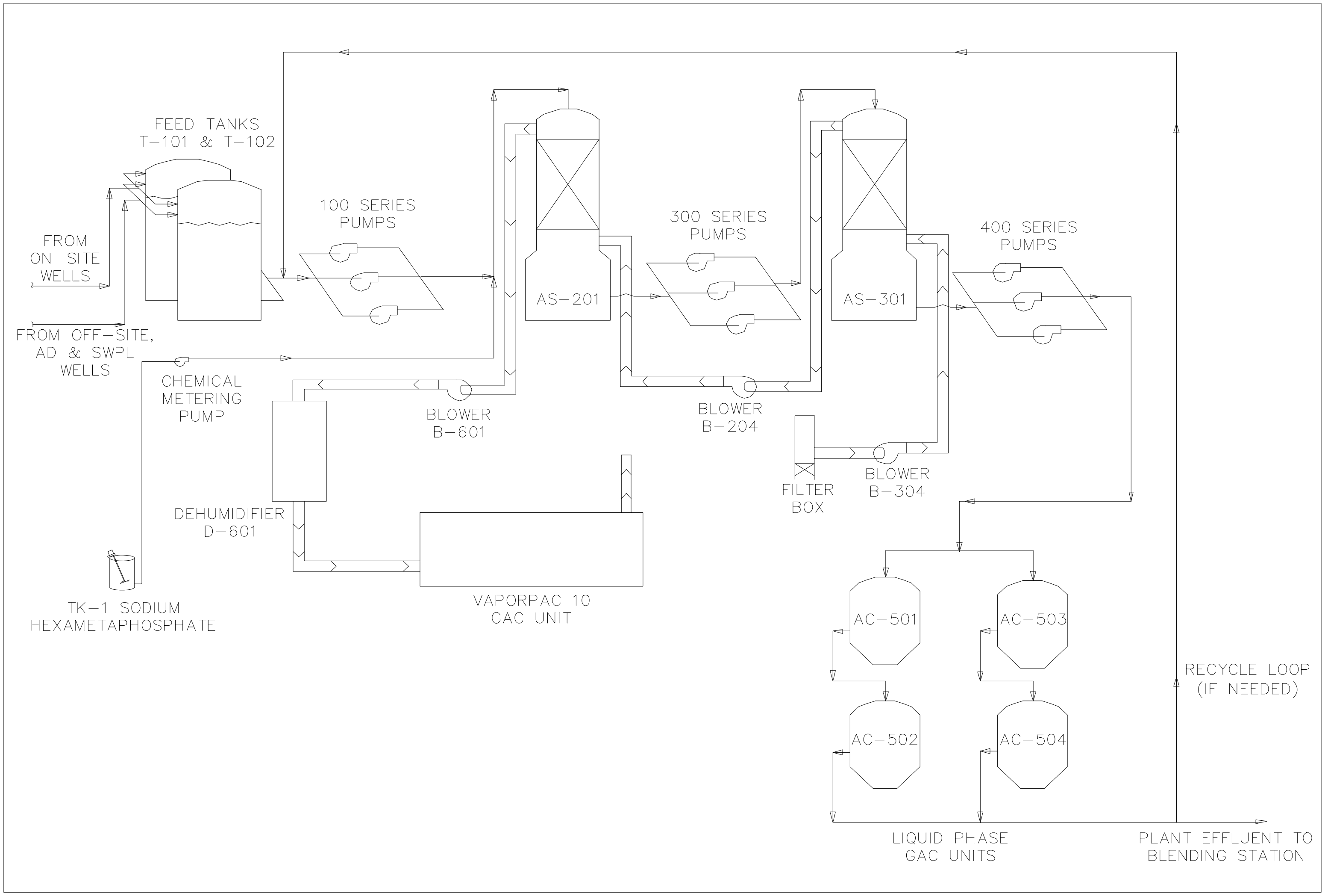
Figure 3

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2010 OPERATIONS
MARCH 2011

OU1-2010-3.DWG 2-23-11

52nd Street IGWTP Process Flow Diagram



52nd STREET IGWTP PROCESS FLOW DIAGRAM

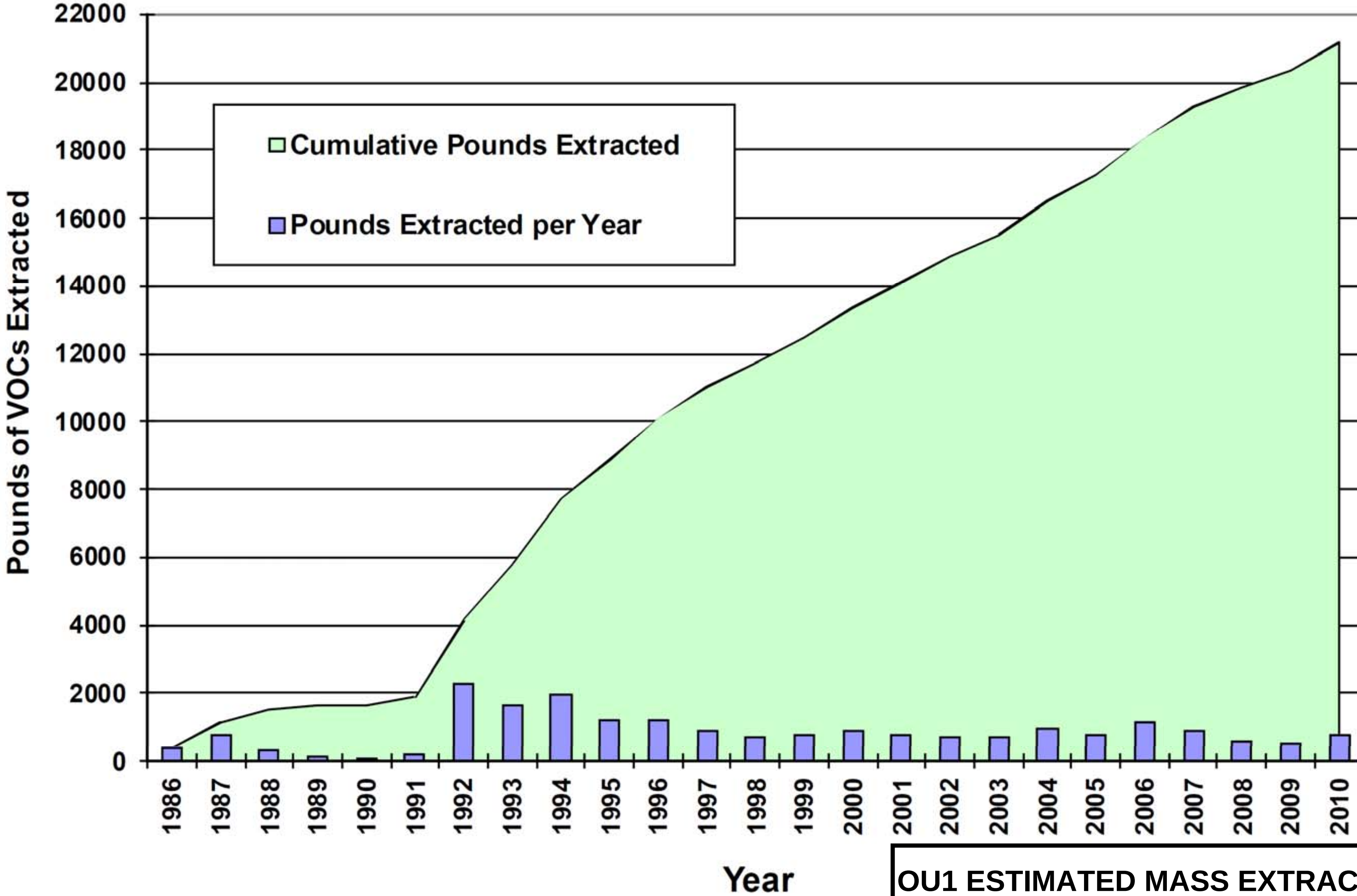
Figure 4

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT

2010 OPERATIONS

MARCH 2011

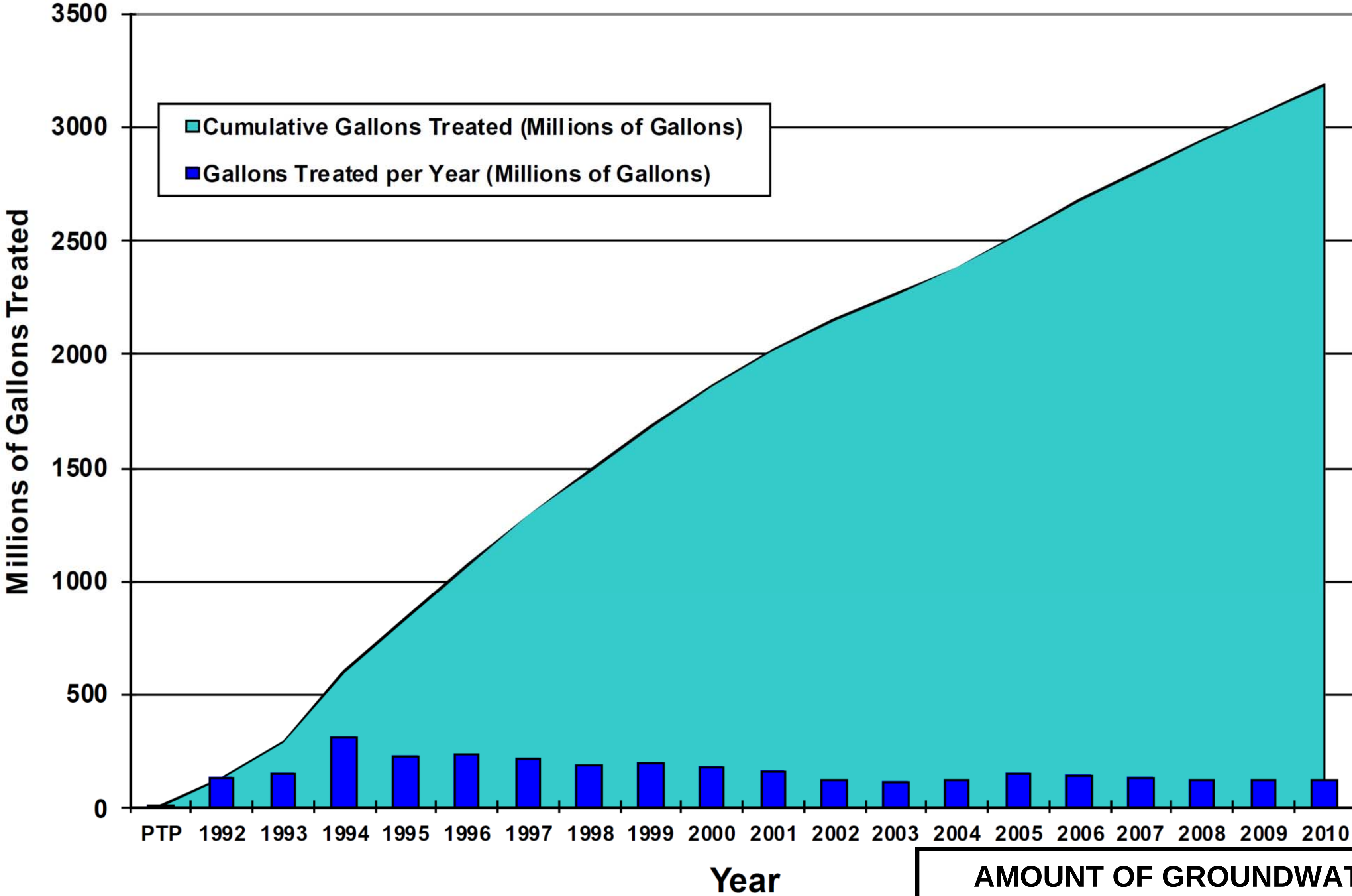


OU1 ESTIMATED MASS EXTRACTED (POUNDS OF VOCS)

Figure 5

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2010 OPERATIONS
MARCH 2011

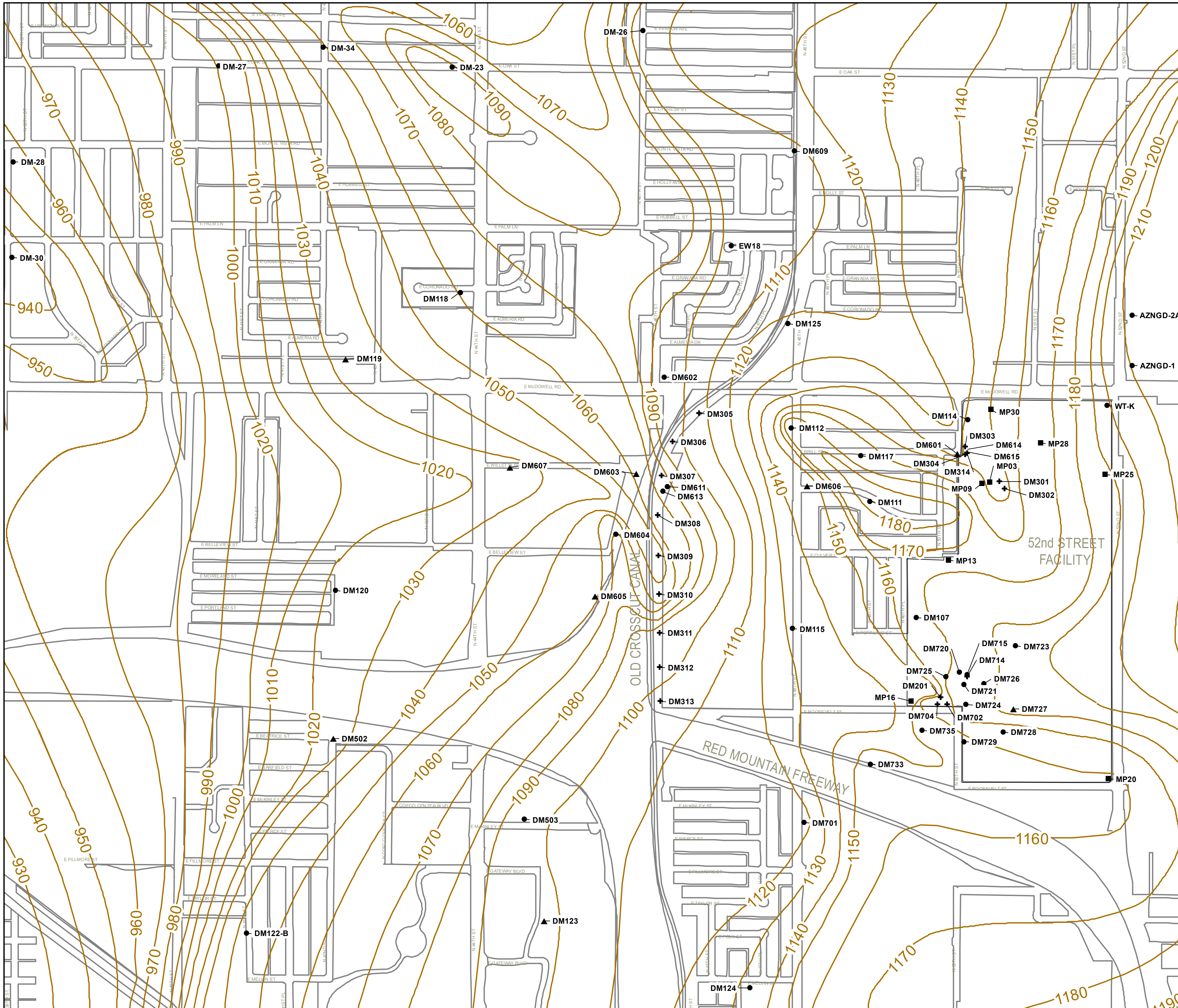


AMOUNT OF GROUNDWATER TREATED AT OU1

Figure 6

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2010 OPERATIONS
MARCH 2011



Legend:

SYMBOL	WELL TYPE
●	CONVENTIONAL
+	EXTRACTION
■	MULTIPORT
▲	WESTBAY or FLUTe

—1210— BEDROCK ELEVATION CONTOURS (FEET AMSL)

● DM602 WELL SYMBOL AND WELL NAME

N

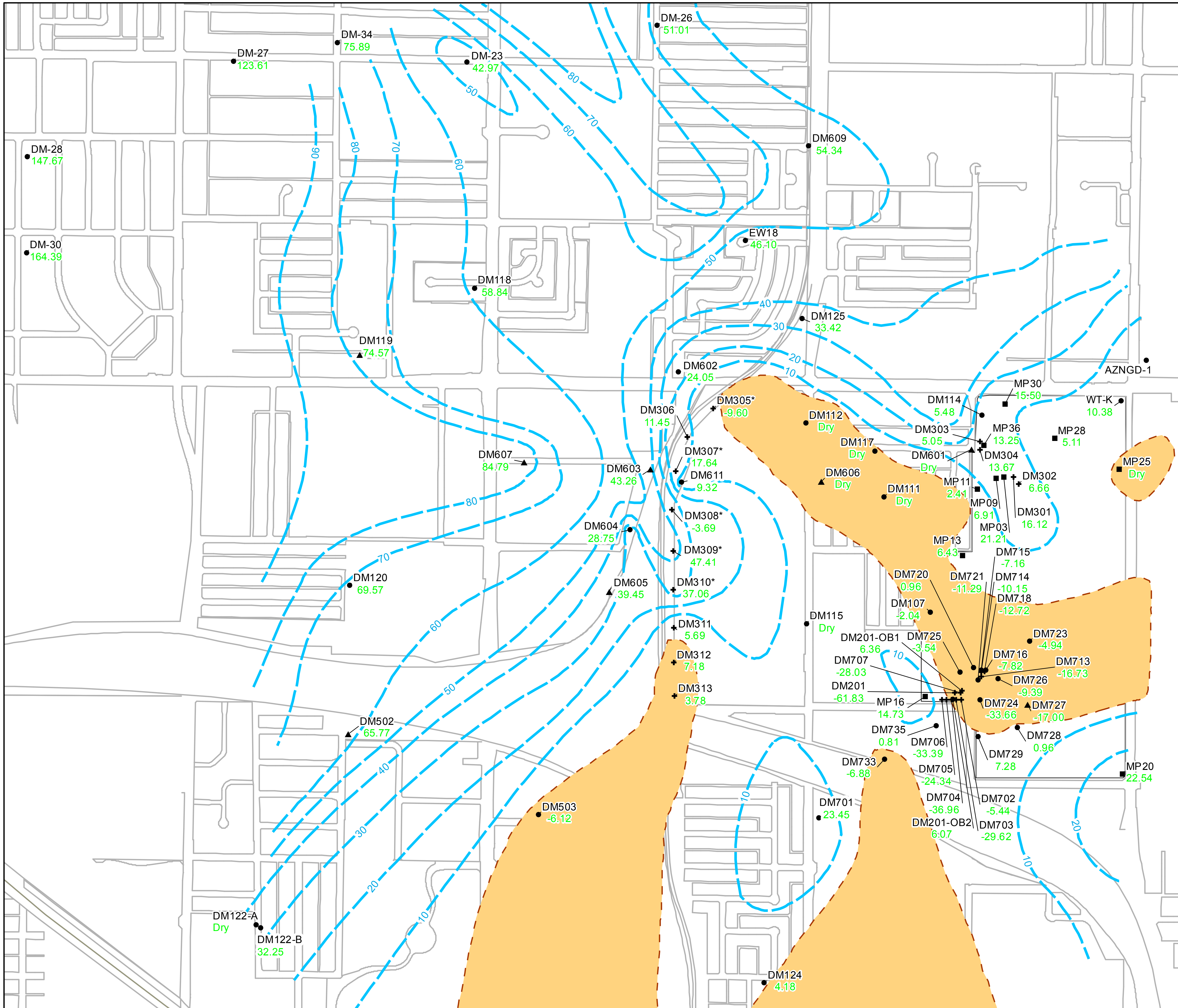
Feet
0 500 1,000 2,000

BEDROCK CONTOUR MAP

Figure 7

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2010 OPERATIONS
MARCH 2011



LEGEND:

SYMBOL	WELL TYPE
●	CONVENTIONAL
✚	EXTRACTION
■	MULTIPORT
▲	WESTBAY or FLUTe
DM602 24.05	WELL NAME POSITIVE NUMBER INDICATES THICKNESS (IN FEET) OF SATURATED ALLUVIUM NEGATIVE NUMBER INDICATES DEPTH (IN FEET) OF WATER BELOW BEDROCK / ALLUVIUM CONTACT
— 30 —	SATURATED ALLUVIUM THICKNESS CONTOUR (IN FEET)
(shaded area)	APPROXIMATE AREA OF BEDROCK ABOVE DECEMBER 2010 WATER TABLE

NOTES:

1. FOR MORE DETAILED INFORMATION ON WELLS REFER TO MI52 QUARTERLY AND SEMI-ANNUAL REPORTS AND THE MI52 FR RI REPORT.
2. CALCULATIONS ARE BASED ON DECEMBER 2010 WATER LEVELS, UNLESS OTHERWISE NOTED. WATER LEVELS IN WELLS DM-23, DM-26, DM-27, DM-28, DM-30, AND DM-34 WERE MEASURED IN OCTOBER 2010.
3. CONTOUR INTERVAL 10 FEET.
4. WELLS WITH * WERE PUMPING WHEN WATER MEASUREMENTS WERE RECORDED.

N

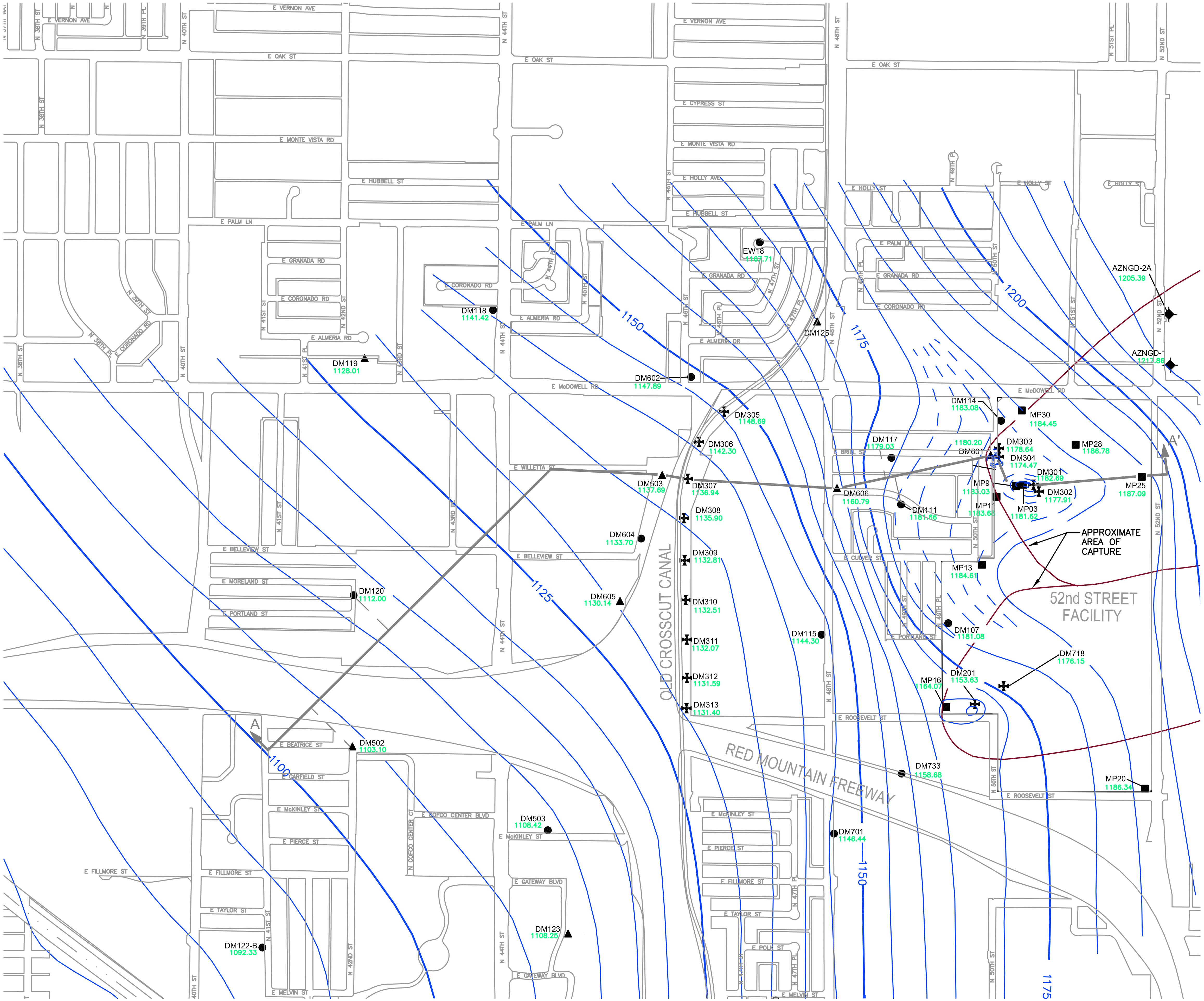
0 500 1,000 2,000 Feet

SATURATED ALLUVIAL THICKNESS DECEMBER 2010

Figure 8

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2010 OPERATIONS
MARCH 2011



LEGEND:

(symbols)	WELL LOCATION SYMBOLS
DM 119	WELL NAME
1088.65	GROUNDWATER ELEVATION (IN FEET AMSL)
1100	GROUNDWATER ELEVATION CONTOUR (FEET AMSL)
(dashed line)	SUPPLEMENTAL 1-FOOT CONTOURS (DASHED) SHOWN FOR MORE DETAIL
(line)	APPROXIMATE AREA OF CAPTURE

NOTES:

1. FOR MORE DETAILED INFORMATION ON WELLS, REFER TO MI52 QUARTERLY AND SEMI-ANNAL REPORTS AND THE 1992 MI52 FR RI REPORT.
2. THE OFFSITE PORTION OF THE OU1 WAS NOT IN OPERATION AT THIS TIME (3/92) ALTHOUGH EXTRACTION WAS OCCURING IN THE COURTYARD AND SWPL AREAS.
3. CONTOUR INTERVAL IS 5 FEET EXCEPT AS NOTED.
4. SECTION A-A' IS SHOWN ON FIGURE 10.

N

0 400 800 1600

SCALE IN FEET

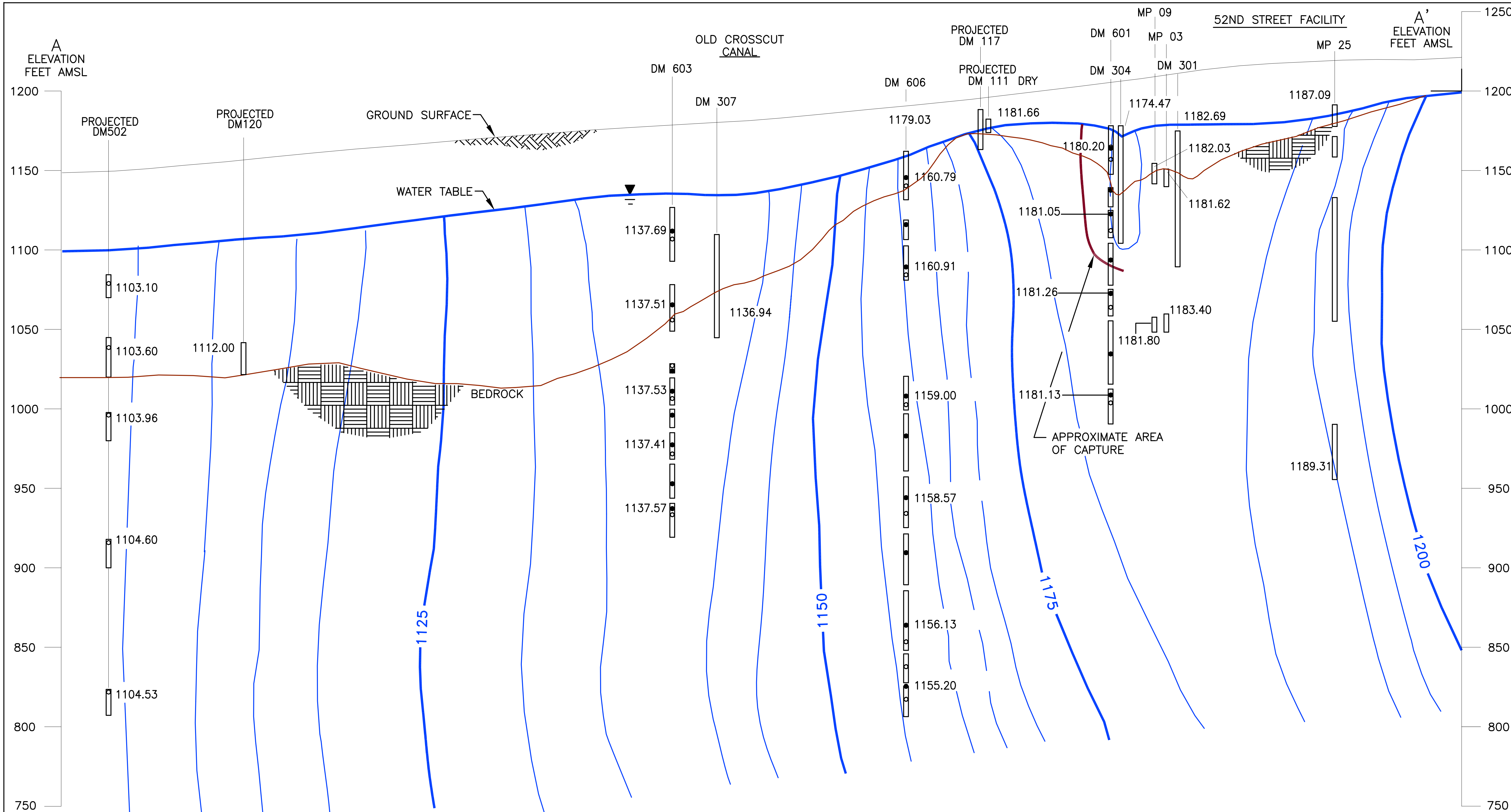
WATER LEVEL ELEVATIONS ALLUVIAL AQUIFER PLAN VIEW BASELINE (MARCH-MAY 1992)

Figure 9

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2010 OPERATIONS
MARCH 2011

OU1-2011-09.DWG 3-29-11



LEGEND:

- DM 606 — NAME OF WELL
- GROUND SURFACE
- BEDROCK CONTACT
- 1992 WATER TABLE
- MONITOR ZONE
- MEASUREMENT PORT
- PUMPING PORT
- 1160.91 WATER LEVEL ELEVATION (FEET AMSL)
- 1125 — WATER LEVEL ELEVATION CONTOUR (FEET AMSL)
- CAPTURE ZONE

NOTES:

1. LOCATION OF SECTION A–A' IS SHOWN ON FIGURES 1 AND 9.
2. THE SPECIFIC DEPTHS/LOCATIONS OF MEASUREMENT AND PUMPING PORTS, AND MONITOR ZONES ARE PROVIDED IN THE MI52 1992 FR RI REPORT AND OTHER RELATED DOCUMENTS. THE ENTIRE WELL CONSTRUCTION IS NOT SHOWN ON THIS FIGURE.
3. THE OLD CROSSCUT CANAL LOCATION PORTION OF THE OU1 WAS NOT IN OPERATION AT THIS TIME (3/92).

HORIZONTAL SCALE

0 600 1200

IN FEET

VERTICAL EXAGGERATION
10X

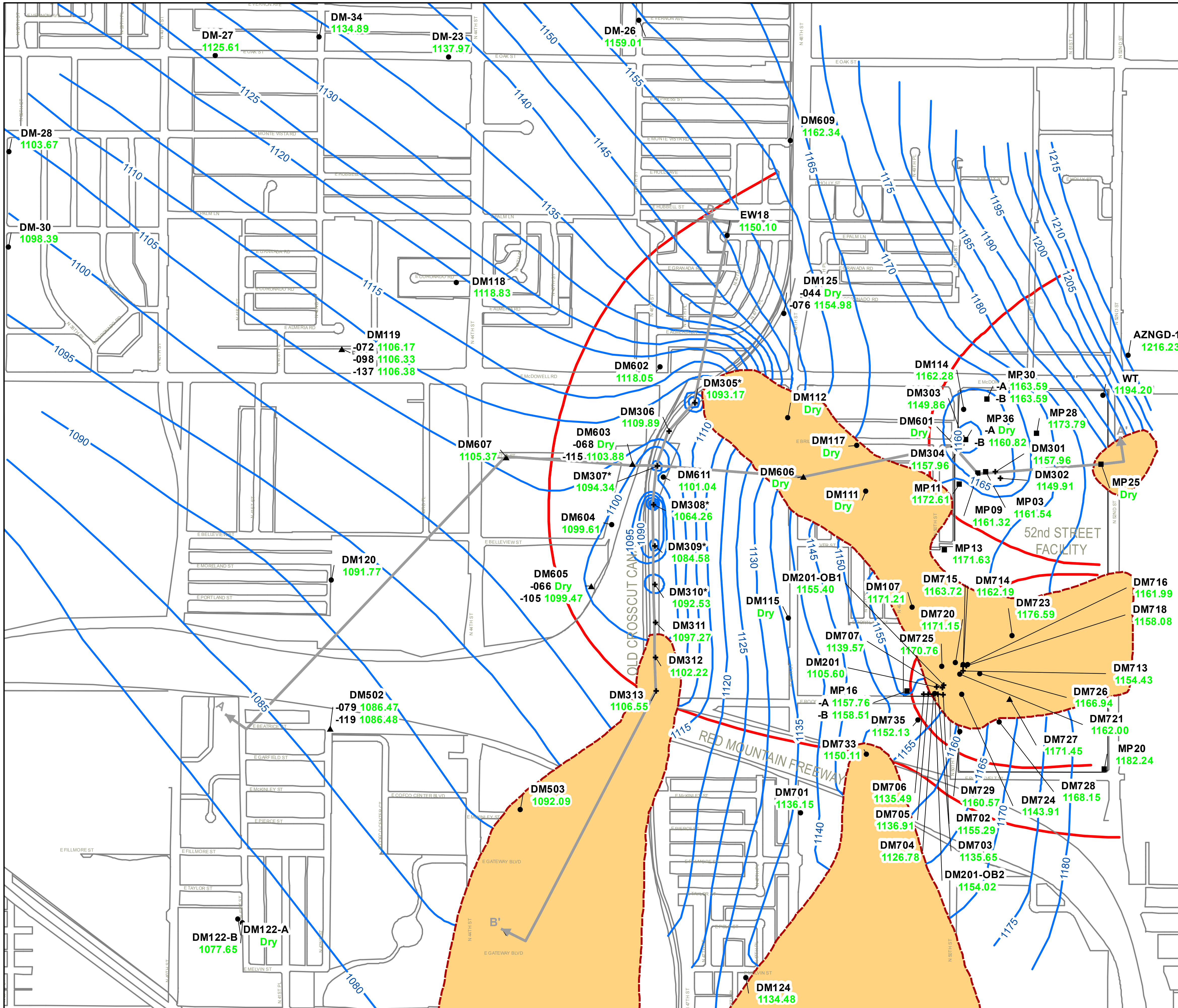
WATER LEVEL ELEVATIONS BASELINE (MARCH - MAY 1992) SECTION A-A'

Figure 10

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2010 OPERATIONS
MARCH 2011

OU1-2010-9.DWG 3-29-11



LEGEND:

SYMBOL	WELL TYPE
●	CONVENTIONAL
✚	EXTRACTION
■	MULTIPORT
▲	WESTBAY or FLUTe

DM602 — WELL NAME
-068 DRY — DEPTH OF SAMPLE PORT (IN FEET) OR COMPLETION INTERVAL DESIGNATION — GROUNDWATER ELEVATION (FEET AMSL)
-115 1118.05

1210 — GROUNDWATER ELEVATION CONTOURS (FEET AMSL)

CAPTURE ZONE

APPROXIMATE AREA OF BEDROCK ABOVE DECEMBER 2010 WATER TABLE

A — A' Cross Section Location and Designation

Notes:
1. Water levels for wells DM305, DM307, DM308, DM309, and DM310 adjusted for well efficiency.
2. Wells with * were pumping when water level measurements were recorded.
3. Water level measurements recorded in December 2010 unless otherwise noted; Water levels in wells DM-23, DM-26, DM-27, DM-28, DM-30, and DM-34 were measured in October 2010.

N

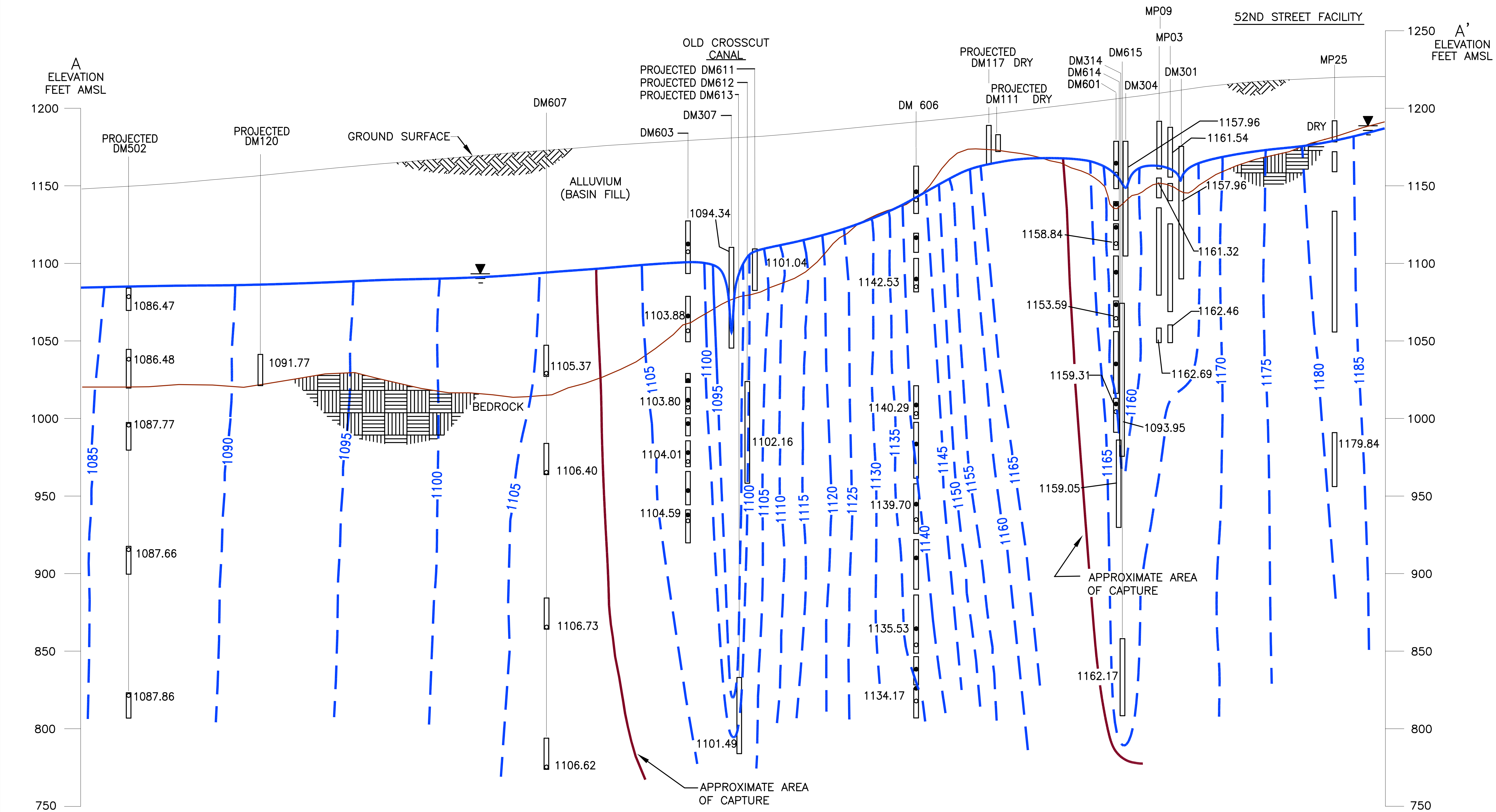
0 500 1,000 2,000 Feet

WATER LEVEL ELEVATIONS ALLUVIAL AQUIFER PLAN VIEW DECEMBER 2010

Figure 11

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2010 OPERATIONS
MARCH 2011



LEGEND:

- DM 502 — NAME OF WELL
- GROUND SURFACE
- BEDROCK CONTACT
- 2010 WATER TABLE
- MONITOR ZONE
- MEASUREMENT PORT
- PUMPING PORT
- MONITOR ZONE
- 1087.86 WATER LEVEL ELEVATION (IN FEET AMSL)
- APPROXIMATE AREA OF CAPTURE
- 1000 — WATER LEVEL ELEVATION CONTOUR (IN FEET AMSL)

NOTES:

1. LOCATION OF SECTION A–A' IS SHOWN ON FIGURES 1 AND 11.
2. THE WATER TABLE WAS PLOTTED USING DECEMBER 2010 DATA.
3. WATER LEVEL FOR DM 307 ADJUSTED FOR WELL EFFICIENCY. SEE APPENDIX B OF THIS REPORT.
4. FIGURE 1 SHOWS WHERE THE CROSS SECTION CROSSES THE CAPTURE ZONE NEAR THE OCC. GROUNDWATER FLOW IS SOUTH–EAST TOWARD THE EXTRACTION WELLS. IN THIS FIGURE THIS MEANS WATER ON THE EAST SIDE OF THE CAPTURE ZONE WOULD BE COMING OUT OF THE PAPER AND TO THE READER'S RIGHT, TOWARD THE EXTRACTION WELLS.

HORIZONTAL SCALE

0 600 1200

IN FEET

VERTICAL EXAGGERATION
10X

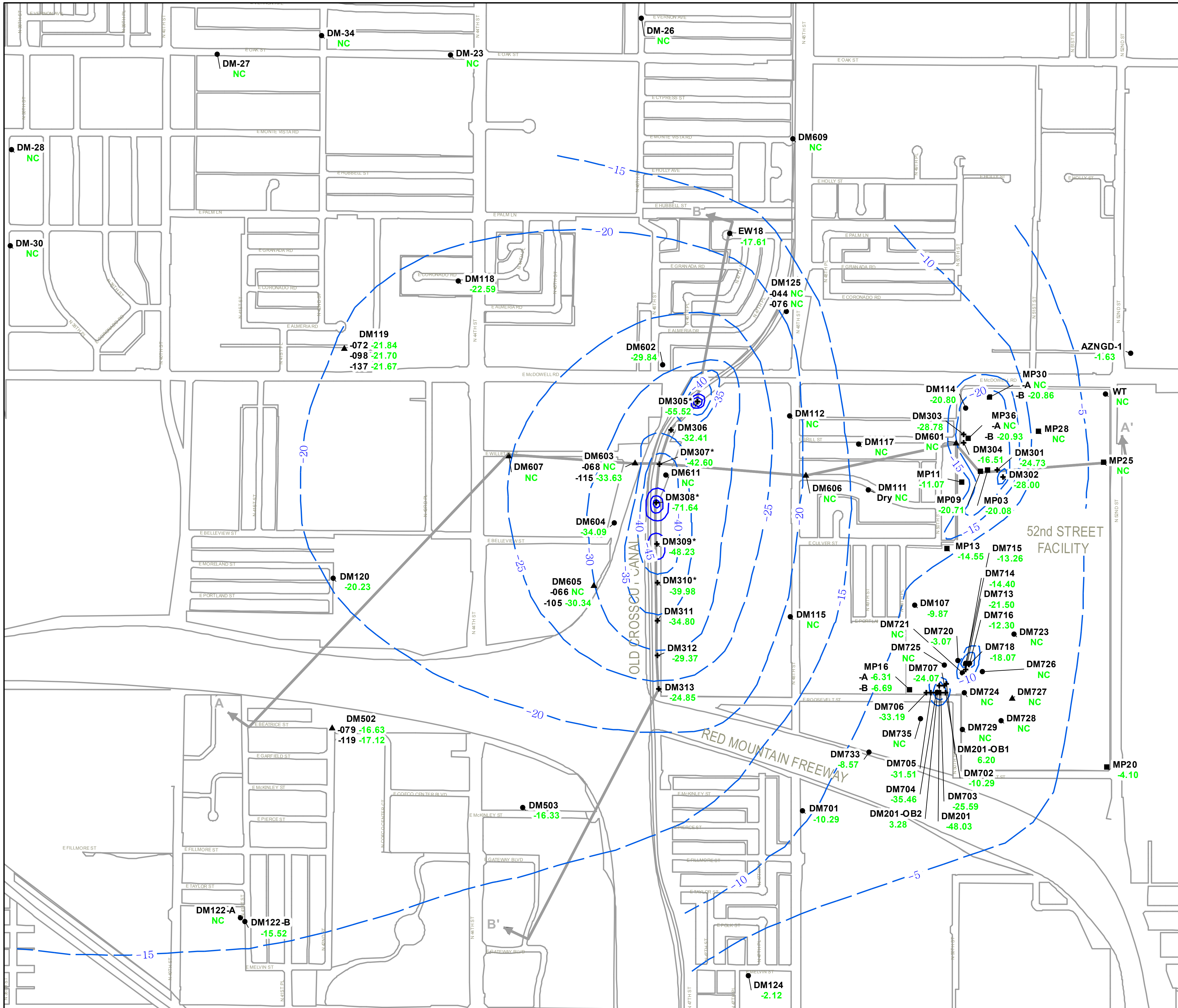
WATER LEVEL ELEVATIONS DECEMBER 2010 SECTION A-A'

Figure 12

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2010 OPERATIONS
MARCH 2011

OU1-2010-12.DWG 3-25-11



LEGEND:

SYMBOL	WELL TYPE
●	CONVENTIONAL
✚	EXTRACTION
■	MULTIPORT
▲	WESTBAY or FLUTe

DM602 -29.84 — WELL NAME; CHANGE IN WATER LEVEL (FEET); POSITIVE NUMBER REPRESENTS RISE IN WATER LEVEL AND NEGATIVE NUMBER REPRESENTS DECLINE IN WATER LEVEL

DM603 -115 -33.63 — WELL NAME; DEPTH OF WELL SAMPLE PORT (IN FEET) OR COMPLETION INTERVAL; CHANGE IN WATER LEVEL ELEVATION (IN FEET); POSITIVE NUMBER REPRESENTS WATER LEVEL RISE, AND NEGATIVE NUMBER REPRESENTS A DECLINE IN WATER LEVEL

— 5 — TOTAL WATER LEVEL CHANGE (FEET) FROM MARCH-MAY 1992 TO DECEMBER 2010; POSITIVE NUMBER REPRESENTS RISE IN WATER LEVEL AND NEGATIVE NUMBER REPRESENTS DECLINE IN WATER LEVEL

A ⟷ A' Cross Section Location and Designation

NOTES:

1. FOR MORE DETAILED INFORMATION ON WELLS, REFER TO MI52 QUARTERLY AND SEMI-ANNUAL REPORTS AND THE MI52 FR RI REPORT.
2. EXTRACTION WELL DRAWDOWNS ARE TOO SENSITIVE TO PUMPING RATE SO THESE WELLS WERE NOT CONTOURED IN DETAIL; ONLY GENERAL TRENDS ARE INDICATED.
3. NC DENOTES NOT CALCULABLE; TYPICALLY WATER LEVEL IN WELL WAS NOT MEASURED OR WELL DID NOT EXIST AT BASELINE OR WELL WAS DRY IN 2010 SO CHANGE IN WATER LEVELS COULD NOT BE DETERMINED.
4. WATER LEVEL DECLINES ARE ALSO THE RESULT OF A REGIONAL MULTI-YEAR DROUGHT.

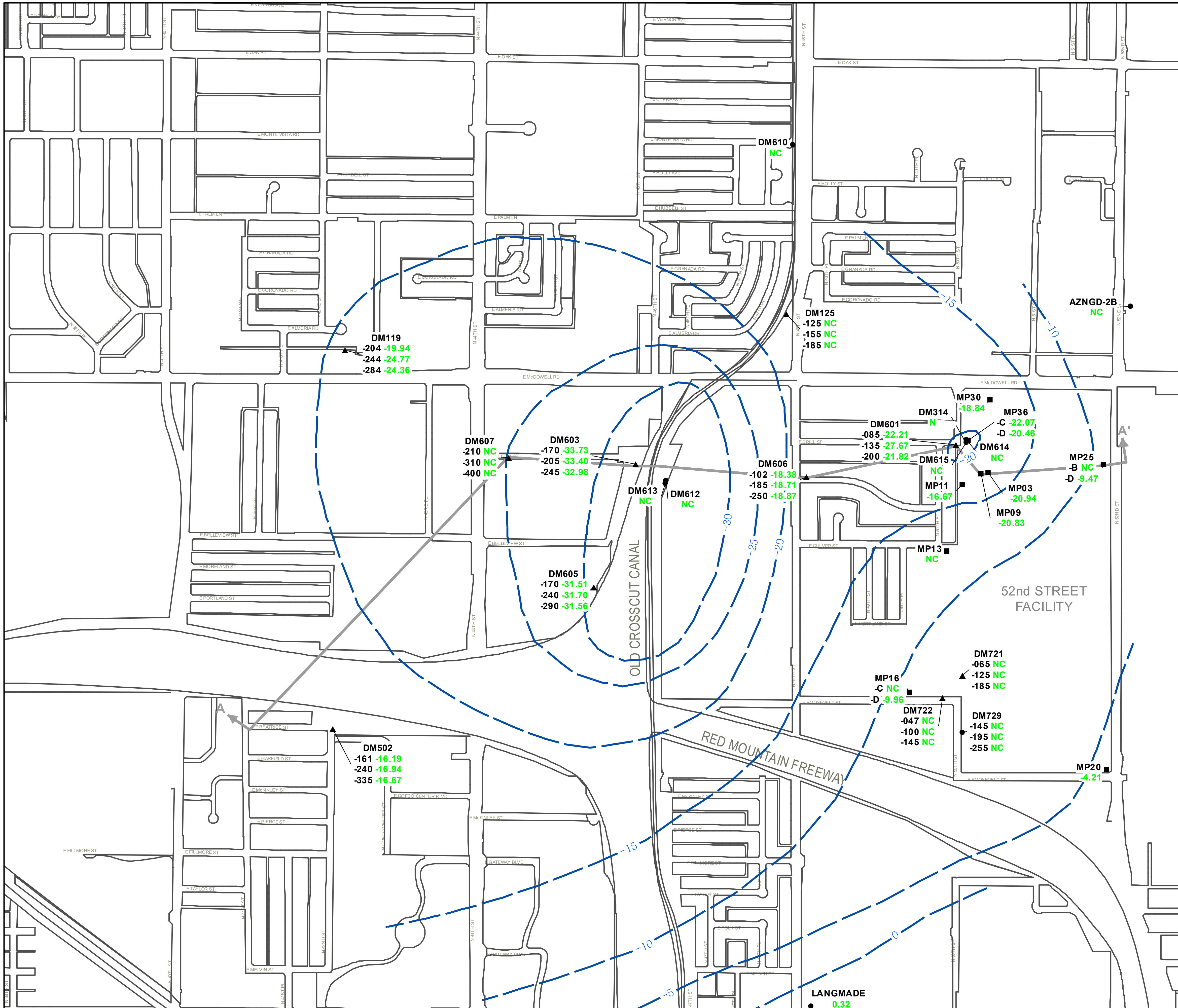
0 500 1,000 2,000 Feet

WATER LEVEL ELEVATION CHANGES ALLUVIAL AQUIFER PLAN VIEW BASELINE TO DECEMBER 2010

Figure 13

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2010 OPERATIONS
MARCH 2011



LEGEND:

SYMBOL	WELL TYPE
●	CONVENTIONAL
✚	EXTRACTION
■	MULTIPORT
▲	WESTBAY or FLUTe

● DM612 — WELL NAME
NC — CHANGE IN WATER LEVEL ELEVATION (IN FEET); NEGATIVE NUMBER REPRESENTS WATER LEVEL DECLINE, AND POSITIVE NUMBER REPRESENTS A RISE IN WATER LEVEL.

● DM603 — WELL NAME
-170 — DEPTH OF WELL SAMPLE PORT (IN FEET) OR COMPLETION INTERVAL
-33.73 — CHANGE IN WATER LEVEL ELEVATION (IN FEET); NEGATIVE NUMBER REPRESENTS WATER LEVEL DECLINE, AND POSITIVE NUMBER REPRESENTS A RISE IN WATER LEVEL.

— 20 — CHANGE IN WATER LEVEL ELEVATION CONTOUR (IN FEET) FROM BASELINE (MARCH-MAY 1992) TO DECEMBER 2010 NEGATIVE NUMBER REPRESENTS WATER LEVEL DECLINE, AND POSITIVE NUMBER REPRESENTS A RISE IN WATER LEVEL. CONTOURS DASHED WHERE APPROXIMATE.

NC — NOT CALCULABLE. WELL WAS EITHER NOT COMPLETED DURING BASELINE PERIOD OR WATER LEVELS WERE NOT MEASURED DURING BOTH TIME PERIODS.

A ←→ A' Cross Section Location and Designation

NOTES:

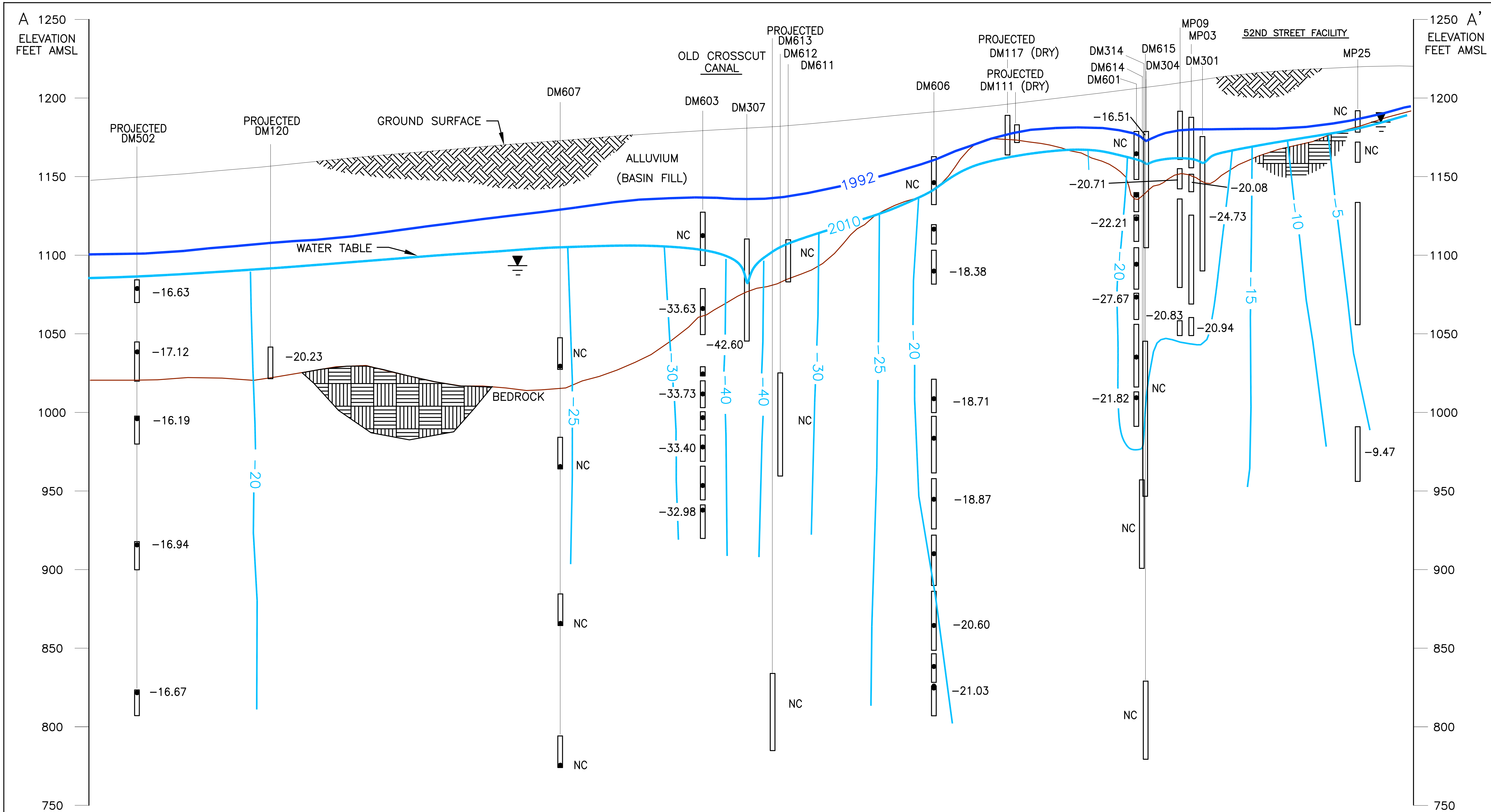
1. FOR MORE DETATILED INFORMATION ON WELLS, REFER TO MI52 QUARTERLY AND SEMI-ANNUAL REPORTS AND THE MI52 FR RI REPORT.
2. WATER LEVEL DECLINES ARE ALSO THE RESULT OF A REGIONAL MULTI-YEAR DROUGHT.

WATER LEVEL ELEVATION CHANGES IN BEDROCK BASELINE TO DECEMBER 2010

Figure 14

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2010 OPERATIONS
MARCH 2011



LEGEND:

DM 502	NAME OF WELL
	GROUND SURFACE
	BEDROCK CONTACT
	2010 WATER TABLE
	MONITOR ZONE
	MEASUREMENT PORT
-16.63	CHANGE IN WATER LEVEL (IN FEET) 1992 TO 2010
	MONITOR ZONE
1992	BASELINE MARCH–MAY 1992 WATER TABLE
2010	DECEMBER 2010 WATER TABLE
15	CONTOUR SHOWING CHANGE IN WATER LEVEL ELEVATION (IN FEET). A NEGATIVE NUMBER INDICATES A DECLINE; A POSITIVE NUMBER INDICATES A RISE.
NC	NOT CALCULABLE

NOTES:

1. LOCATION OF SECTION A–A' IS SHOWN ON FIGURE 1 AND 13.
2. THE SPECIFIC DEPTHS/LOCATIONS OF MEASUREMENT AND PUMPING PORTS, AND MONITOR ZONES ARE PROVIDED IN THE MI52 1992 FR RI REPORT AND OTHER RELATED DOCUMENTS. THE ENTIRE WELL CONSTRUCTION IS NOT SHOWN ON THIS FIGURE.
3. WATER LEVEL FOR 2010 FOR WELL DM307 WAS ADJUSTED FOR WELL EFFICIENCY. SEE DISCUSSION IN APPENDIX B OF THIS REPORT.

HORIZONTAL SCALE

0 600 1200

IN FEET

VERTICAL EXAGGERATION 10X

WATER LEVEL ELEVATION CHANGES BASELINE TO DECEMBER 2010 SECTION A-A'

Figure 15

CLEAR CREEK ASSOCIATES

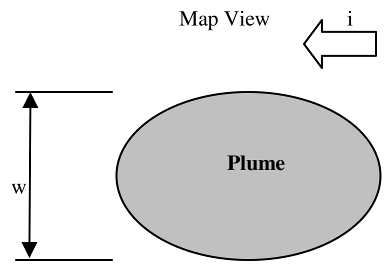
OU1 EFFECTIVENESS REPORT
2010 OPERATIONS
MARCH 2011

OU1-2010-14.DWG 3-05-11

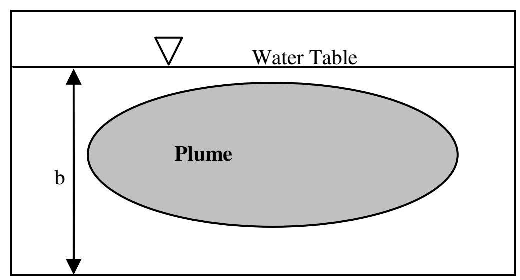
Estimated Flow Rate Calculation

Assumptions:

- Homogeneous, isotropic, confined aquifer of infinite extent
- Uniform aquifer thickness
- Fully penetrating extraction well(s)
- Uniform regional horizontal hydraulic gradient
- Steady-state flow
- Negligible vertical gradient
- No net recharge, or net recharge is accounted for in regional hydraulic gradient
- No other sources of water introduced to aquifer due to extraction (e.g., from rivers or leakage from above or below)



$$Q = K*(b*w)*i*factor$$



Where:

Q	=	extraction rate
K	=	hydraulic conductivity
b	=	saturated thickness
i	=	regional (i.e., pre-remedy-pumping) hydraulic gradient
w	=	plume width
factor	=	"rule of thumb" is 1.5 to 2.0, intended to account for other contributions to the pumping well such as flux from a river or induced vertical flow from another stratigraphic unit

Reference: A Systematic Approach for Evaluations of Capture Zones at Pump and Treat Systems (EPA 2008)

	Range of Results					
Q (ft^3/day)	682	613	477	341	136	68
K (ft/day)	30	30	30	30	30	30
b (ft)	50	45	35	25	10	5
w (ft)	4166	4166	4166	4166	4166	4166
i	0.014	0.014	0.014	0.014	0.014	0.014
factor	1.5	1.5	1.5	1.5	1.5	1.5

ESTIMATED FLOW RATE CALCULATION

Figure 16

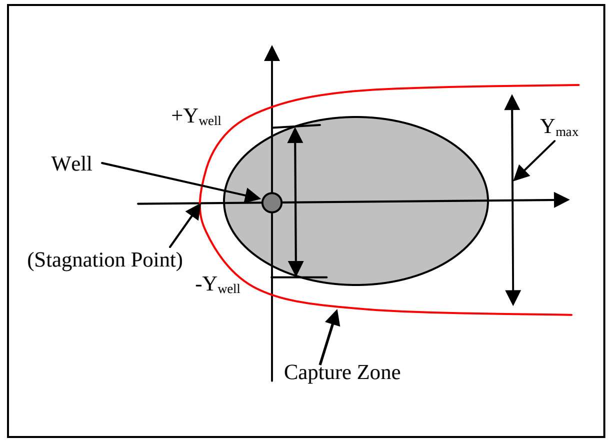
CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2010 OPERATIONS
MARCH 2011

Capture Zone Width Calculation, One Extraction Well

Assumptions:

- Homogeneous, isotropic, confined aquifer of infinite extent
- Uniform aquifer thickness
- Fully penetrating extraction well(s)
- Uniform regional horizontal hydraulic gradient
- Steady-state flow
- Negligible vertical gradient
- No net recharge, or net recharge is accounted for in regional hydraulic gradient
- No other sources of water introduced to aquifer due to extraction (e.g., from rivers or leakage from above or below)



$$x = \frac{-y}{\tan\left(\frac{2\pi Ti}{Q}y\right)y}$$

\- or -

$$y = \pm\left(\frac{Q}{2Ti}\right) - \left(\frac{Q}{2\pi Ti}\right)\tan^{-1}\left(\frac{y}{x}\right)$$

$$X_0 = -Q/2\pi Ti \qquad Y_{\max} = \pm Q/2Ti \qquad Y_{well} = \pm Q/4Ti$$

Where:

Q	=	extraction rate
T	=	transmissivity, K*b
b	=	saturated thickness
i	=	regional (i.e., pre-remedy-pumping) hydraulic gradient
X_0	=	distance from the well to the down gradient end of the capture zone along the central line of the flow direction
Y_{max}	=	maximum capture zone width from the central line of the plume
Y_{well}	=	capture zone width at the location of well from the central line of the plume

The above equation is used to calculate the outline of the capture zone. Solving the equation for x = 0 allows one to calculate the distance between the dividing streamlines at the line of wells ($2*Y_{well}$) and solving the equation for x = : allows one to calculate the distance between the dividing streamlines far upstream from the wells ($2*Y_{max}$). One can also calculate the distance from the well to the stagnation point (X_0) that marks the downgradient end of the capture zone by solving for x at y = 0. For any value of y between 0 and Y_{max} one can calculate the corresponding x value, allowing the outline of the capture zone to be calculated.

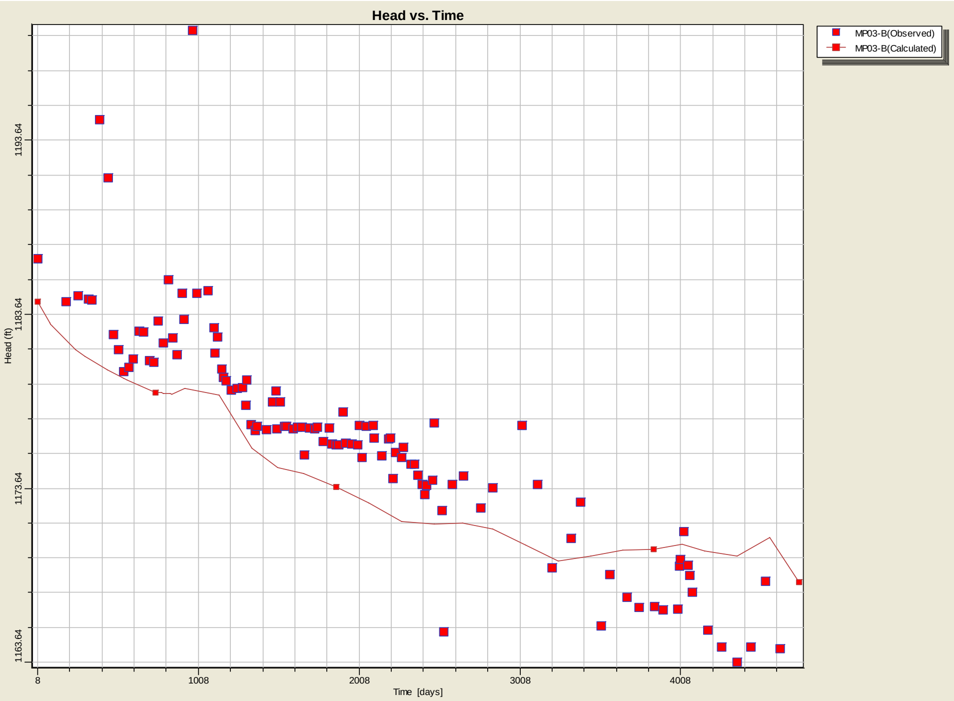
	Range of Results					
Y_{well} (ft)	578	642	825	1155	2888	5775
Y_{max} (ft)	1155	1283	1650	2310	5775	11551
X (ft)	-368	-409	-525	-735	-1838	-3677
Q (ft^3/day)	48513	48513	48513	48513	48513	48513
K (ft/day)	30	30	30	30	30	30
b (ft)	50	45	35	25	10	5
i	0.014	0.014	0.014	0.014	0.014	0.014

CALCULATION OF CAPTURE ZONE WIDTH

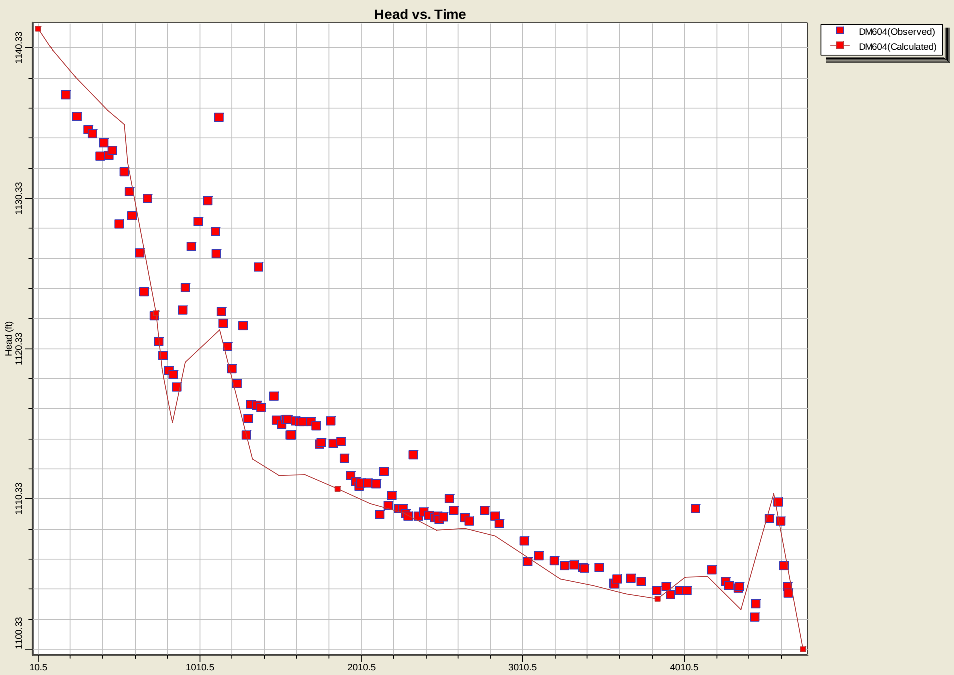
Figure 17

CLEAR CREEK ASSOCIATES

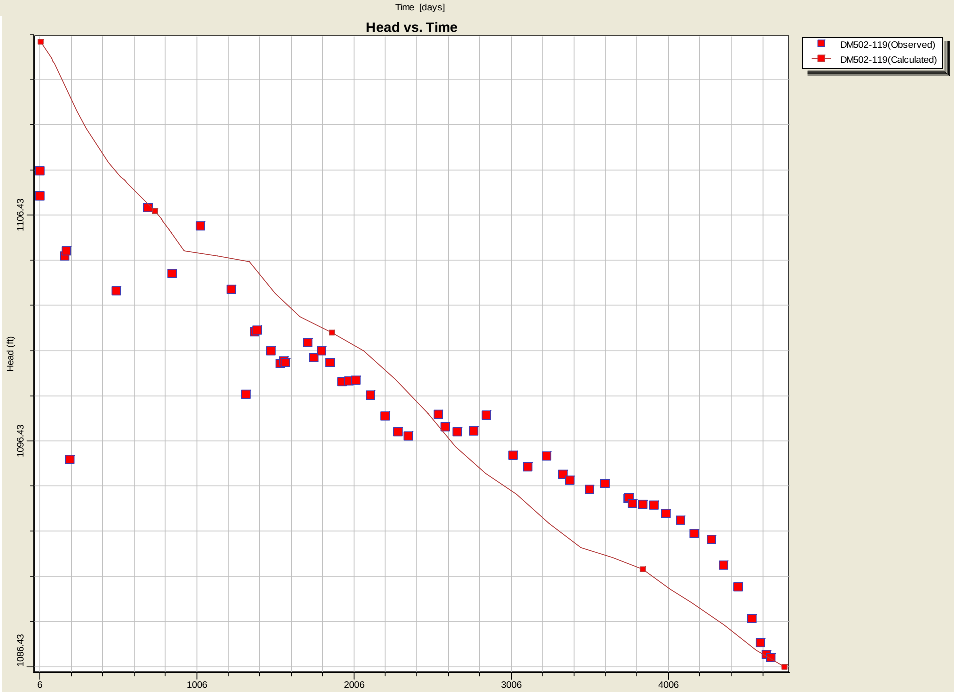
OU1 EFFECTIVENESS REPORT
2010 OPERATIONS
MARCH 2011



MP03-B



DM604



DM502-119

Notes:

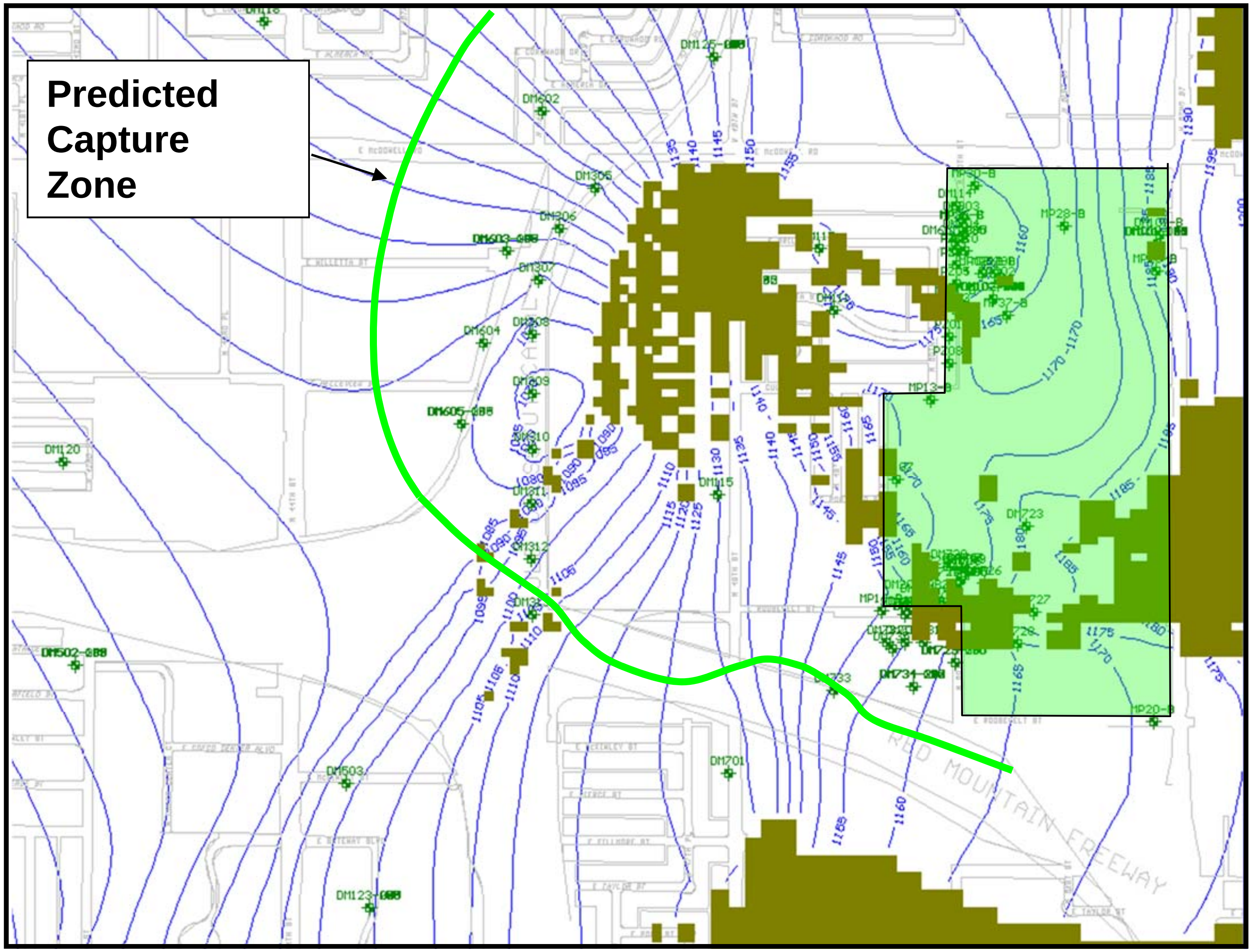
This figure is modified from figures presented in Groundwater Remedial Alternatives Analysis, Appendix A – OU1 Evaluation Model Report (Geotrans, 2005)

PREDICTED AND OBSERVED WATER LEVELS OVER TIME

Figure 18

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2010 OPERATIONS
MARCH 2011



OU1 Evaluation
Model Report
September 2005

Figure 32

Continued Current Conditions and Pumping Rates After 5 Years in Alluvium

Notes:

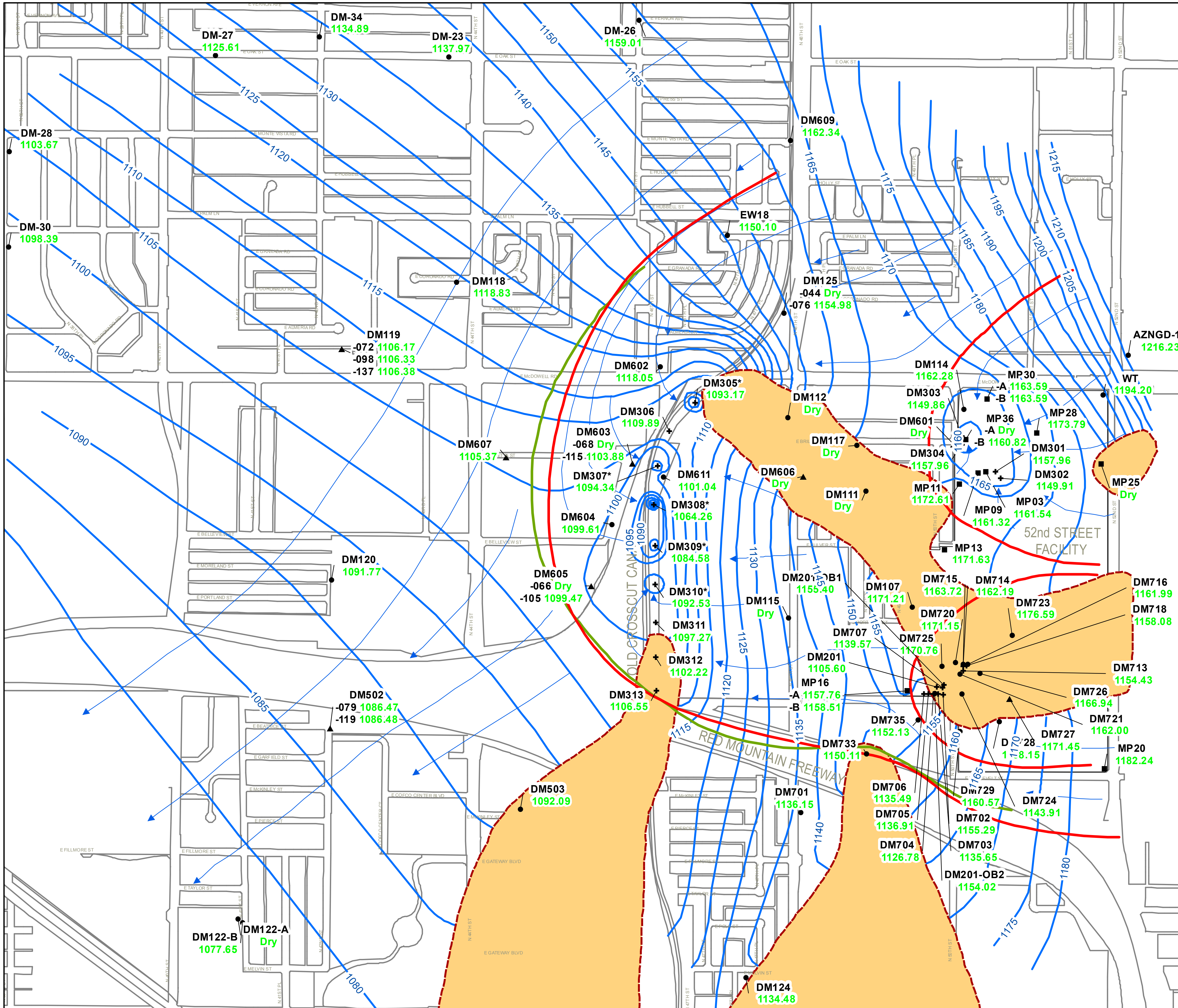
This figure is reproduced from Groundwater Remedial Alternatives Analysis, Appendix A – OU1 Evaluation Model Report (Geotrans, 2005)

The predicted capture zone was added for this presentation.

Model Run: Year 2003 - 2008

PREDICTED GROUNDWATER ELEVATION CONTOURS AFTER FIVE YEARS OF CONTINUED OPERATIONS: YEAR 2008

Figure 19



LEGEND:

SYMBOL	WELL TYPE
●	CONVENTIONAL
✚	EXTRACTION
■	MULTIPORT
▲	WESTBAY or FLUTe

● DM125 / -044 Dry / -076 1156.13 — WELL NAME; DEPTH OF SAMPLE POINT (FEET BGS) OR SAMPLE PORT DESIGNATION; WATER LEVEL ELEVATION (FEET AMSL)

—1210— GROUNDWATER ELEVATION CONTOURS (FEET AMSL)

→ DIRECTION OF GROUNDWATER FLOW

Model Predicted Capture Zone

Capture Zone from observed December 2010 water levels as shown on Water Level Elevations contour map (Figure 11)

APPROXIMATE AREA OF BEDROCK ABOVE DECEMBER 2010 WATER TABLE

Notes:

1. Water levels for wells DM305, DM307, DM308, DM309, and DM310 adjusted for well efficiency.
2. Wells with * were pumping when water level measurements were recorded.
3. Water level measurements recorded in December 2010 unless otherwise noted. Water levels for wells DM-23, DM-26, DM-27, DM-28, DM-30 and DM-34 were recorded in October 2010.
4. Model Predicted Capture Zone from RRA Modeling (Geotrans 2005).

N

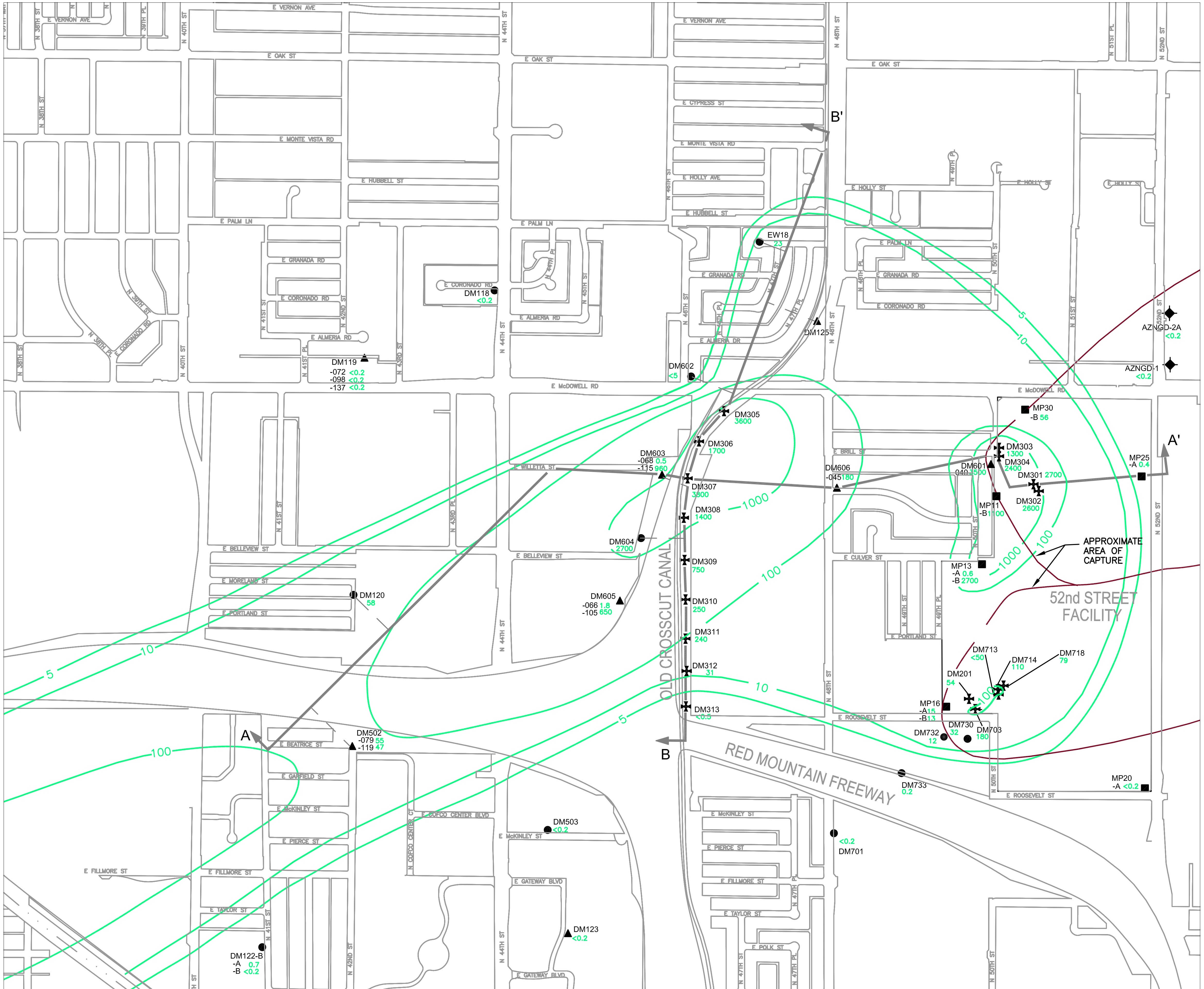
0 500 1,000 2,000 Feet

WATER LEVEL ELEVATIONS FLOW LINES AND CAPTURE ZONES ALLUVIAL AQUIFER PLAN VIEW DECEMBER 2010

Figure 20

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2010 OPERATIONS
MARCH 2011



LEGEND:

- ✚ ● ▲ ■ ✦ WELL LOCATION SYMBOLS
- DM 119 WELL NAME
- −72 <0.2 DEPTH OF WESTBAY SAMPLE PORT (IN FEET) OR COMPLETION INTERVAL DESIGNATION, AND TCE CONCENTRATION (IN ug/L)
- 5 TCE CONCENTRATION CONTOUR (IN ug/L)
- APPROXIMATE AREA OF CAPTURE
- WELL PROJECTED ONTO CROSS SECTION

NOTES:

1. THE TCE CONCENTRATIONS DRAWN ON THIS FIGURE ARE APPROXIMATE, AND ARE REPRESENTED TO ILLUSTRATE GENERAL CONCENTRATIONS OF TCE IN THE AREA.

N

0 400 800 1600

SCALE IN FEET

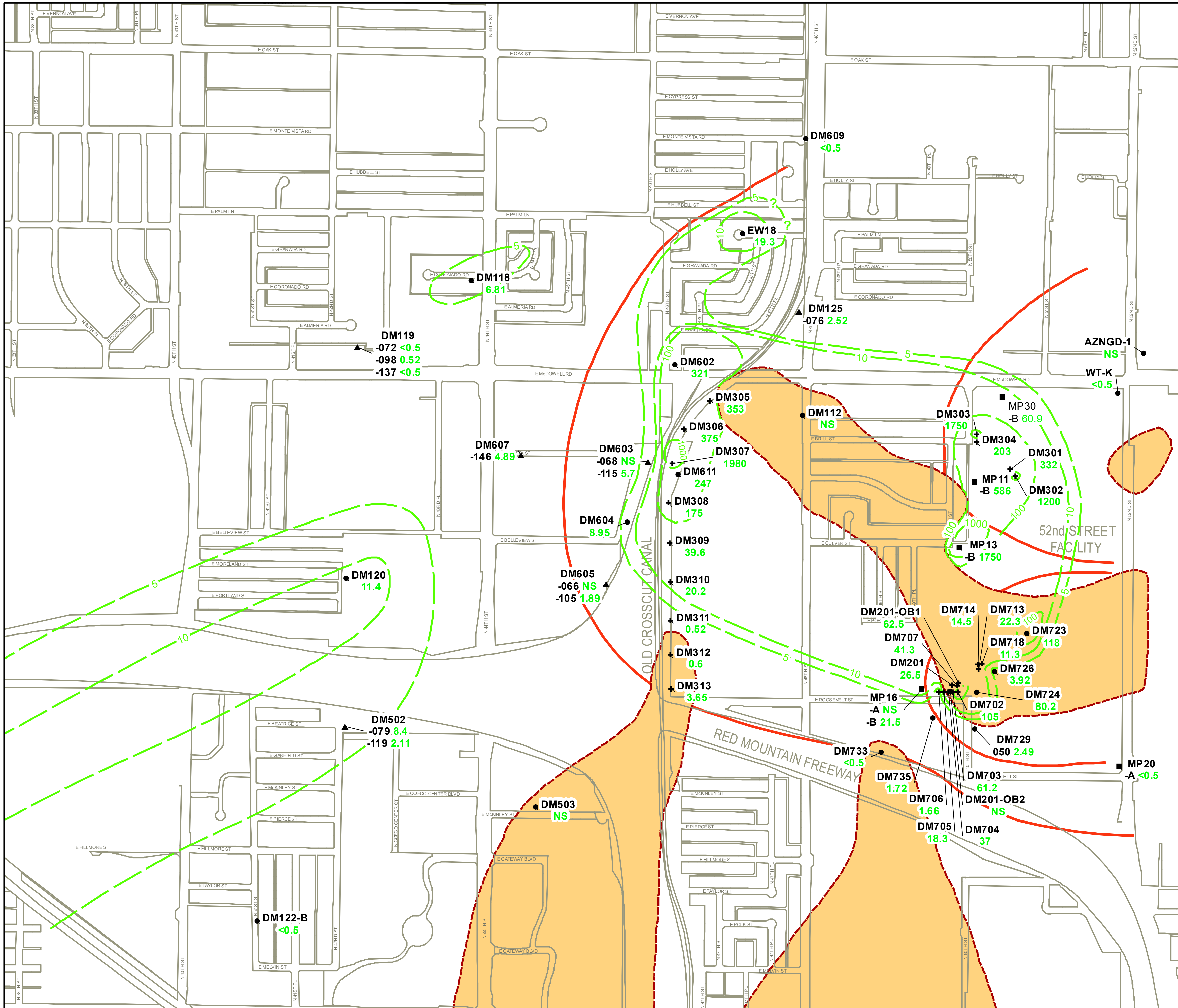
TCE CONCENTRATIONS ALLUVIAL AQUIFER PLAN VIEW BASELINE (MARCH - MAY 1992)

Figure 21

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2010 OPERATIONS
MARCH 2011

OU1−2010−20.DWG 3−05−11



LEGEND:

SYMBOL	WELL TYPE
●	CONVENTIONAL
✚	EXTRACTION
■	MULTIPORT
▲	WESTBAY or FLUTe
DM605 -105 1.89	WELL NAME, DEPTH OF WESTBAY SAMPLE PORT (IN FEET BGS) OR COMPLETION INTERVAL DESIGNATION, TCE CONCENTRATION (ug/l)
DM120 9.5	WELL NAME, TCE CONCENTRATION (ug/l)
red line	APPROXIMATE AREA OF CAPTURE
—10—	TCE CONCENTRATION CONTOUR (ug/l)
NS	NOT SAMPLED
shaded box	DRY BEDROCK

NOTE:
The TCE contours drawn on this figure are approximate and are represented to illustrate general concentrations of TCE in the area. Contours are dashed where approximate or conjectured.

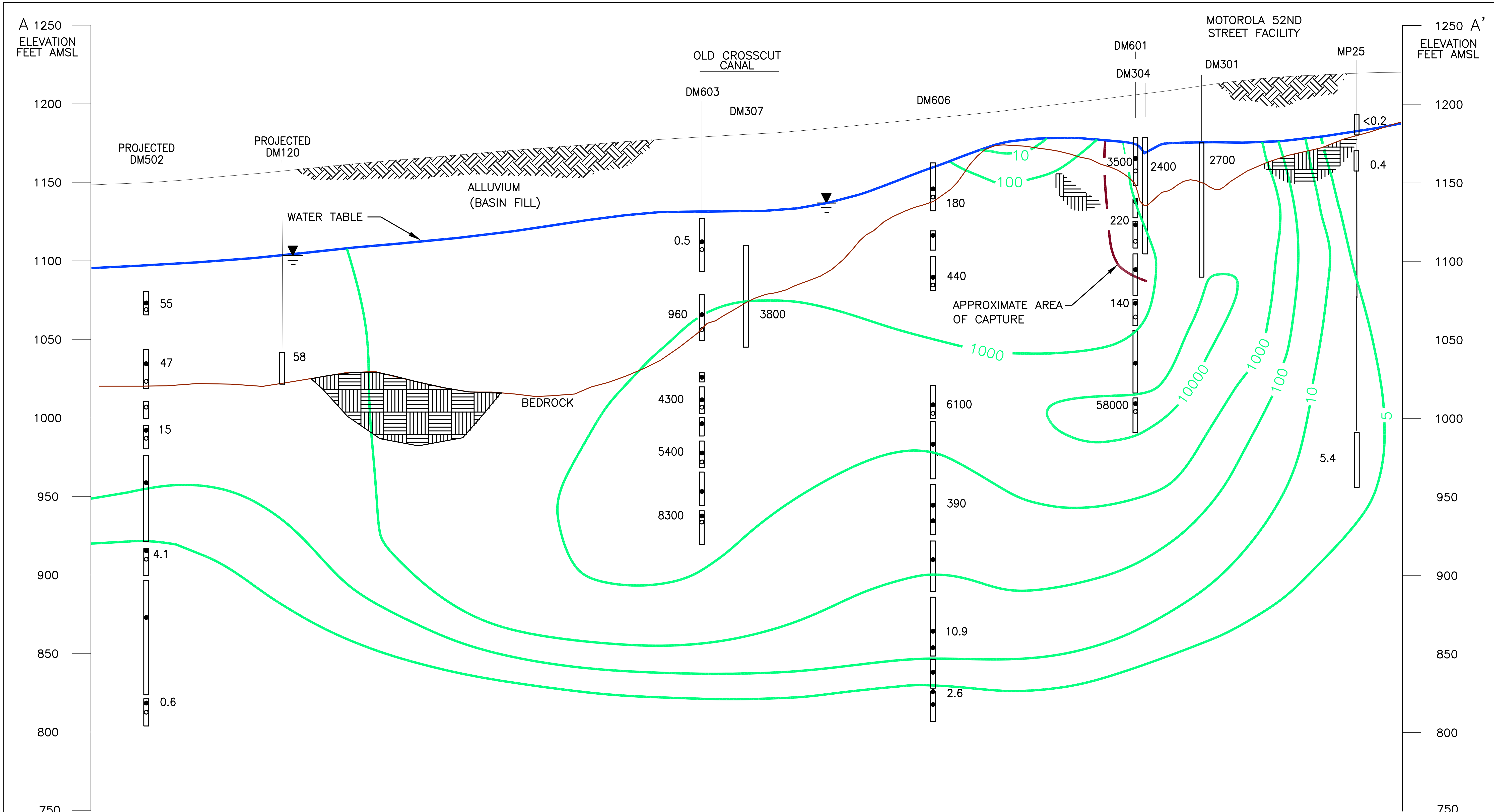
0 500 1,000 2,000 Feet

TCE CONCENTRATIONS ALLUVIAL AQUIFER PLAN VIEW SEPTEMBER 2010

Figure 22

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2010 OPERATIONS
MARCH 2011



LEGEND:

- DM 123 — NAME OF WELL
- GROUND SURFACE
- BEDROCK CONTACT
- 1992 WATER TABLE
- MONITOR ZONE
- MEASUREMENT PORT
- PUMPING PORT
- MONITOR ZONE
- WELL SCREEN
- 180 — TCE CONCENTRATION (ppb)
- 5 — TCE CONCENTRATION CONTOUR (ppb)
- CAPTURE ZONE

NOTES:

1. LOCATION OF SECTION A–A' IS SHOWN ON FIGURE 1 AND 21. THIS SECTION LOCATION WAS MODIFIED FROM PREVIOUS OU1 EFFECTIVENESS REPORTS.
2. THE TCE CONTOURS DRAWN ON THIS FIGURE ARE APPROXIMATE AND ARE SHOWN TO ILLUSTRATE THE GENERAL CONCENTRATIONS OF TCE IN THE AREA.
3. THE WATER TABLE WAS PLOTTED USING MARCH–MAY 1992 DATA.
4. THE OU1 WAS NOT IN OPERATION AT THIS TIME (3/92).

HORIZONTAL SCALE

0 600 1200

IN FEET

VERTICAL EXAGGERATION 10X

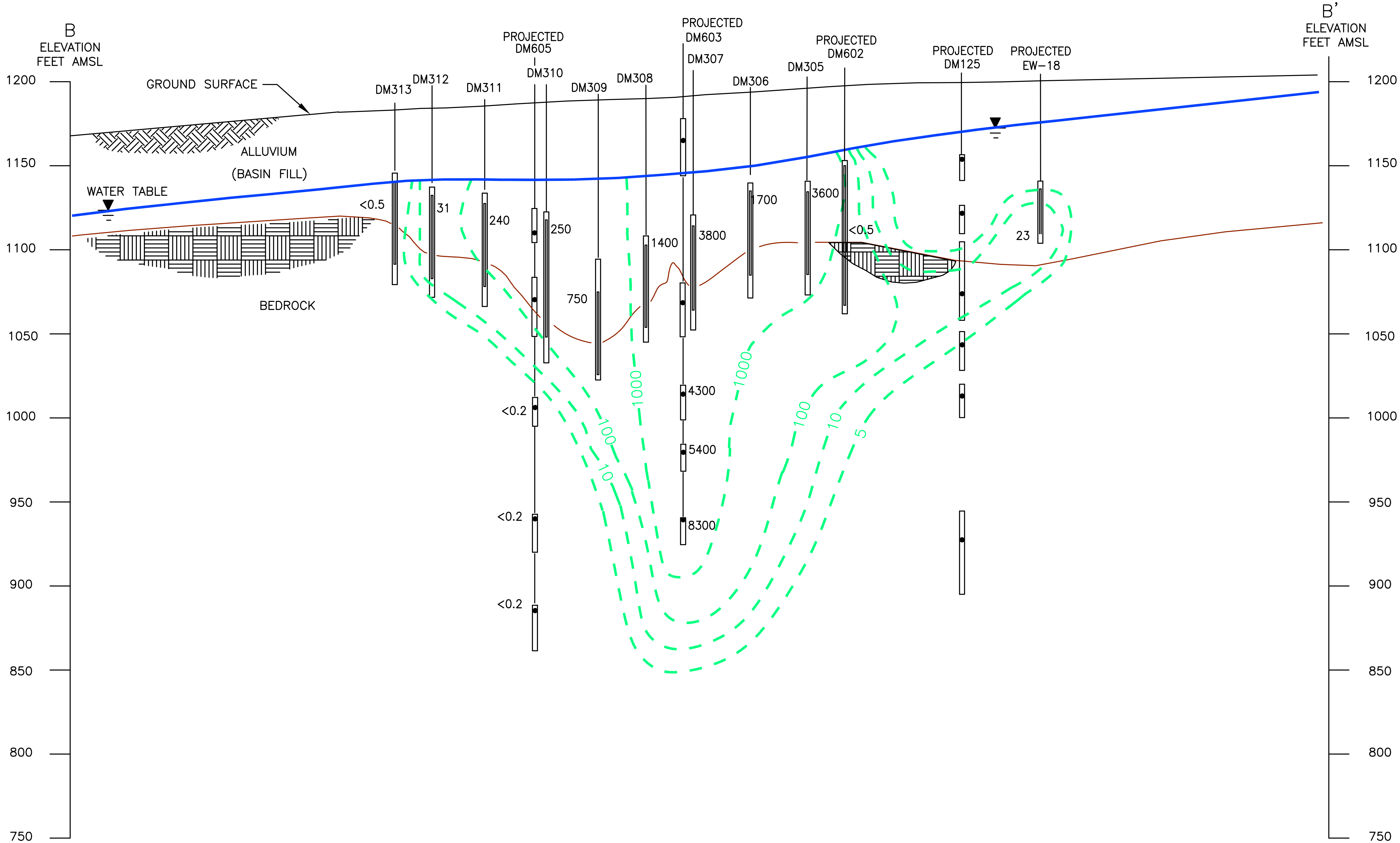
TCE CONCENTRATIONS BASELINE (MARCH - MAY 1992) SECTION A-A'

Figure 23

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2010 OPERATIONS
MARCH 2011

OU1-2010-22.DWG 3-05-11



LEGEND:

- DM 123 — NAME OF WELL
- GROUND SURFACE
- BEDROCK CONTACT
- 1992 WATER TABLE
- MONITOR ZONE
- MEASUREMENT PORT
- MONITOR ZONE
- WELL SCREEN
- <0.5 TCE CONCENTRATION (ppb)
- —10— TCE CONCENTRATION CONTOUR (ppb)

NOTES:

1. LOCATION OF SECTION B-B' IS SHOWN ON FIGURE 1 AND 21
2. THE WATER TABLE WAS PLOTTED USING MARCH-MAY 1992 DATA.
3. DM313 WAS FIRST SAMPLED JUNE 22, 1992.
4. THE TCE CONTOURS DRAWN ON THIS FIGURE ARE APPROXIMATE AND ARE PRESENTED TO ILLUSTRATE THE GENERAL CONCENTRATIONS OF TCE IN THE AREA.

HORIZONTAL SCALE
0 600 1200
IN FEET

VERTICAL EXAGGERATION
10X

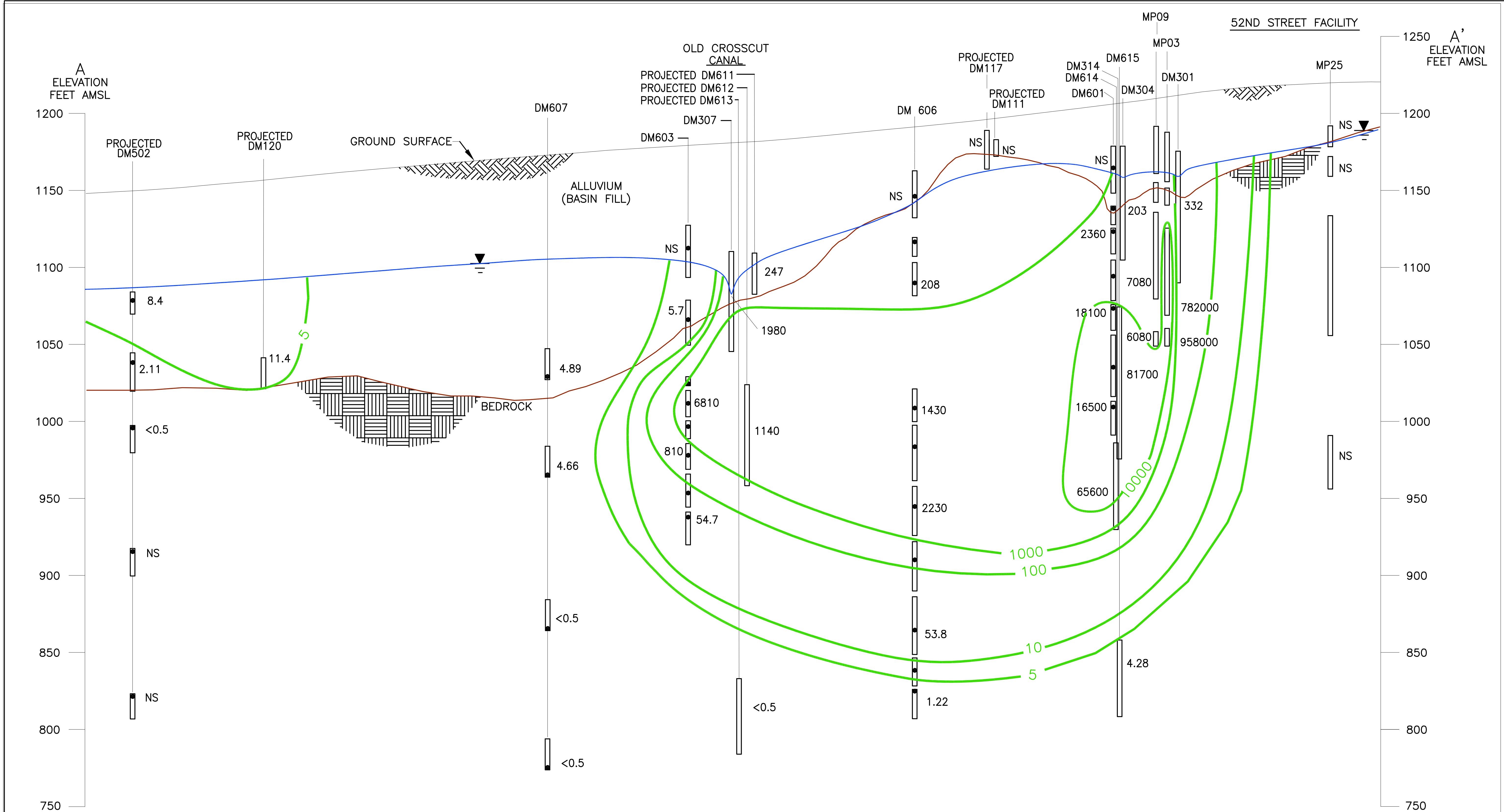
TCE CONCENTRATIONS BASELINE (MARCH-MAY 1992) SECTION B-B'

Figure 24

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2010 OPERATIONS
MARCH 2011

OU1-2008-20.DWG 3-7-11



LEGEND:

DM 502 — NAME OF WELL

GROUND SURFACE

BEDROCK CONTACT

2010 WATER TABLE

MONITOR ZONE

MEASUREMENT PORT

MONITOR ZONE

8.4 TCE CONCENTRATION IN ug/L

NS NOT SAMPLED

5 TCE CONCENTRATION CONTOUR (ug/L)

NOTES:

1. LOCATION OF SECTION A–A' IS SHOWN ON FIGURE 1 AND 22.
2. THE SPECIFIC DEPTHS/LOCATIONS OF MEASUREMENT AND PUMPING PORTS, AND MONITOR ZONES ARE PROVIDED IN THE MI52 1992 FR RI REPORT AND OTHER RELATED DOCUMENTS. THE ENTIRE WELL CONSTRUCTION IS NOT SHOWN ON THIS FIGURE.
3. THE WATER TABLE WAS PLOTTED USING DECEMBER 2010 DATA.
4. WELL DM307 IS A PUMPING WELL. THE WATER LEVEL HAS BEEN ADJUSTED FOR WELL EFFICIENCY.
5. TCE CONCENTRATIONS FOR WELLS MP03 & MP09 ARE FROM AUGUST 2010.
6. NS – NOT SAMPLED

HORIZONTAL SCALE

0 600 1200

IN FEET

VERTICAL EXAGGERATION 10X

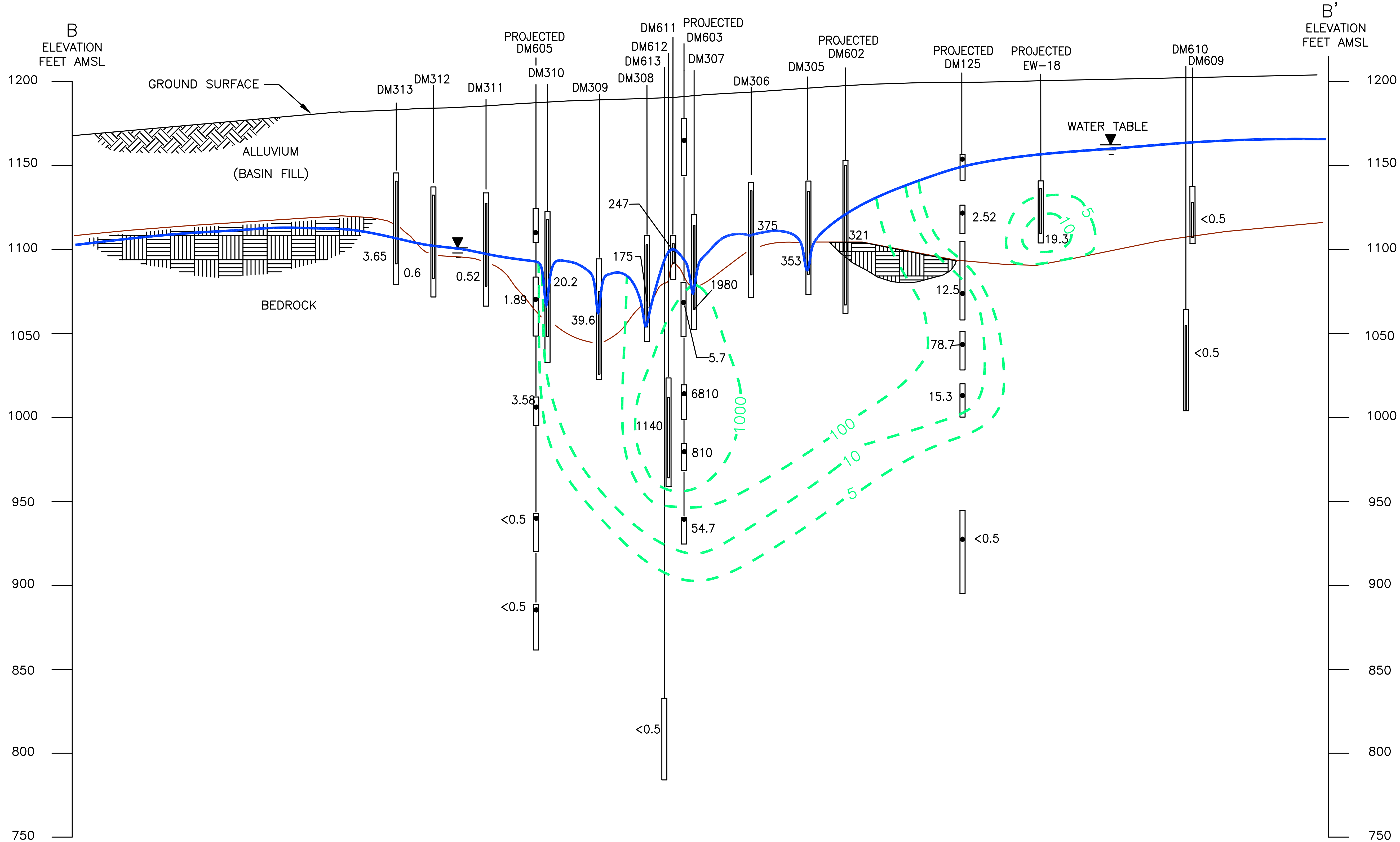
TCE CONCENTRATIONS SEPTEMBER 2010 SECTION A-A'

Figure 25

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2010 OPERATIONS
MARCH 2011

OU1–2010–25.DWG 3–25–11



LEGEND:

- DM 123 — NAME OF WELL
- GROUND SURFACE
- BEDROCK CONTACT
- 2010 WATER TABLE
- MONITOR ZONE
- MEASUREMENT PORT
- MONITOR ZONE
- WELL SCREEN
- <0.5 TCE CONCENTRATION (ug/L)
- 10 TCE CONCENTRATION CONTOUR (ug/L)

NOTES:

1. LOCATION OF SECTION B–B' IS SHOWN ON FIGURE 1 AND 22.
2. THE TCE CONTOURS DRAWN ON THIS FIGURE ARE APPROXIMATE AND ARE PRESENTED TO ILLUSTRATE THE GENERAL CONCENTRATIONS OF TCE IN THE AREA.
3. THE WATER TABLE WAS PLOTTED USING DECEMBER 2010 DATA.
4. WATER LEVELS FOR WELLS DM305, DM306, DM307 AND DM308 HAVE BEEN ADJUSTED FOR WELL EFFICIENCY.

HORIZONTAL SCALE
0 600 1200
IN FEET

VERTICAL EXAGGERATION
10X

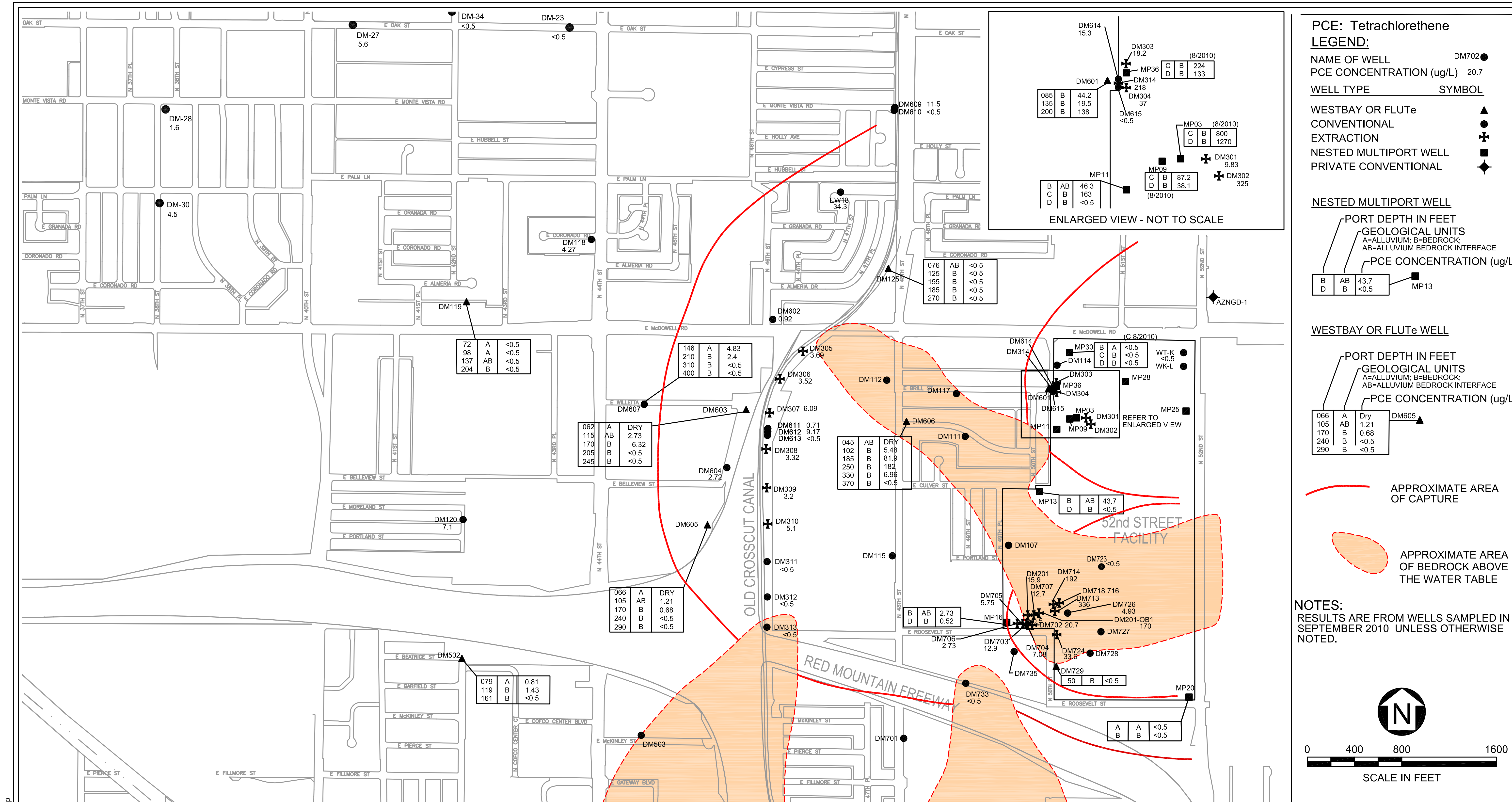
TCE CONCENTRATIONS SEPTEMBER 2010 SECTION B-B'

Figure 26

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2010 OPERATIONS
MARCH 2011

OU1-2010-25.DWG 3-05-11

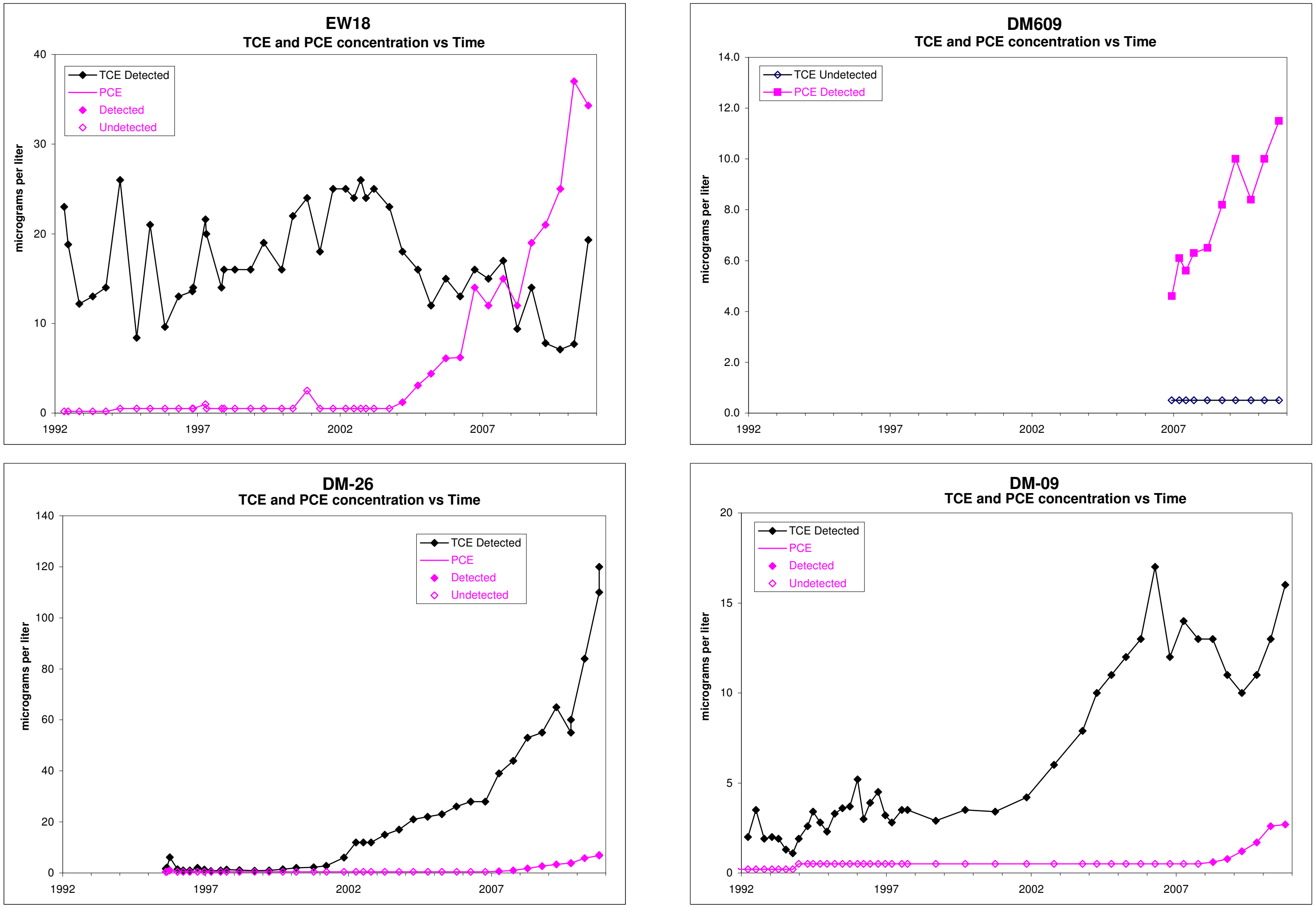


PCE CONCENTRATIONS ALLUVIAL AQUIFER PLAN VIEW SEPTEMBER 2010

Figure 27

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2010 OPERATIONS
MARCH 2011

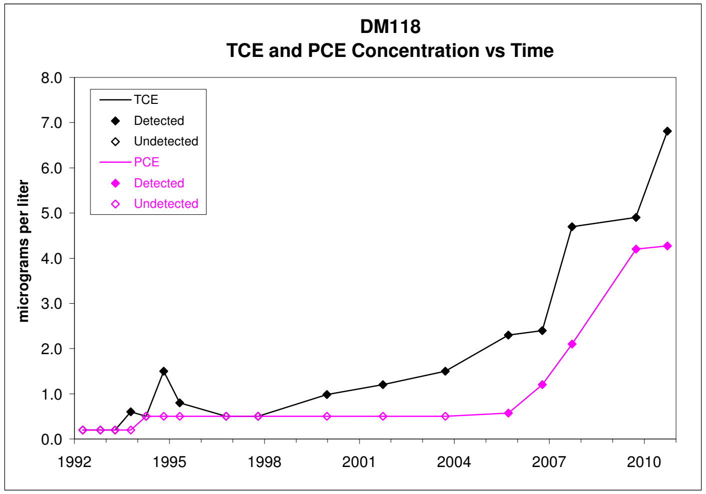


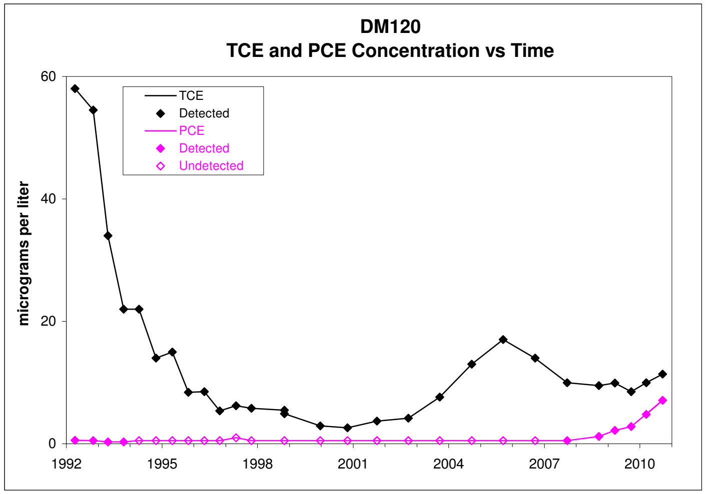
TCE and PCE CONCENTRATIONS VERSUS TIME
WELLS EW-18, DM609, DM-26 AND DM-09

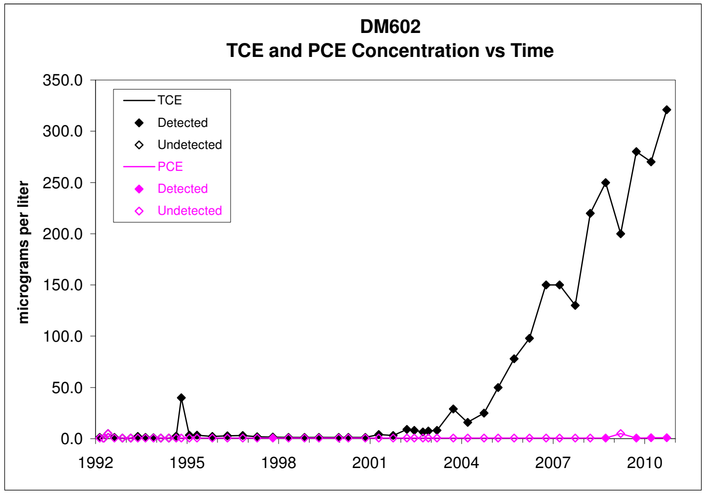
Figure 28

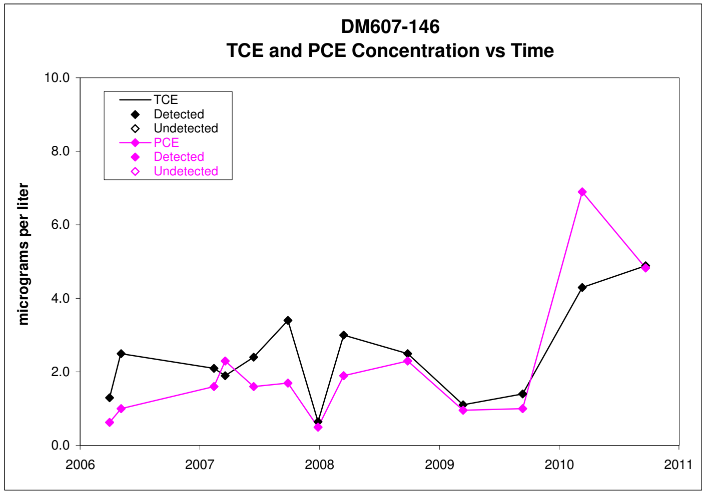
CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2010 OPERATIONS
MARCH 2011







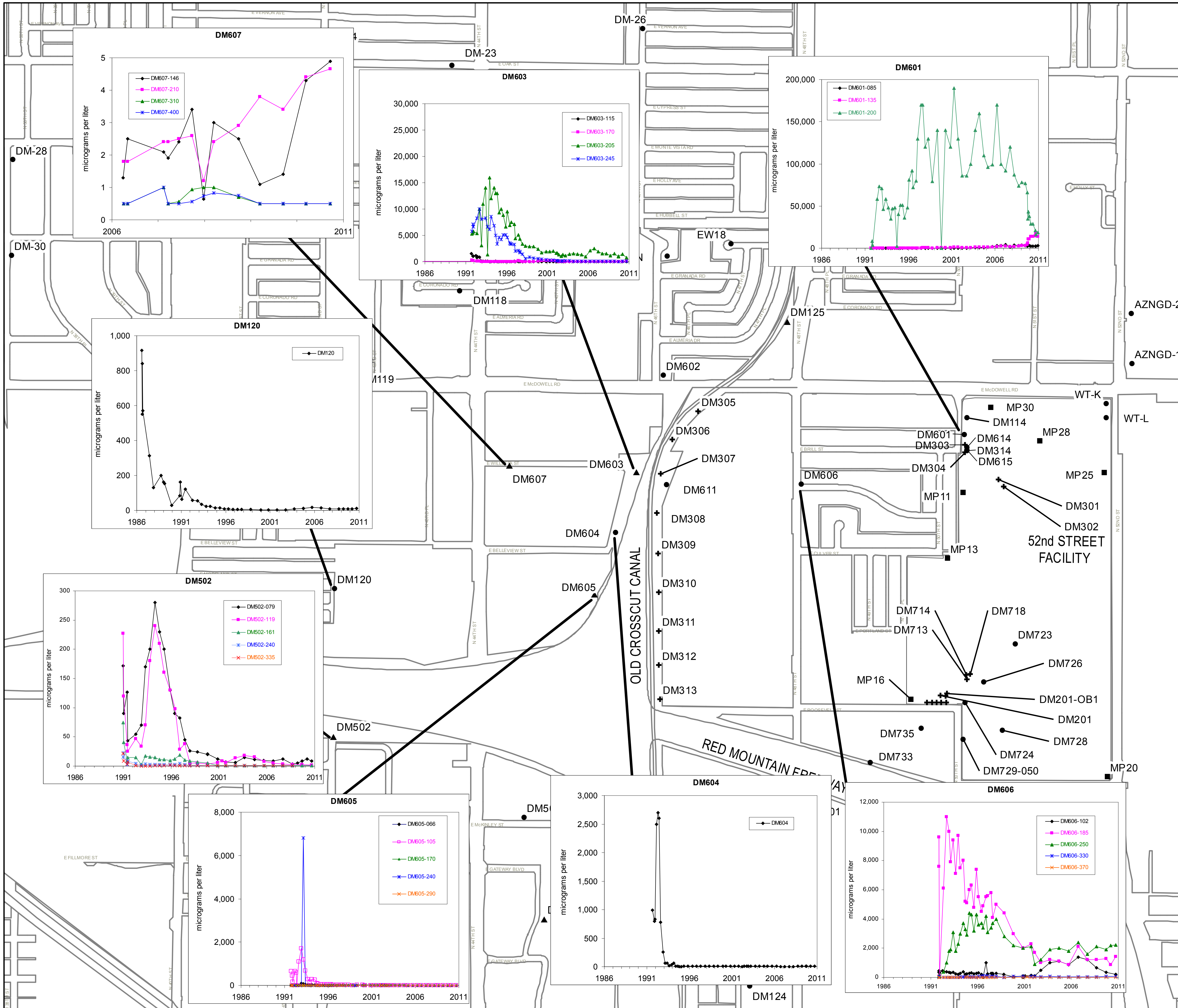


TCE AND PCE CONCENTRATIONS VERSUS TIME
DM118, DM120, DM602, and DM607-146

Figure 29

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2010 OPERATIONS
MARCH 2011



LEGEND:

SYMBOL	WELL TYPE
●	CONVENTIONAL
✚	EXTRACTION
■	MULTIPORT
▲	WESTBAY or FLUTE

● DM602 WELL NAME

NOTES:

1. FOR MORE DETAILED INFORMATION ON WELLS, REFER TO MI52 QUARTERLY AND SEMI-ANNUAL REPORTS AND THE MI52 FR RI REPORT.

2. TCE CONCENTRATIONS IN MICROGRAMS PER LITER (ug/l).

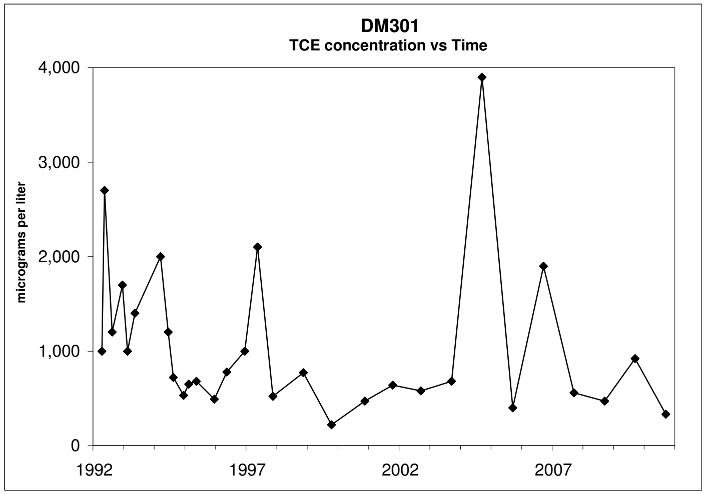
0 500 1,000 2,000 Feet

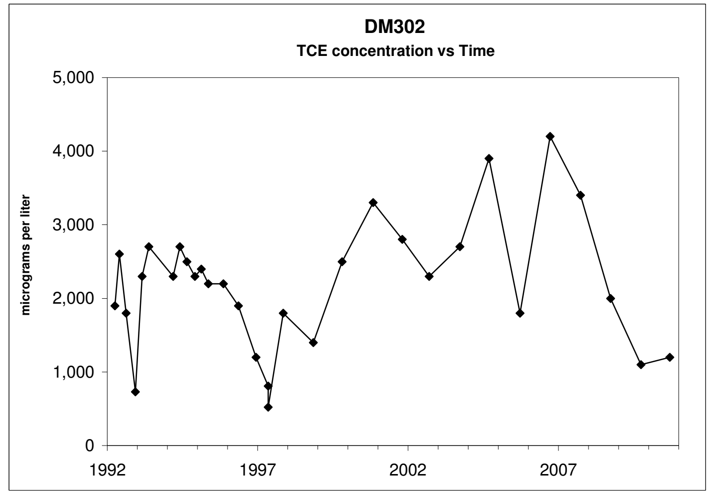
TCE CONCENTRATION TRENDS IN SELECTED WELLS, OU1 AREA

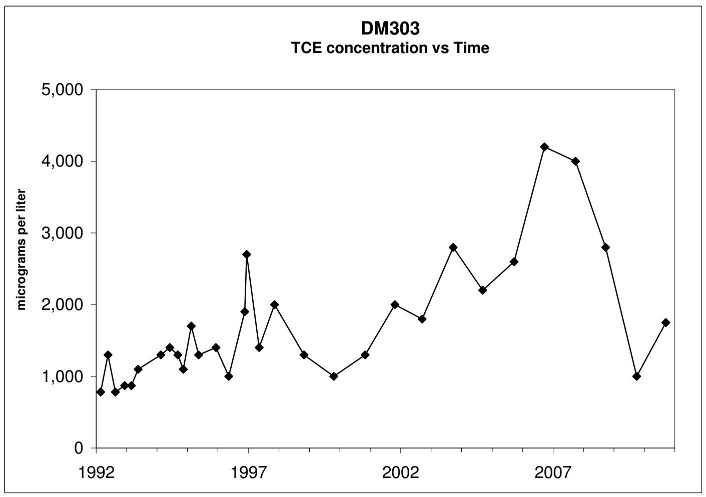
Figure 30

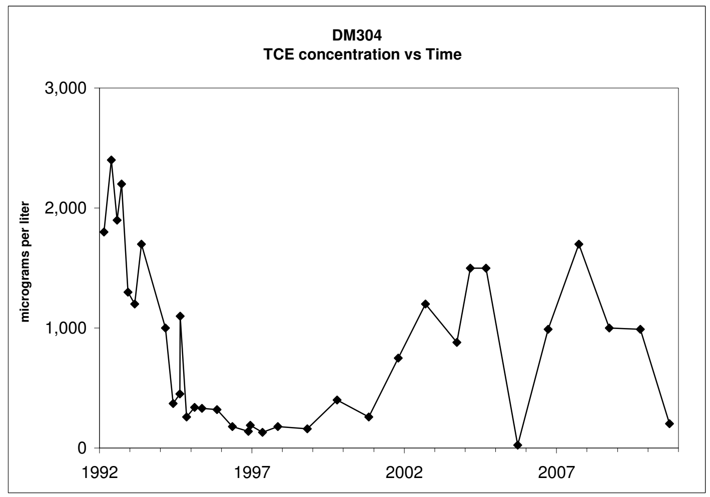
CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2010 OPERATIONS
MARCH 2011







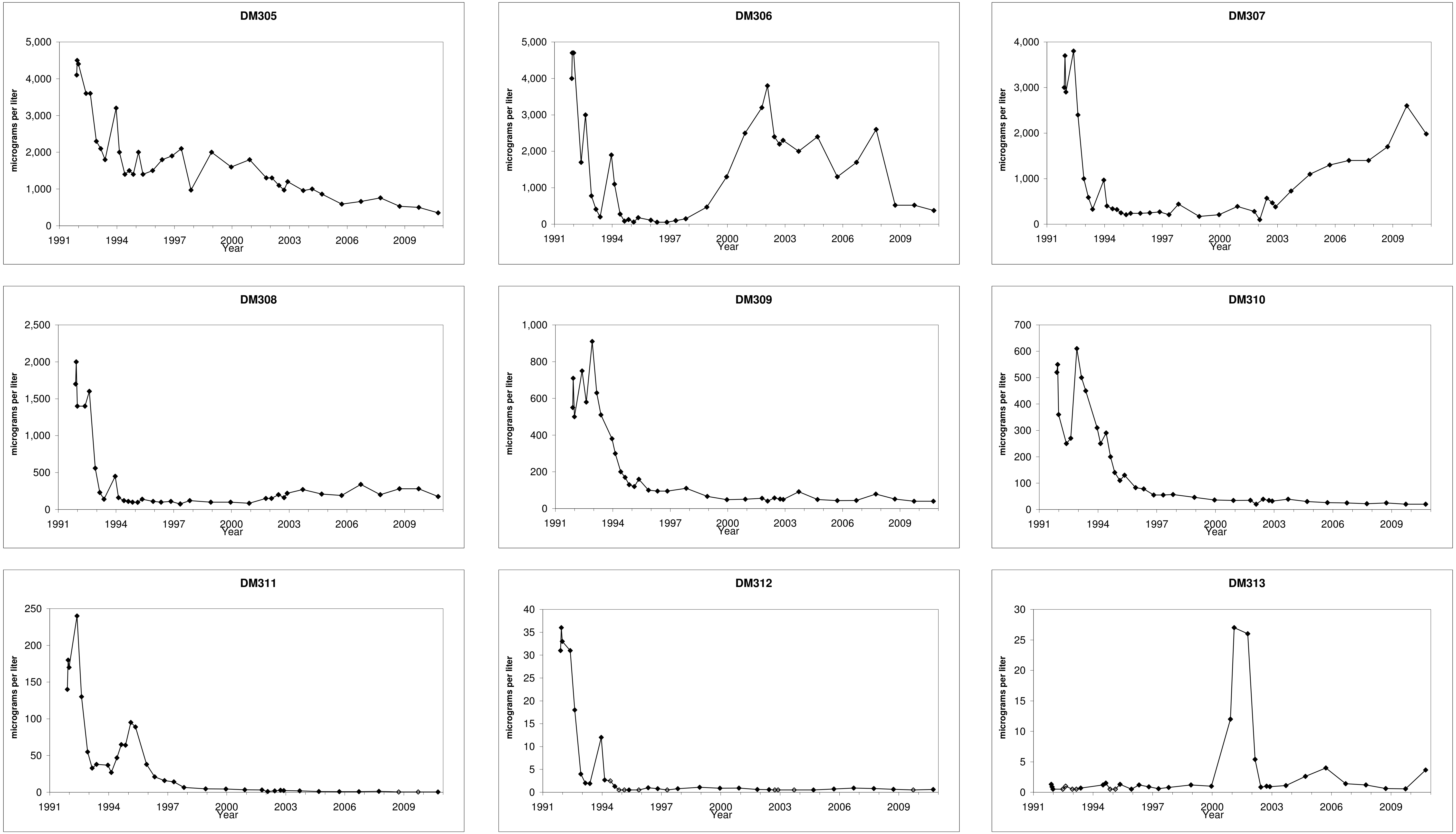


TCE CONCENTRATIONS VERSUS TIME ONSITE EXTRACTION WELLS

Figure 31

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2010 OPERATIONS
MARCH 2011



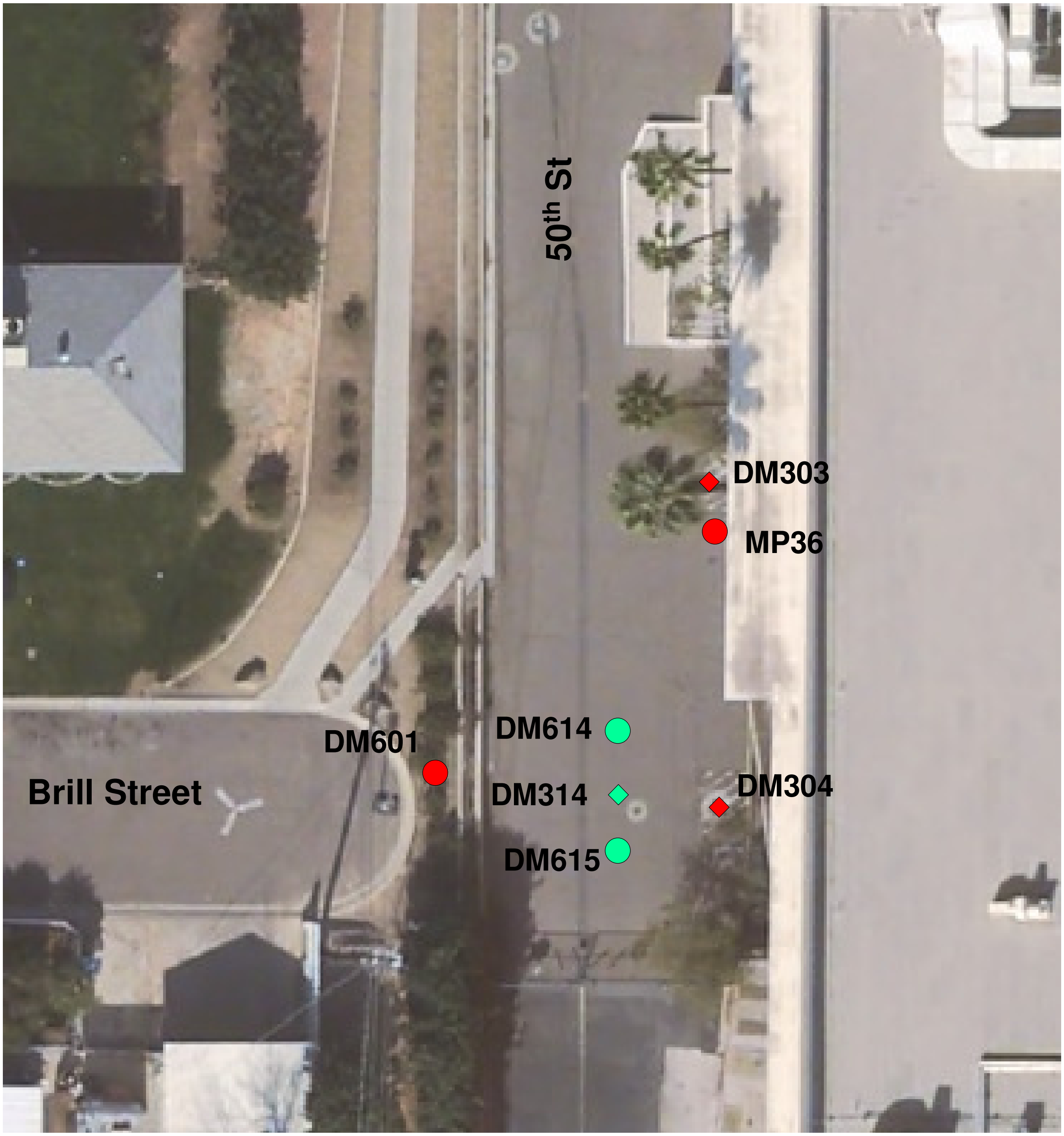
◆ - Detected
◇ - Undetected

TCE CONCENTRATION VERSUS TIME
OCC EXTRACTION WELLS

Figure 32

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2010 OPERATIONS
MARCH 2011



0 25
Feet

Legend

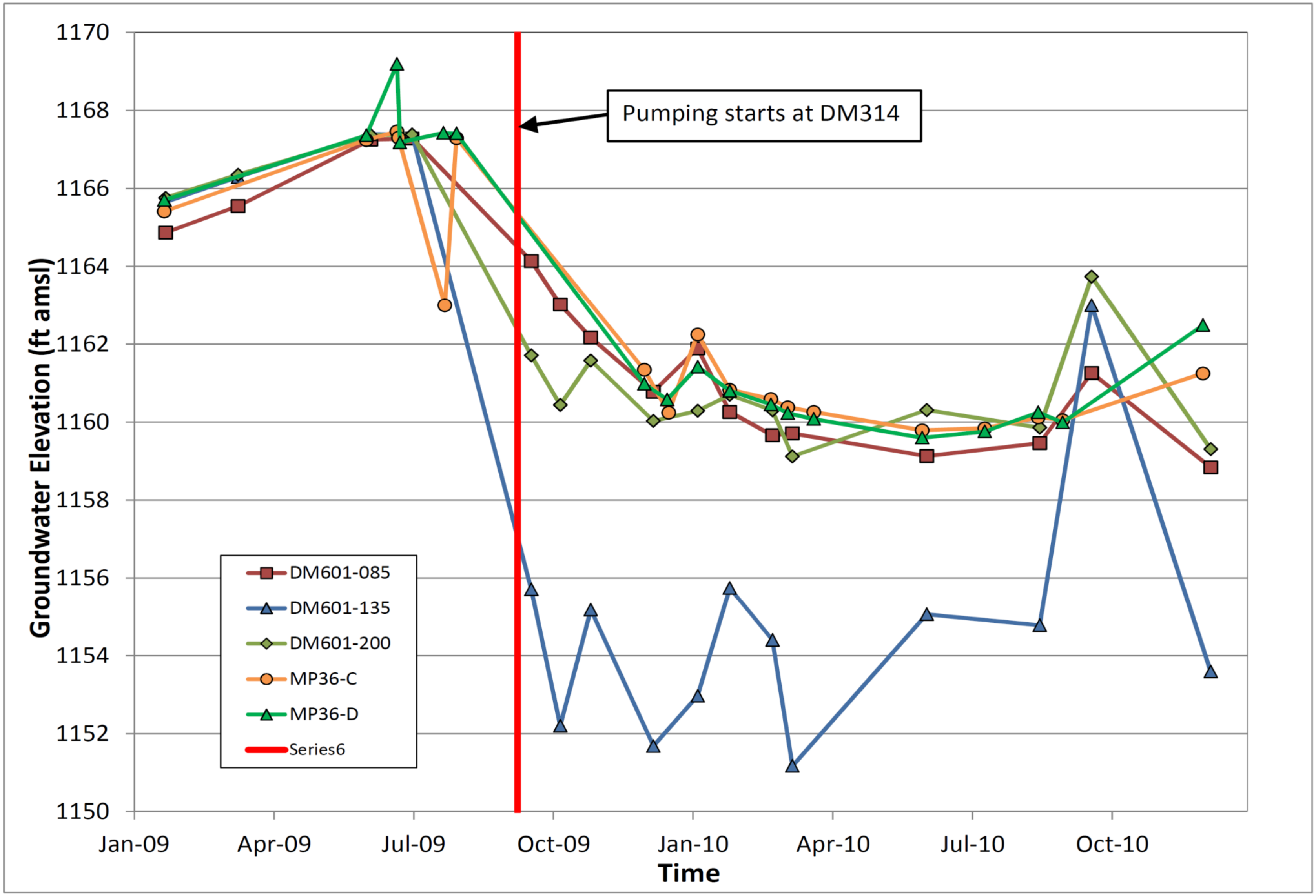
- Existing Extraction Well
- Existing Monitoring Well
- New Bedrock Extraction Well
- New Monitoring Well

BEDROCK PILOT WELL LOCATIONS

Figure 33

CLEAR CREEK ASSOCIATES

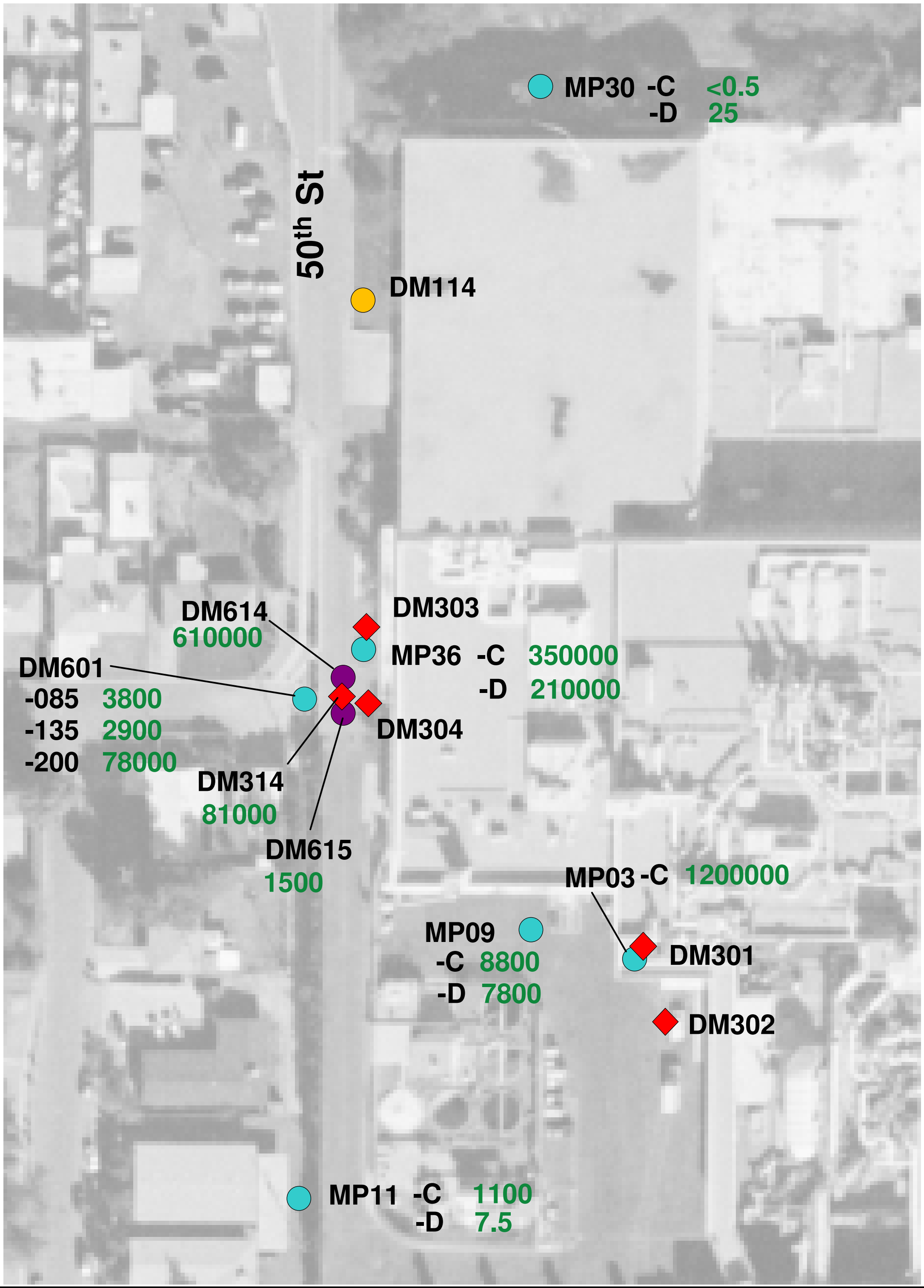
OU1 EFFECTIVENESS REPORT
2010 OPERATIONS
MARCH 2011



GROUNDWATER ELEVATION VS TIME
BEDROCK PILOT STUDY WELLS
Figure 34

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2010 OPERATIONS
MARCH 2011



Legend

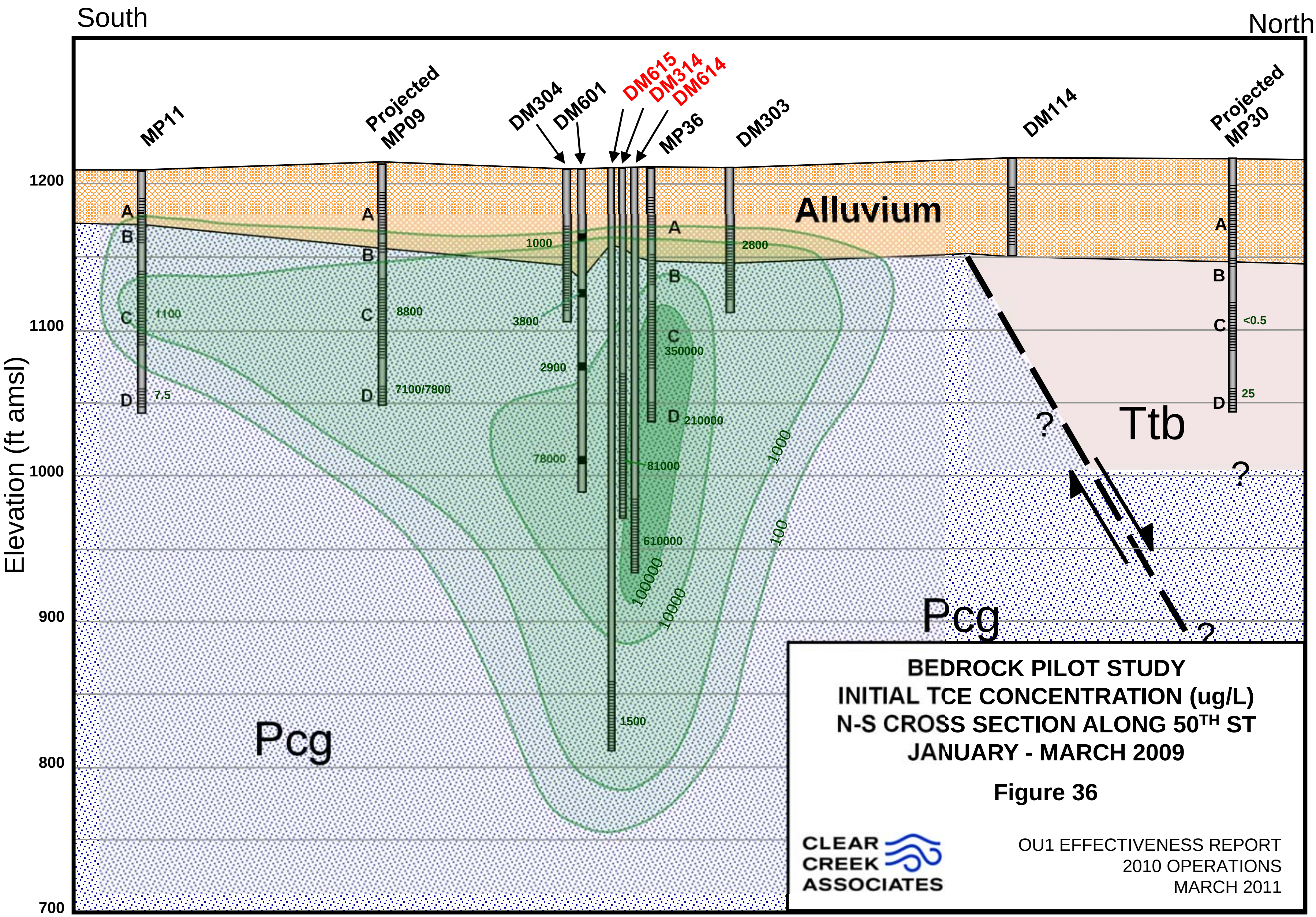
- Extraction Well
- Conventional Monitor Well Location (Alluvium only)
- Multiport Monitor Well Location (Bedrock and Alluvium)
- Conventional Monitor Well Location (Bedrock Only)

INITIAL TCE CONCENTRATIONS
JANUARY – MARCH 2009

Figure 35

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2010 OPERATIONS
MARCH 2011

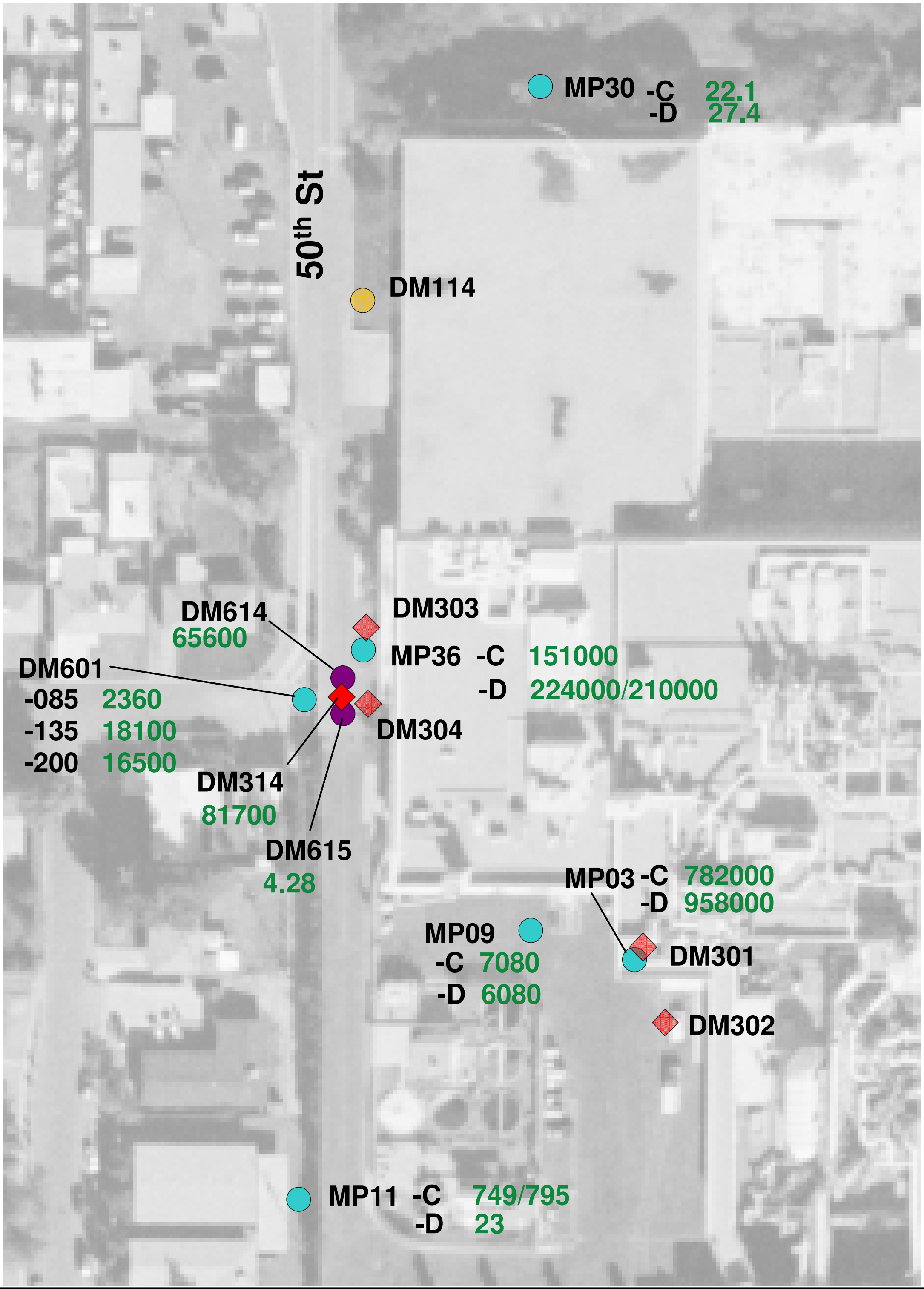


BEDROCK PILOT STUDY
INITIAL TCE CONCENTRATION (ug/L)
N-S CROSS SECTION ALONG 50TH ST
JANUARY - MARCH 2009

Figure 36

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2010 OPERATIONS
MARCH 2011



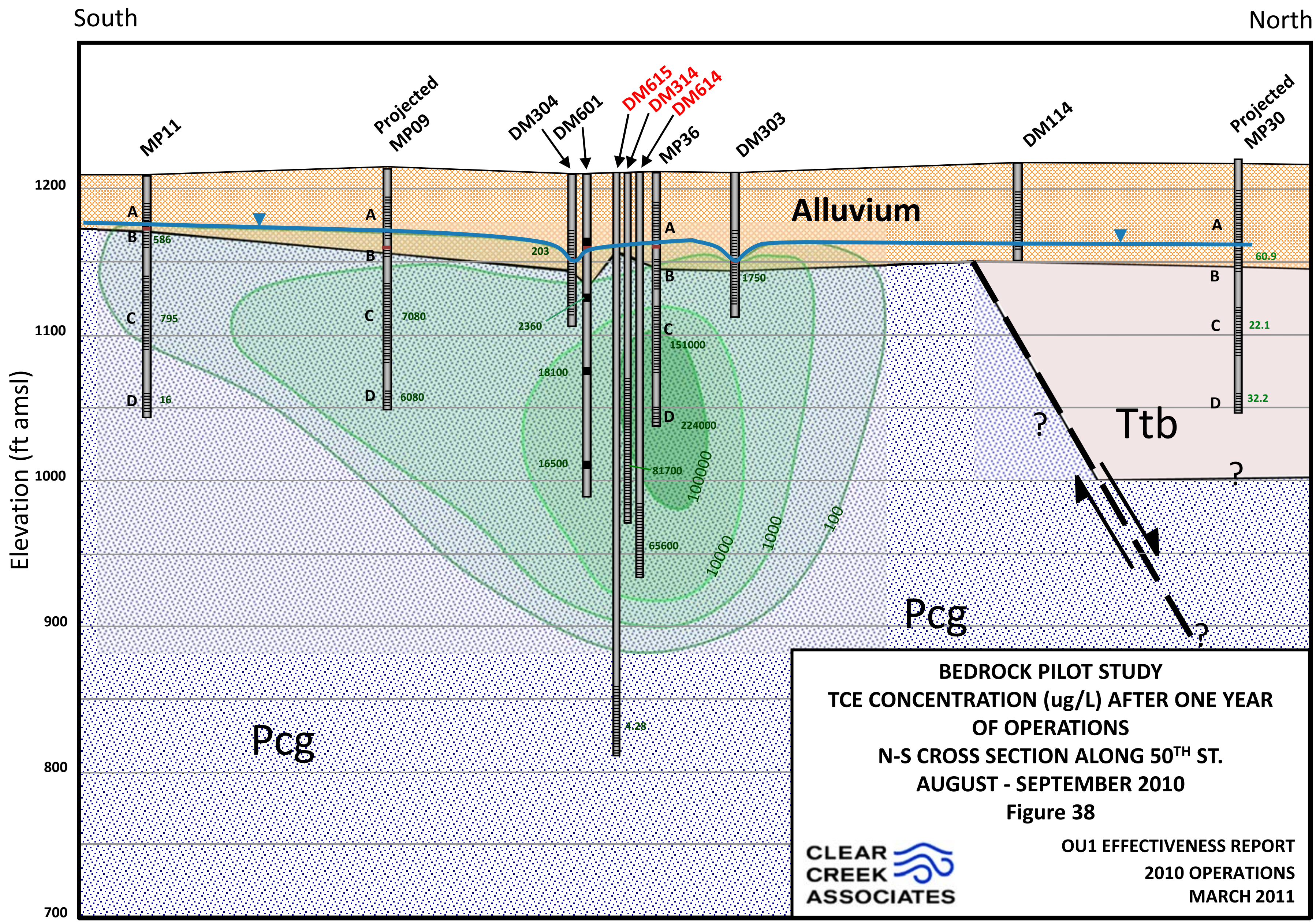
Legend

- Extraction Well (Alluvium wells shaded)
- Conventional Monitor Well Location (Alluvium only)
- Multiport Monitor Well Location (Bedrock and Alluvium)
- Conventional Monitor Well Location (Bedrock Only)

TCE CONCENTRATIONS (ug/L)
AUGUST/SEPTEMBER 2010
Figure 37

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2010 OPERATIONS
MARCH 2011



BEDROCK PILOT STUDY
TCE CONCENTRATION (ug/L) AFTER ONE YEAR OF OPERATIONS
N-S CROSS SECTION ALONG 50TH ST.
AUGUST - SEPTEMBER 2010
Figure 38

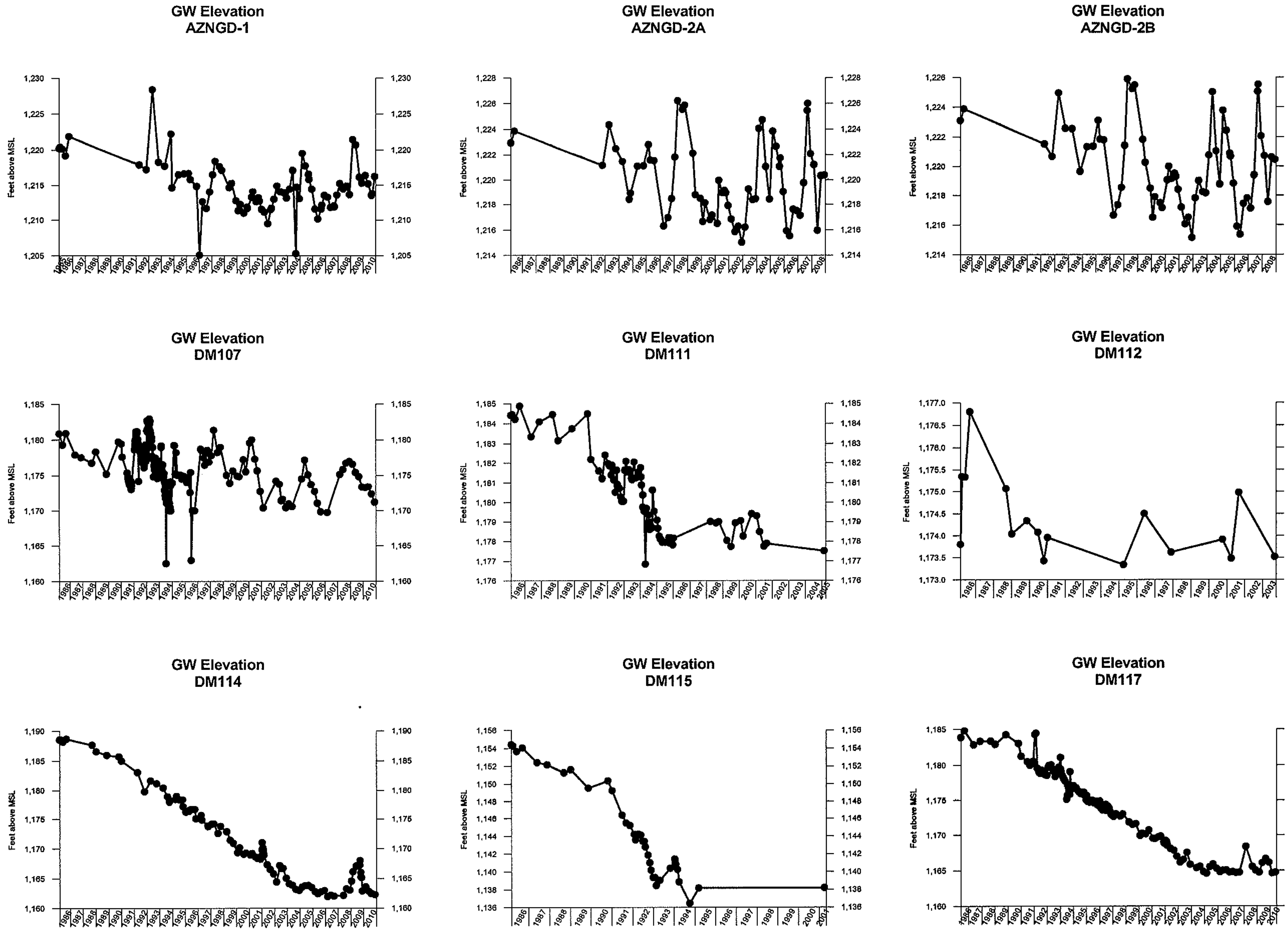
CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2010 OPERATIONS
MARCH 2011

APPENDIX A

HYDROGRAPHS

52ND STREET SUPERFUND SITE
OU1 MONITOR AND EXTRACTION WELLS



EXPLANATION

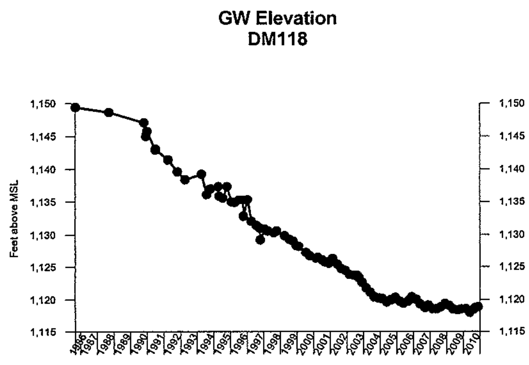
- ● - Measured Value
- ○ - Undetected (Displayed at RL)

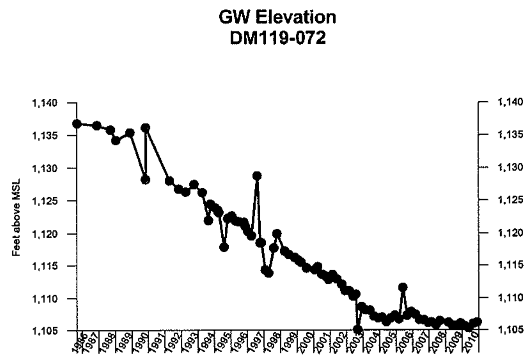
CLEAR CREEK ASSOCIATES

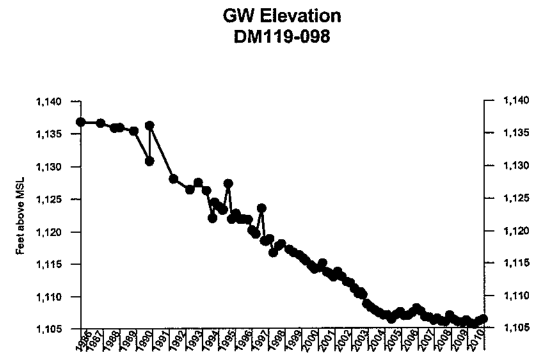
Project Name: 52nd Street Superfund Site

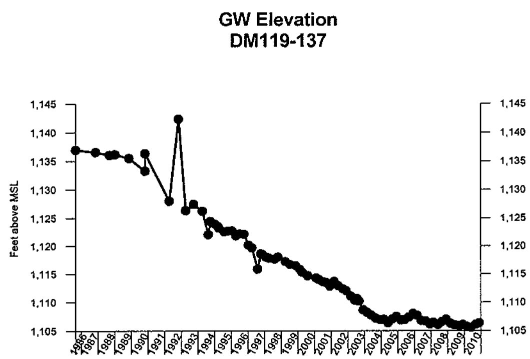
Job No: 00000-000-000 | Date: March 2011

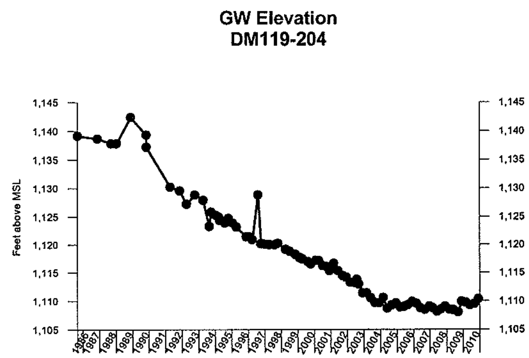
Time-Series Graphs
GW Elevation
52nd Street Superfund Site
Phoenix, Arizona

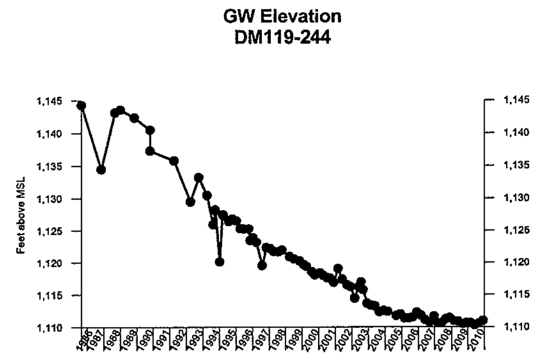


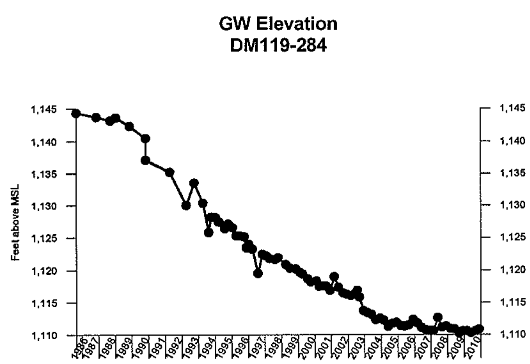


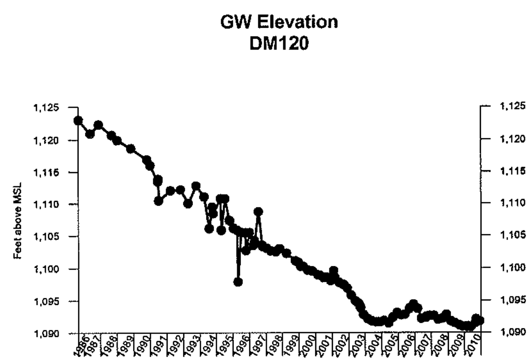


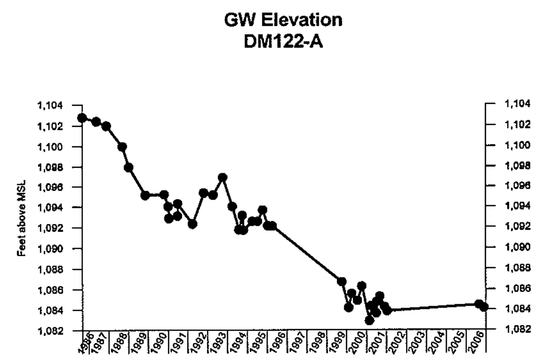












EXPLANATION

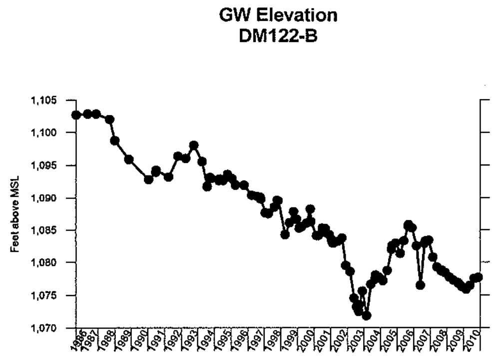
- ● - Measured Value
- ○ - Undetected (Displayed at RL)

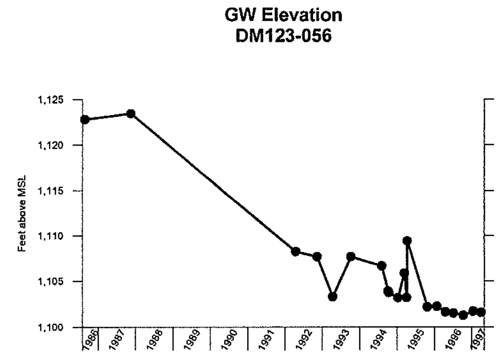
CLEAR CREEK ASSOCIATES

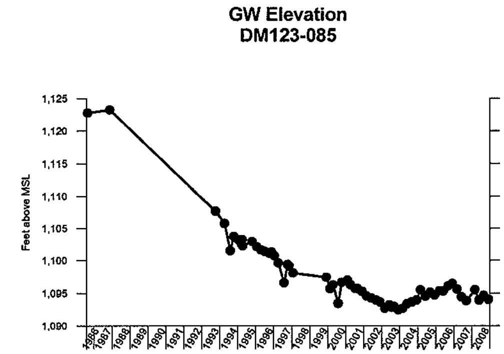
Project Name: 52nd Street Superfund Site

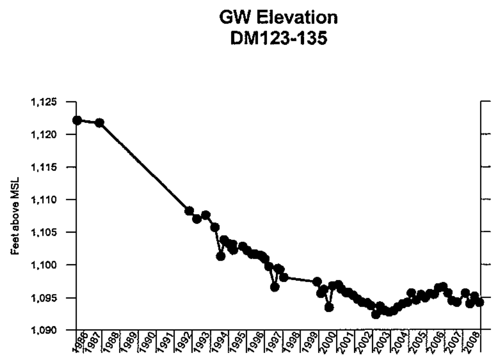
Job No: 00000-000-000 | Date: March 2011

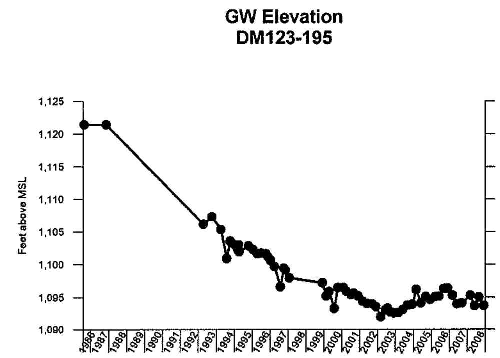
Time-Series Graphs GW Elevation 52nd Street Superfund Site Phoenix, Arizona

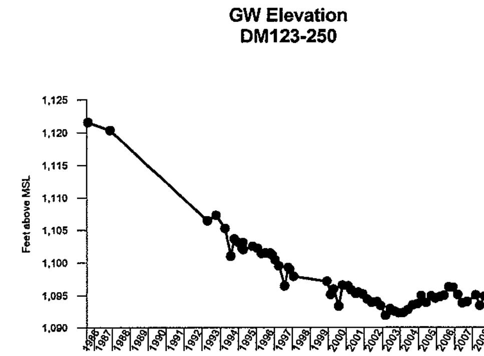


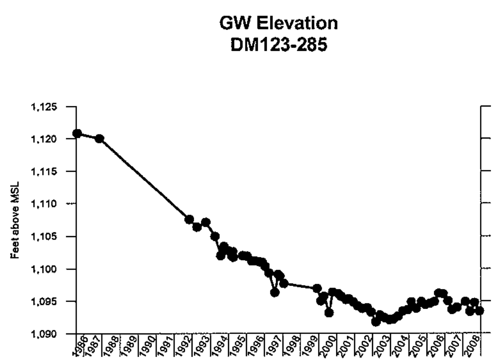


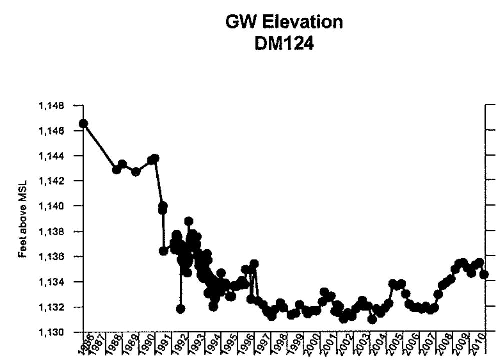


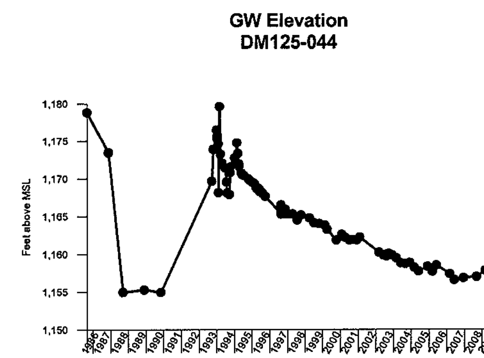












EXPLANATION

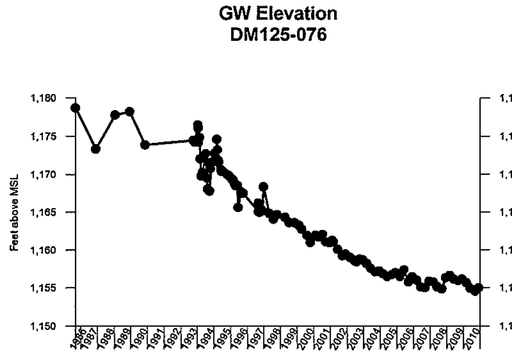
● - Measured Value
○ - Undetected (Displayed at RL)

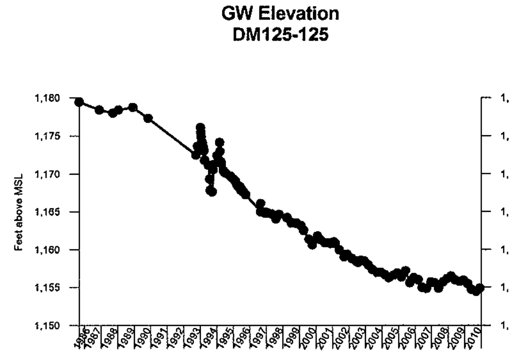
CLEAR CREEK ASSOCIATES

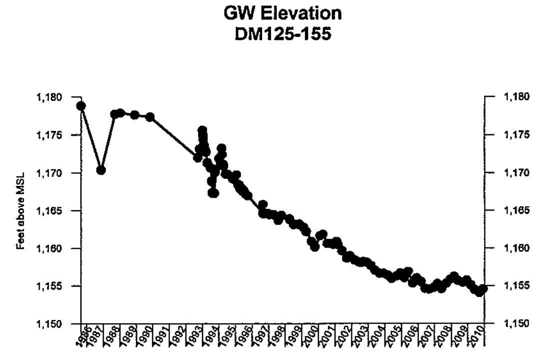
Project Name: 52nd Street Superfund Site

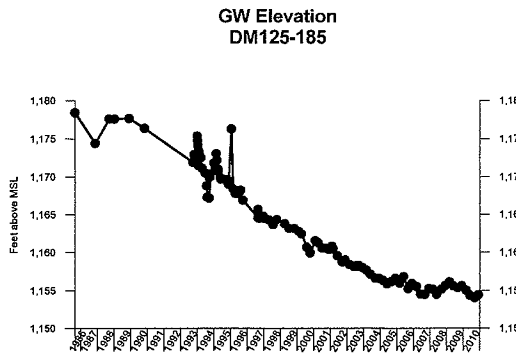
Job No: 00000-000-000 | Date: March 2011

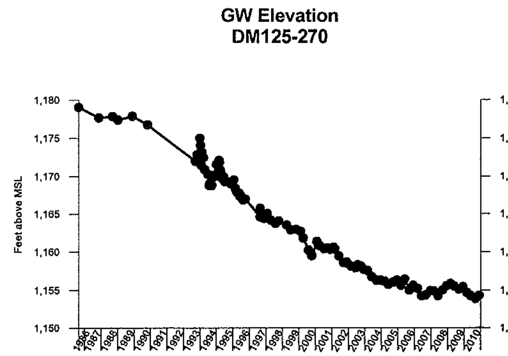
Time-Series Graphs
GW Elevation
52nd Street Superfund Site
Phoenix, Arizona

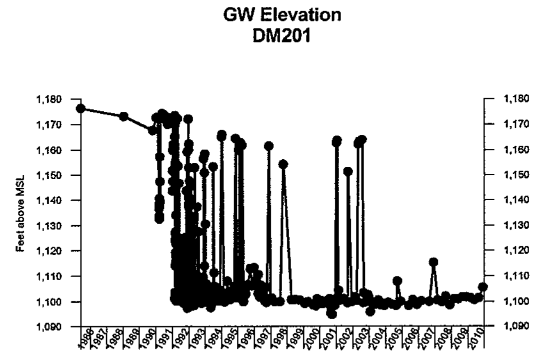


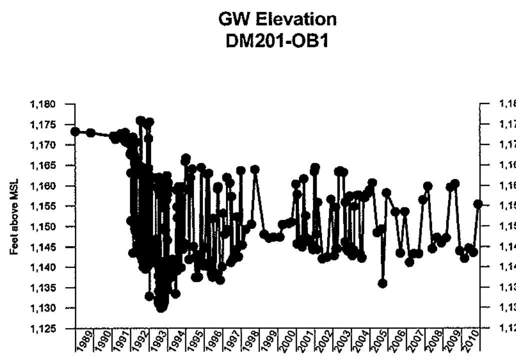


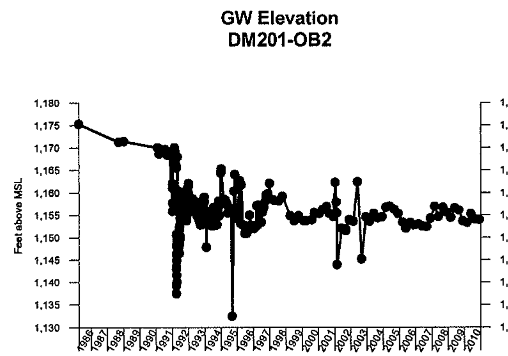


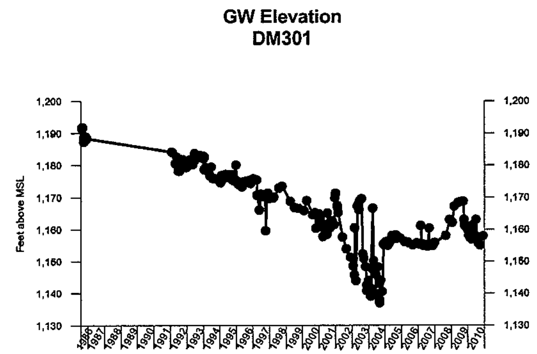












EXPLANATION

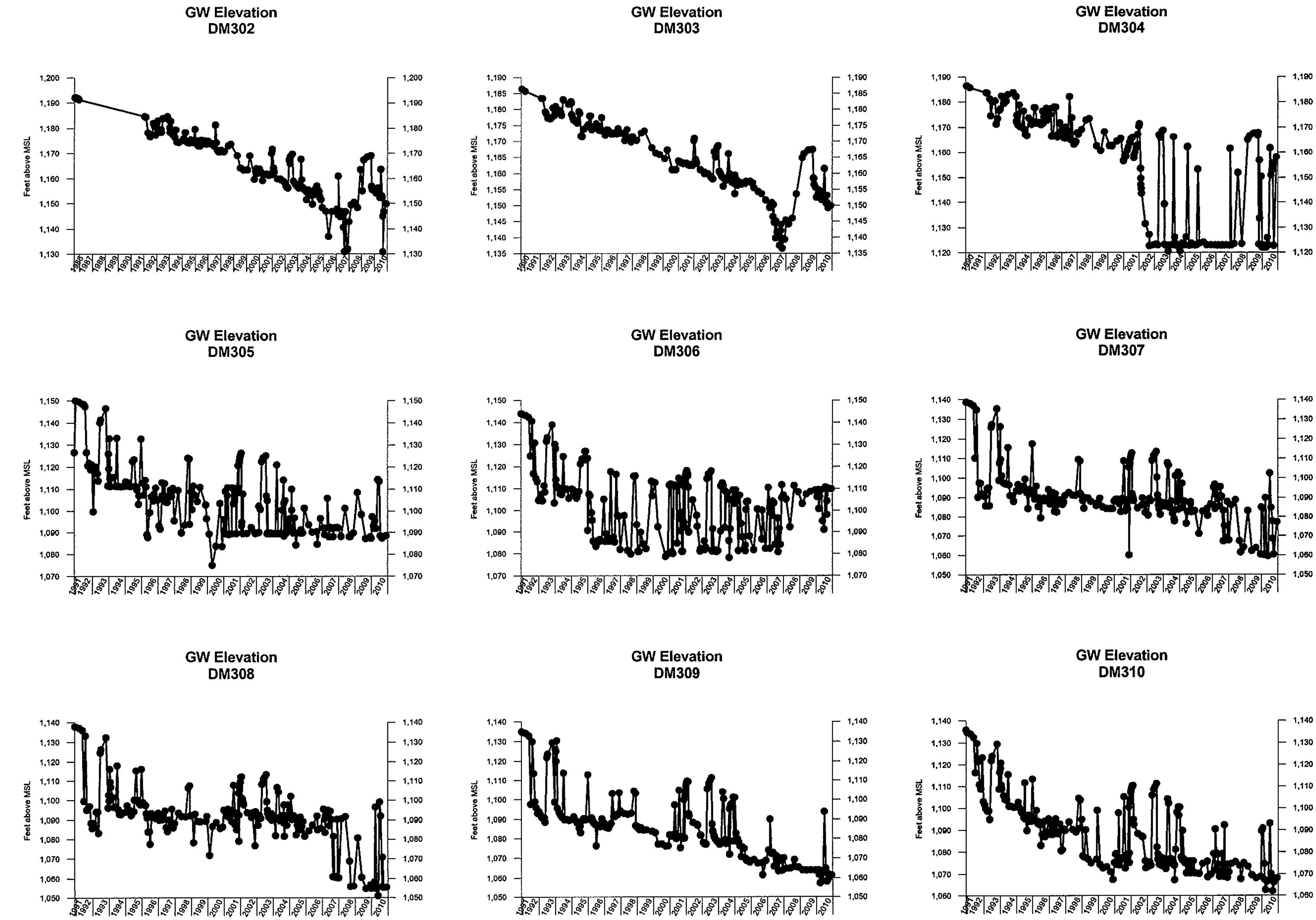
● - Measured Value
○ - Undetected (Displayed at RL)

CLEAR CREEK ASSOCIATES

Project Name: 52nd Street Superfund Site

Job No: 00000-000-000 | Date: March 2011

Time-Series Graphs
GW Elevation
52nd Street Superfund Site
Phoenix, Arizona



EXPLANATION

- ● - Measured Value
- ○ - Undetected (Displayed at RL)

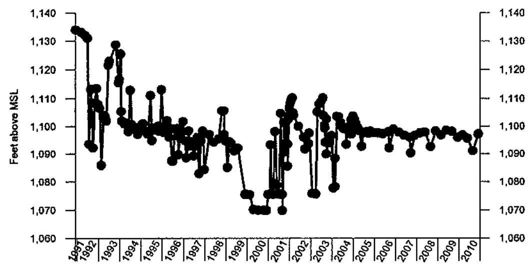
CLEAR CREEK ASSOCIATES

Project Name: 52nd Street Superfund Site

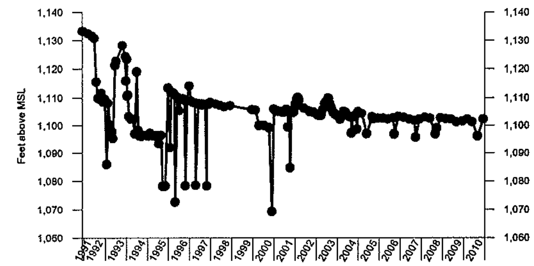
Job No: 00000-000-000 | Date: March 2011

Time-Series Graphs
GW Elevation
52nd Street Superfund Site
Phoenix, Arizona

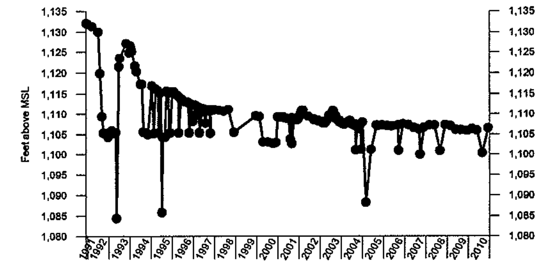
GW Elevation
DM311



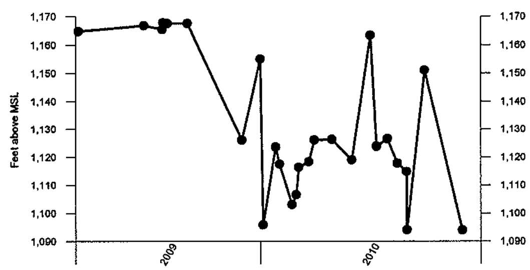
GW Elevation
DM312



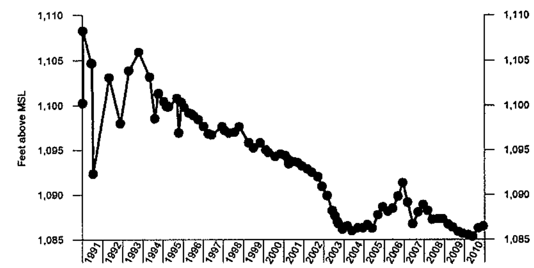
GW Elevation
DM313



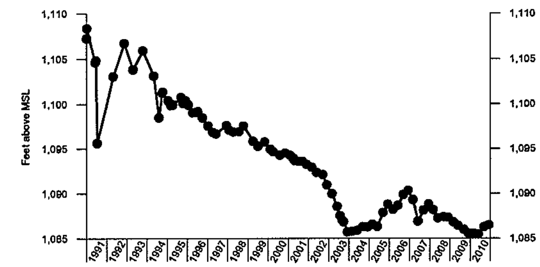
GW Elevation
DM314



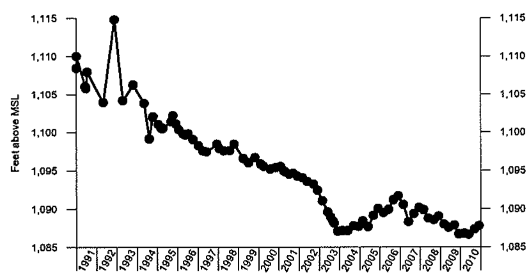
GW Elevation
DM502-079



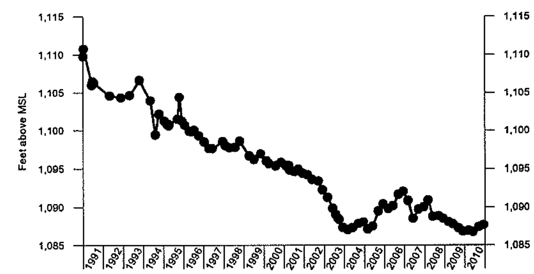
GW Elevation
DM502-119



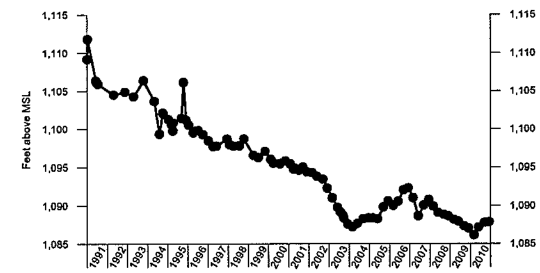
GW Elevation
DM502-161



GW Elevation
DM502-240



GW Elevation
DM502-335



EXPLANATION

● - Measured Value
○ - Undetected (Displayed at RL)

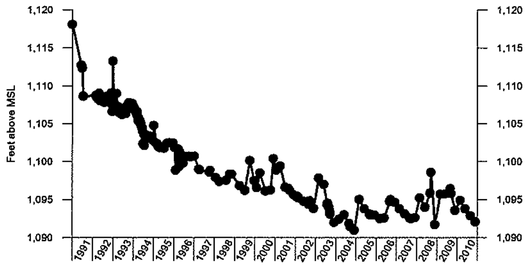
CLEAR CREEK ASSOCIATES

Project Name: 52nd Street Superfund Site

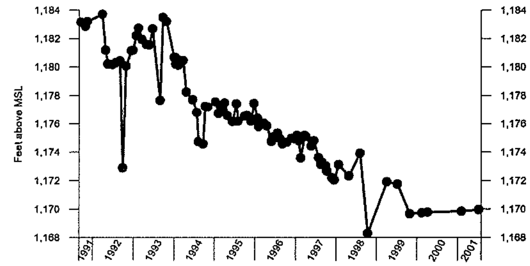
Job No: 00000-000-000 | Date: March 2011

Time-Series Graphs
GW Elevation
52nd Street Superfund Site
Phoenix, Arizona

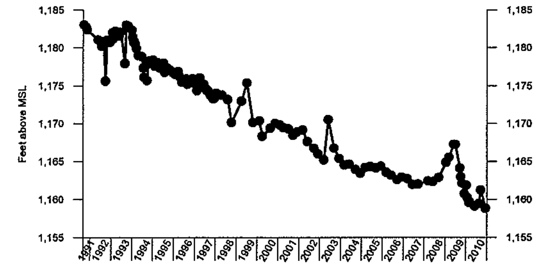
GW Elevation
DM503



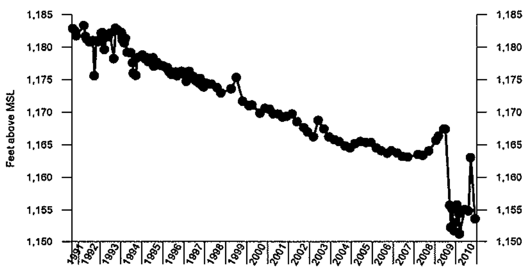
GW Elevation
DM601-040



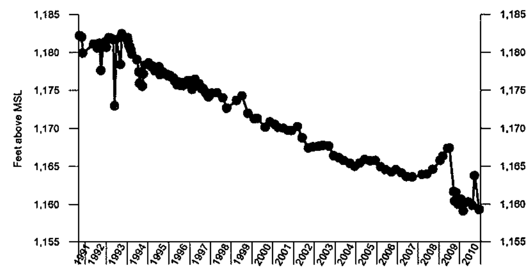
GW Elevation
DM601-085



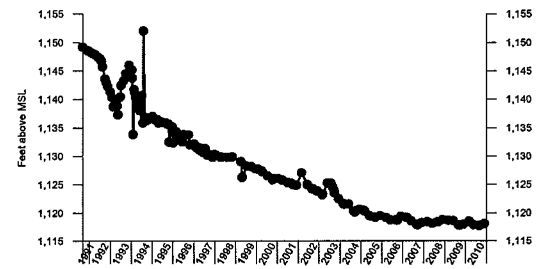
GW Elevation
DM601-135



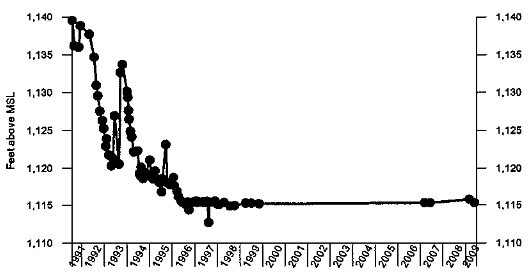
GW Elevation
DM601-200



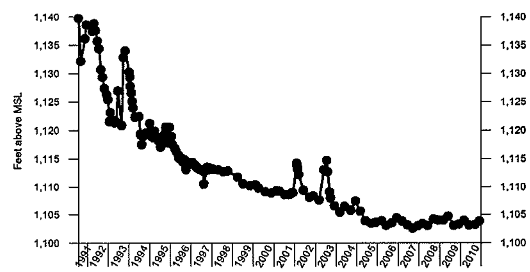
GW Elevation
DM602



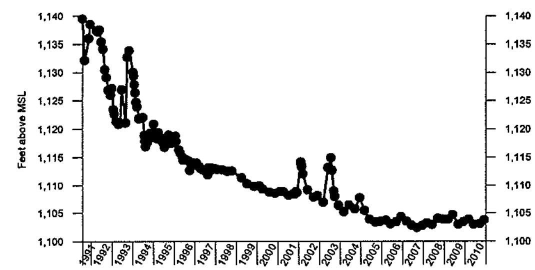
GW Elevation
DM603-068



GW Elevation
DM603-115



GW Elevation
DM603-170



EXPLANATION

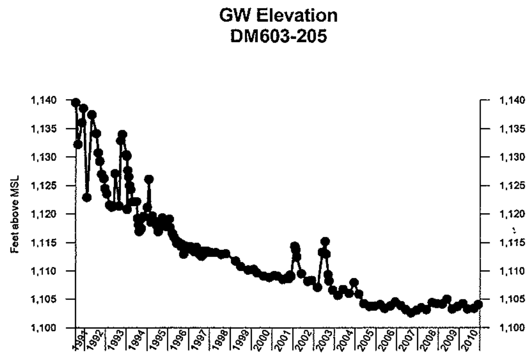
- ● - Measured Value
- ○ - Undetected (Displayed at RL)

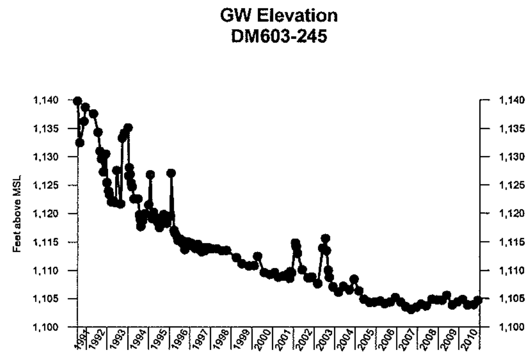
CLEAR CREEK ASSOCIATES

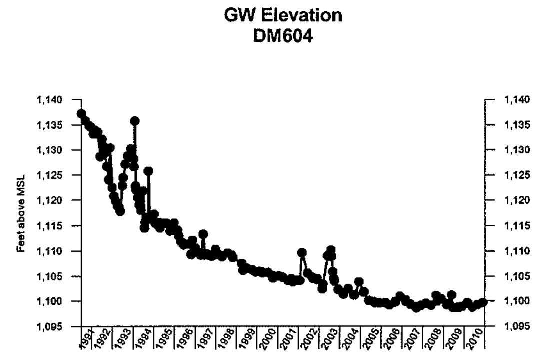
Project Name: 52nd Street Superfund Site

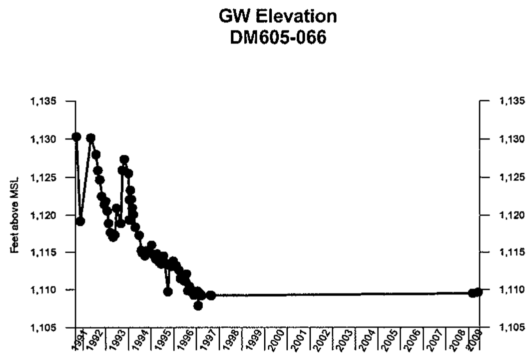
Job No: 00000-000-000 | Date: March 2011

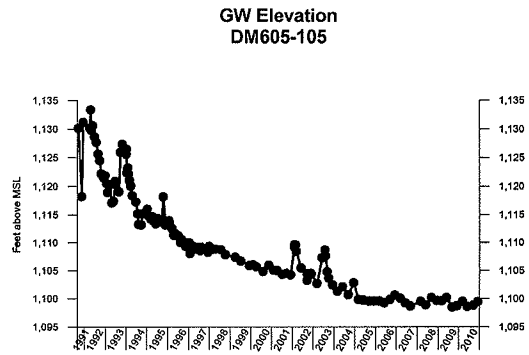
Time-Series Graphs
GW Elevation
52nd Street Superfund Site
Phoenix, Arizona

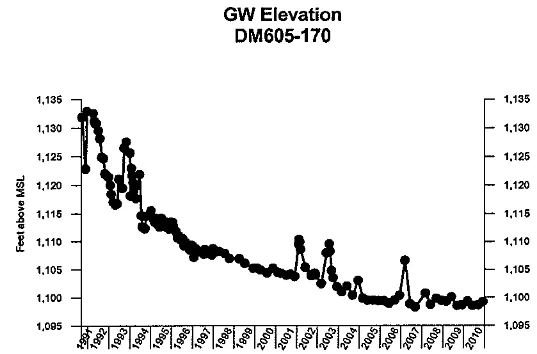


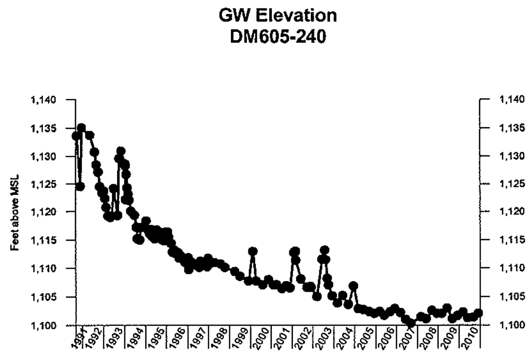


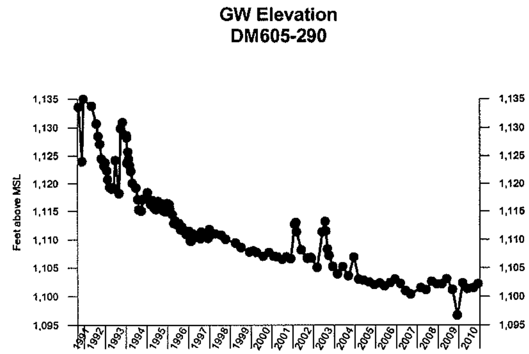


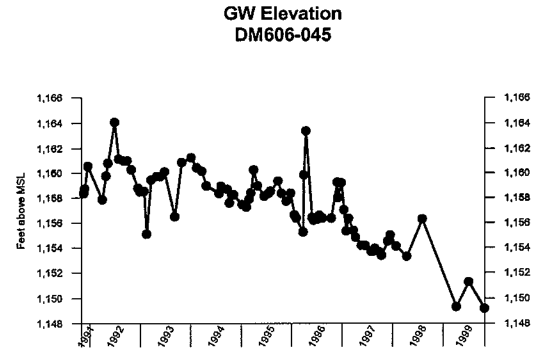












EXPLANATION

- ● - Measured Value
- ○ - Undetected (Displayed at RL)

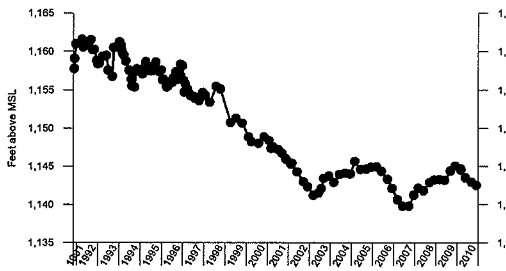
CLEAR CREEK ASSOCIATES

Project Name: 52nd Street Superfund Site

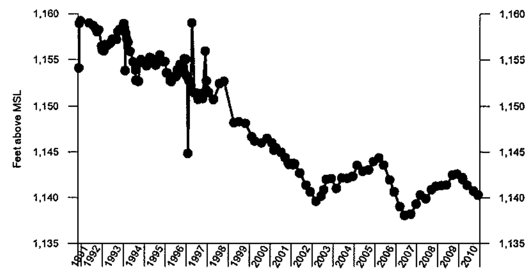
Job No: 00000-000-000 | Date: March 2011

Time-Series Graphs
GW Elevation
52nd Street Superfund Site
Phoenix, Arizona

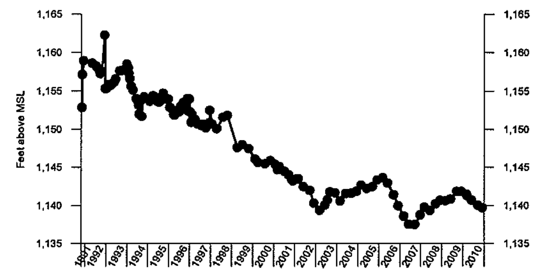
GW Elevation
DM606-102



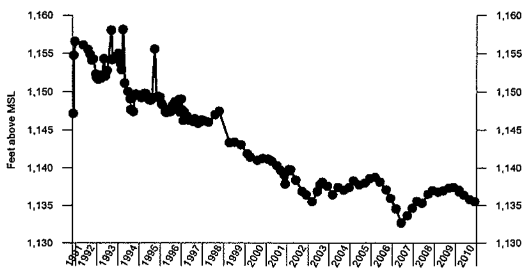
GW Elevation
DM606-185



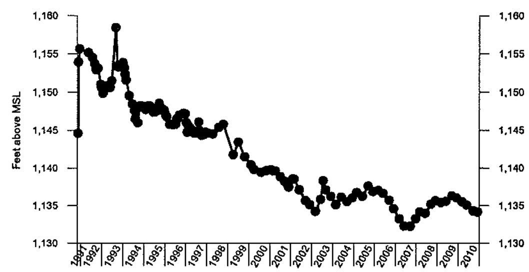
GW Elevation
DM606-250



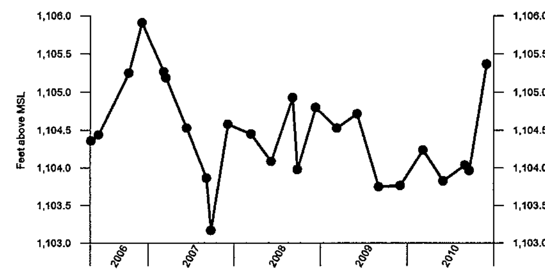
GW Elevation
DM606-330



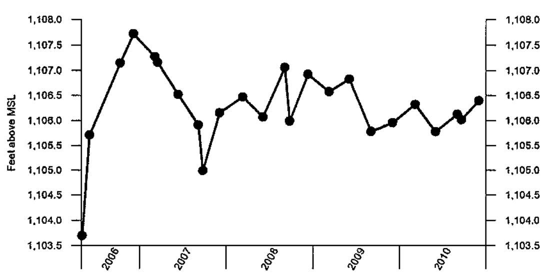
GW Elevation
DM606-370



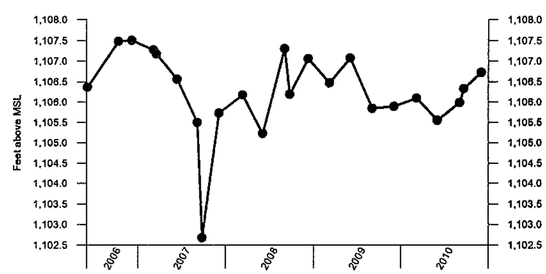
GW Elevation
DM607-146



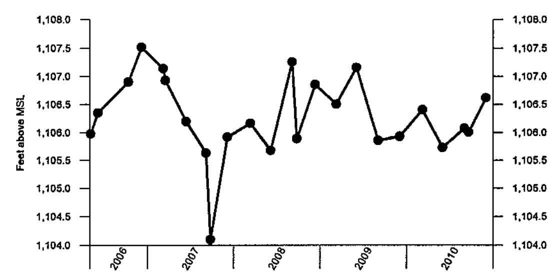
GW Elevation
DM607-210



GW Elevation
DM607-310



GW Elevation
DM607-400



EXPLANATION

- ● - Measured Value
- ○ - Undetected (Displayed at RL)

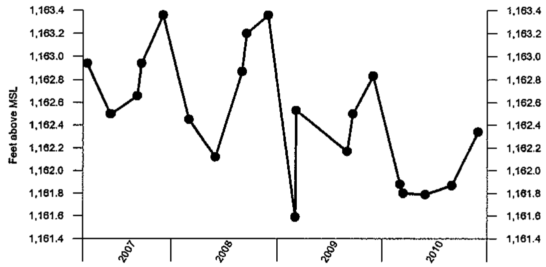
CLEAR CREEK ASSOCIATES

Project Name: 52nd Street Superfund Site

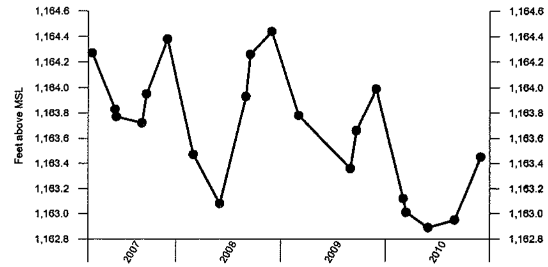
Job No: 00000-000-000 | Date: March 2011

Time-Series Graphs
GW Elevation
52nd Street Superfund Site
Phoenix, Arizona

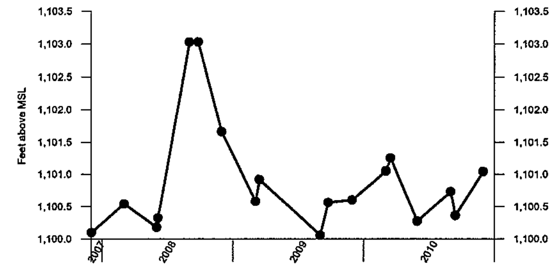
GW Elevation
DM609



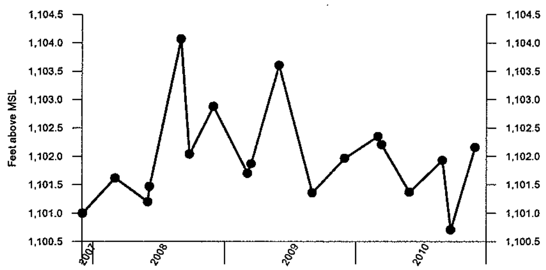
GW Elevation
DM610



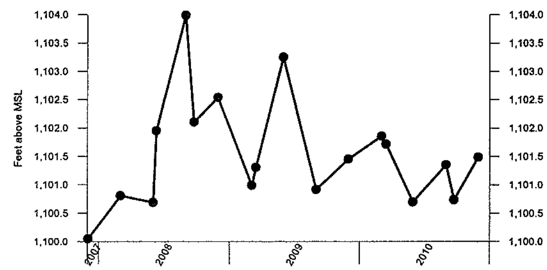
GW Elevation
DM611



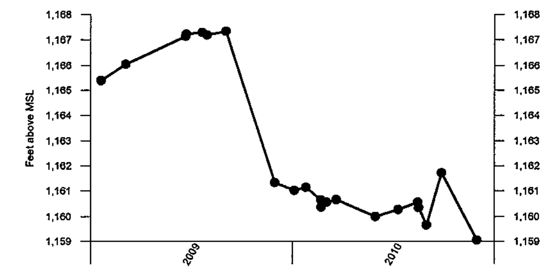
GW Elevation
DM612



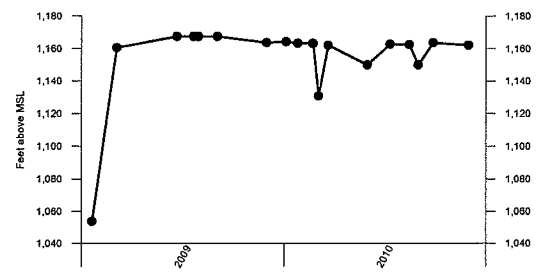
GW Elevation
DM613



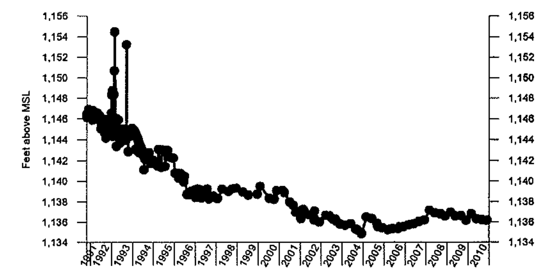
GW Elevation
DM614



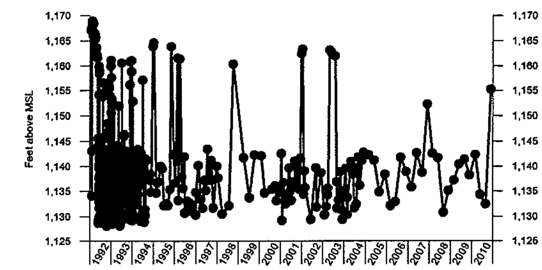
GW Elevation
DM615



GW Elevation
DM701



GW Elevation
DM702



EXPLANATION

- ● - Measured Value
- ○ - Undetected (Displayed at RL)

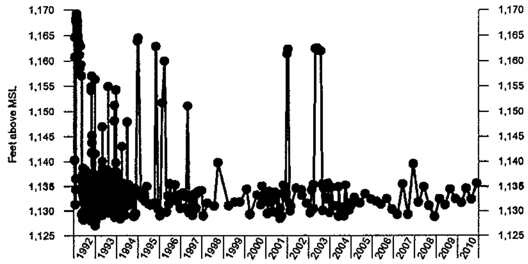
CLEAR CREEK ASSOCIATES

Project Name: 52nd Street Superfund Site

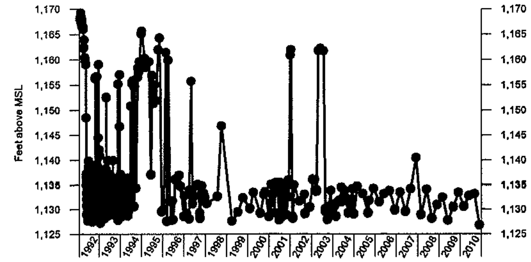
Job No: 00000-000-000 | Date: March 2011

Time-Series Graphs GW Elevation 52nd Street Superfund Site Phoenix, Arizona

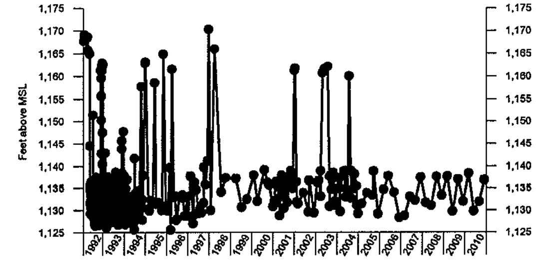
GW Elevation
DM703



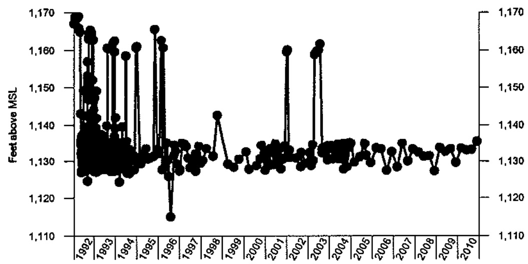
GW Elevation
DM704



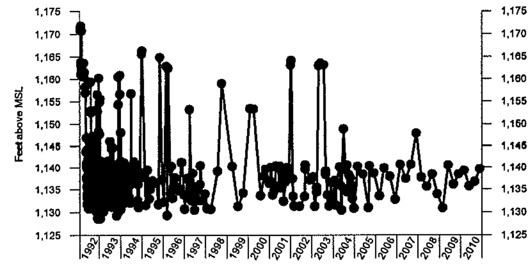
GW Elevation
DM705



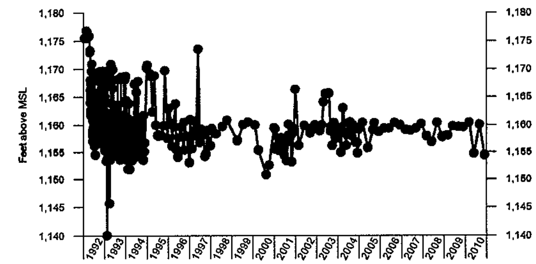
GW Elevation
DM706



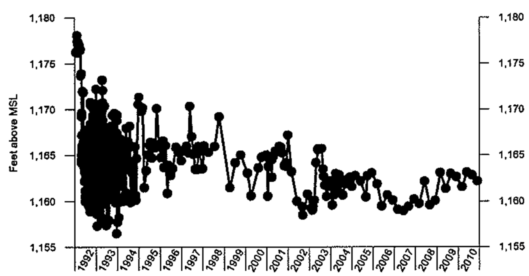
GW Elevation
DM707



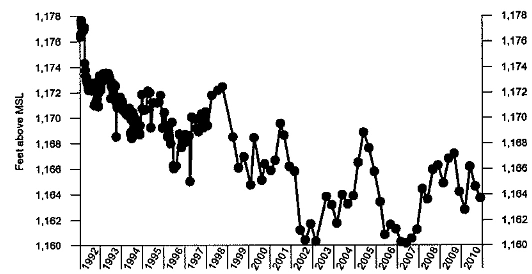
GW Elevation
DM713



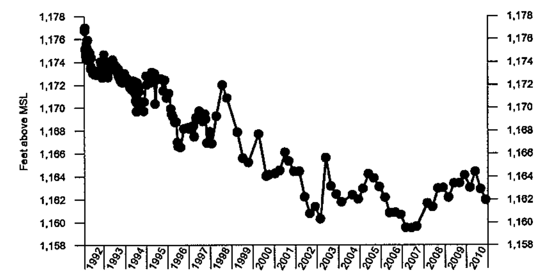
GW Elevation
DM714



GW Elevation
DM715



GW Elevation
DM716



EXPLANATION

● - Measured Value
○ - Undetected (Displayed at RL)

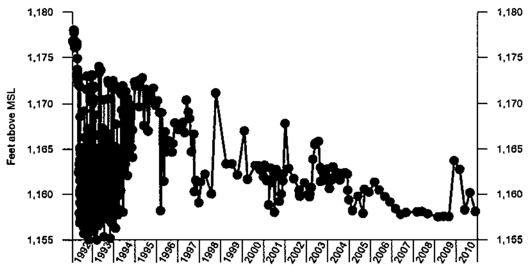
CLEAR CREEK ASSOCIATES

Project Name: 52nd Street Superfund Site

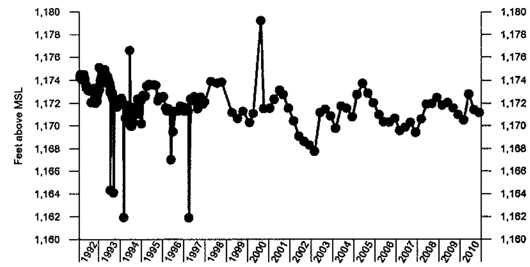
Job No: 00000-000-000 | Date: March 2011

Time-Series Graphs
GW Elevation
52nd Street Superfund Site
Phoenix, Arizona

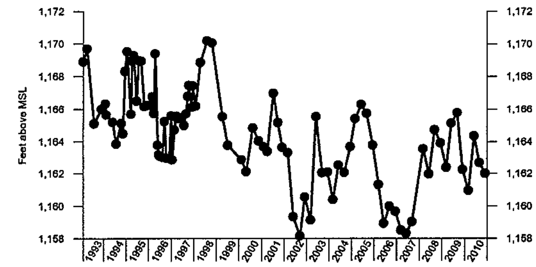
GW Elevation
DM718



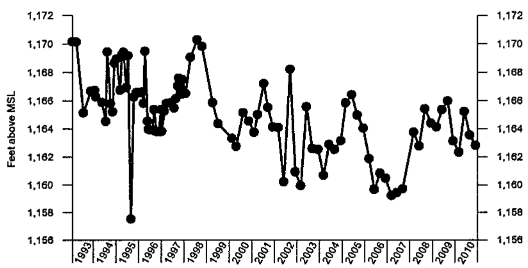
GW Elevation
DM720



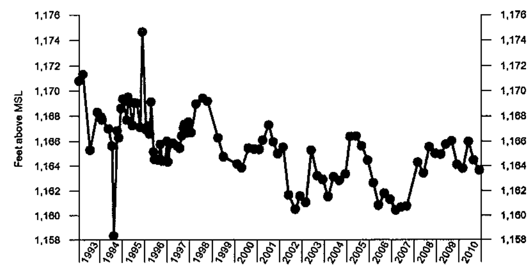
GW Elevation
DM721-045



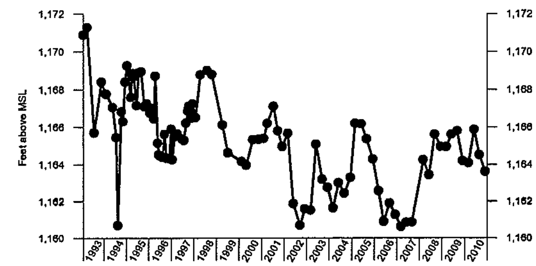
GW Elevation
DM721-065



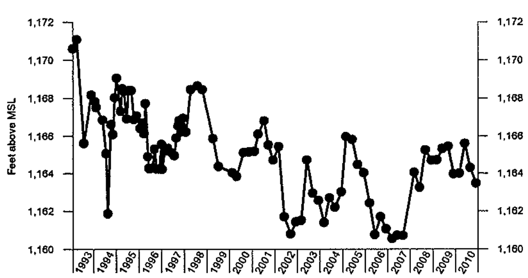
GW Elevation
DM721-125



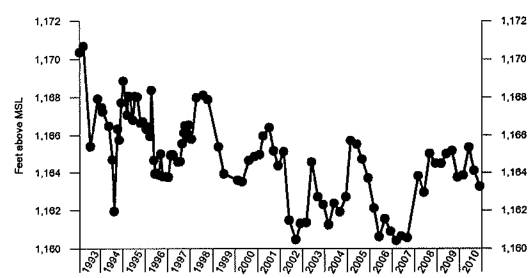
GW Elevation
DM721-185



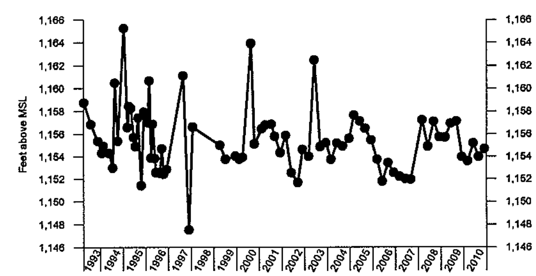
GW Elevation
DM721-260



GW Elevation
DM721-280



GW Elevation
DM722-047



EXPLANATION

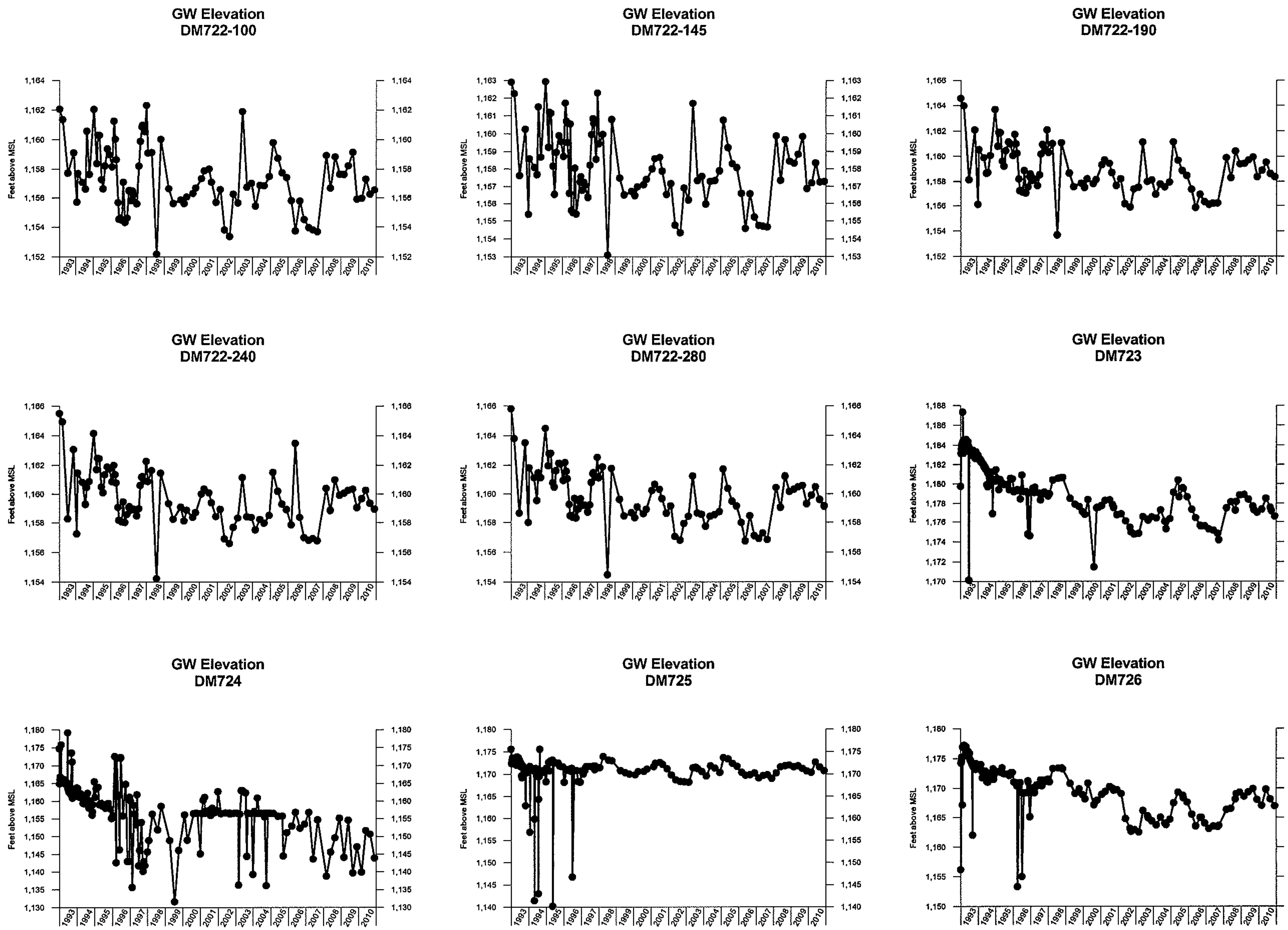
- ● - Measured Value
- ○ - Undetected (Displayed at RL)

CLEAR CREEK ASSOCIATES

Project Name: 52nd Street Superfund Site

Job No: 00000-000-000 | Date: March 2011

Time-Series Graphs
GW Elevation
52nd Street Superfund Site
Phoenix, Arizona



EXPLANATION

- ● - Measured Value
- ○ - Undetected (Displayed at RL)

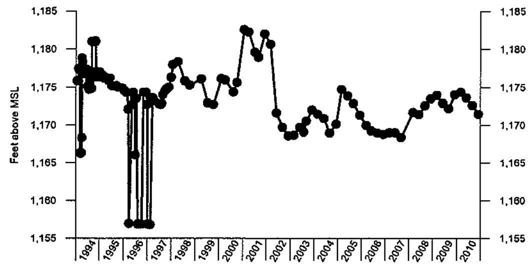
CLEAR CREEK ASSOCIATES

Project Name: 52nd Street Superfund Site

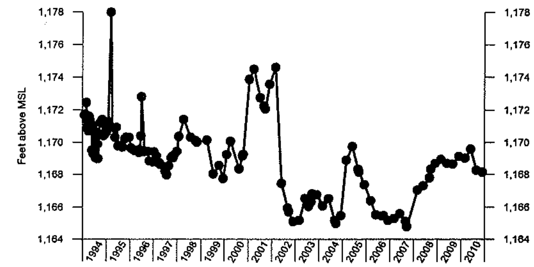
Job No: 00000-000-000 | Date: March 2011

Time-Series Graphs
GW Elevation
52nd Street Superfund Site
Phoenix, Arizona

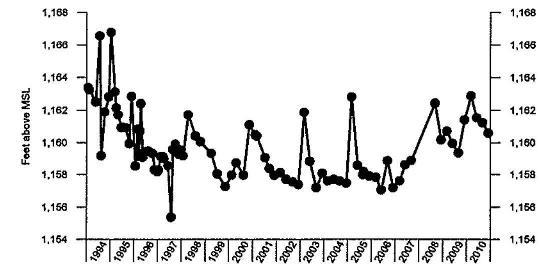
GW Elevation
DM727



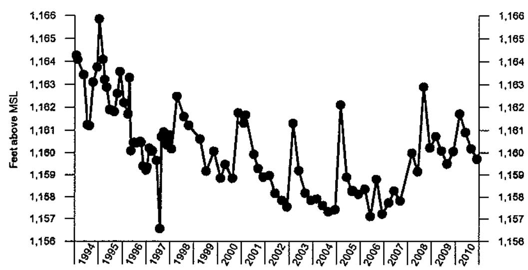
GW Elevation
DM728



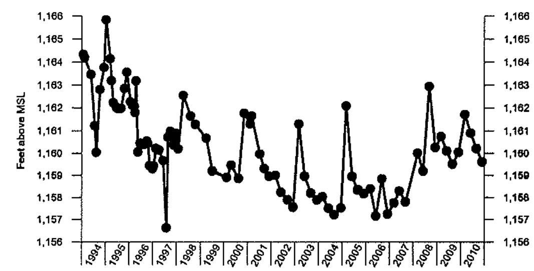
GW Elevation
DM729-050



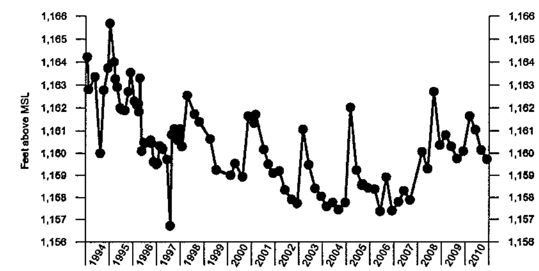
GW Elevation
DM729-145



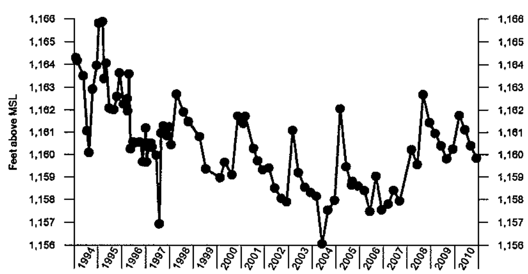
GW Elevation
DM729-195



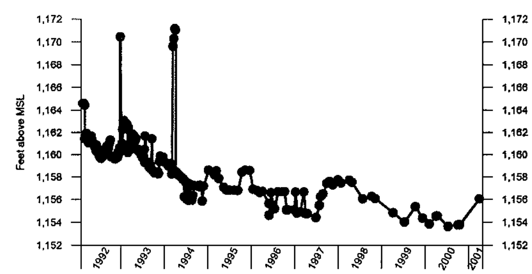
GW Elevation
DM729-255



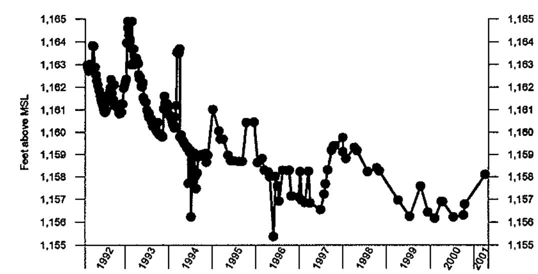
GW Elevation
DM729-285



GW Elevation
DM730



GW Elevation
DM731



EXPLANATION

- ● - Measured Value
- o - Undetected (Displayed at RL)

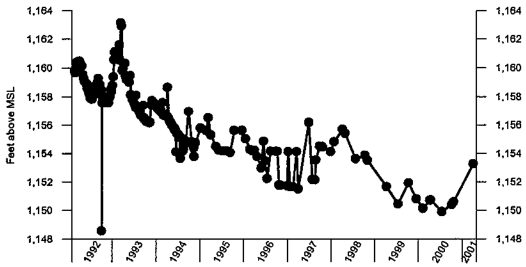
CLEAR CREEK ASSOCIATES

Project Name: 52nd Street Superfund Site

Job No: 00000-000-000 | Date: March 2011

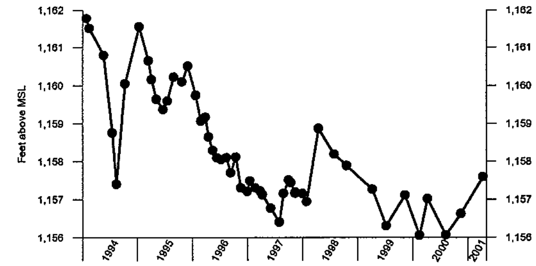
Time-Series Graphs
GW Elevation
52nd Street Superfund Site
Phoenix, Arizona

GW Elevation
DM732

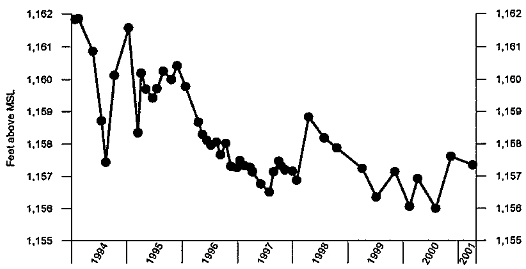


GW Elevation
DM733

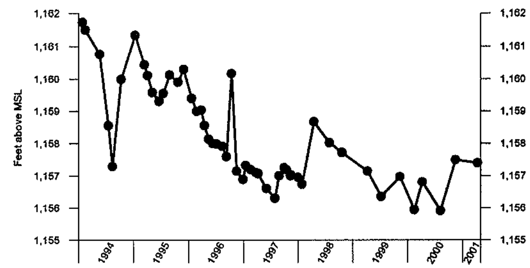
GW Elevation
DM734-045



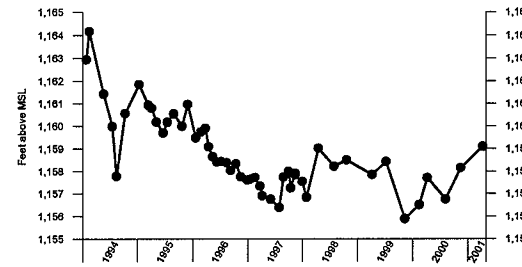
GW Elevation
DM734-110



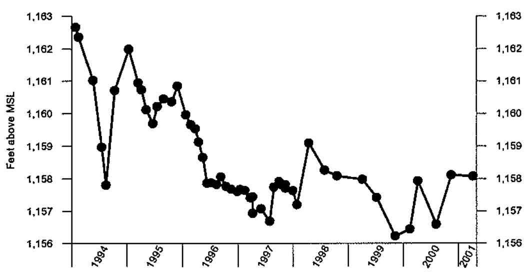
GW Elevation
DM734-162



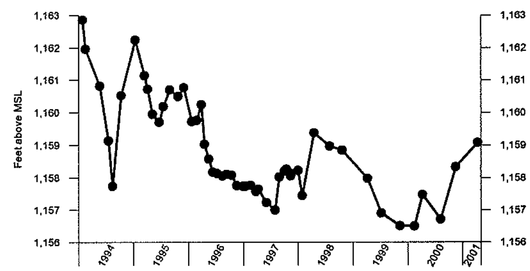
GW Elevation
DM734-200



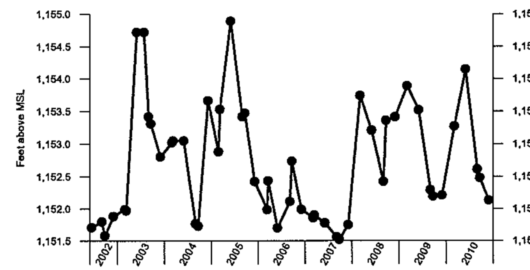
GW Elevation
DM734-240



GW Elevation
DM734-280



GW Elevation
DM735



EXPLANATION

- ● - Measured Value
- ○ - Undetected (Displayed at RL)

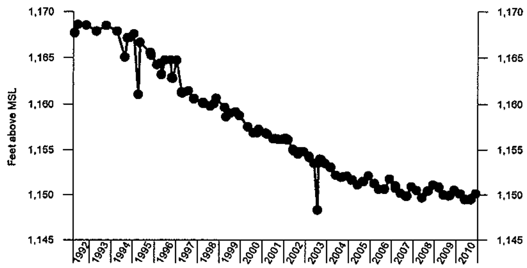
CLEAR CREEK ASSOCIATES

Project Name: 52nd Street Superfund Site

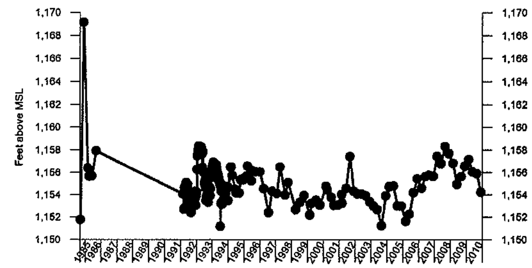
Job No: 00000-000-000 | Date: March 2011

Time-Series Graphs
GW Elevation
52nd Street Superfund Site
Phoenix, Arizona

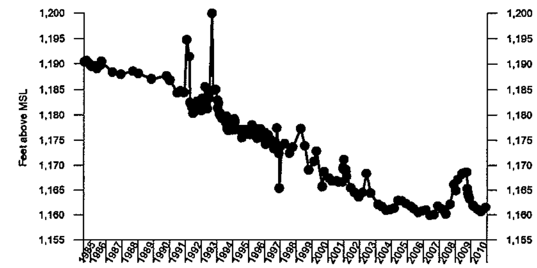
GW Elevation
EW18



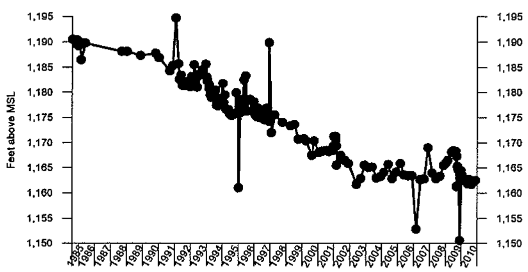
GW Elevation
LANGMADE



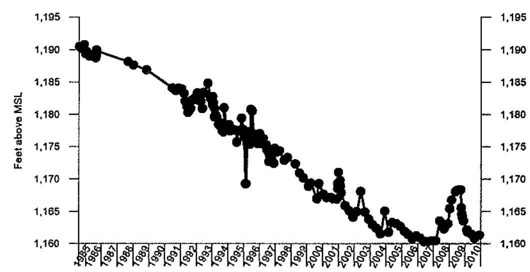
GW Elevation
MP03-B



GW Elevation
MP03-D

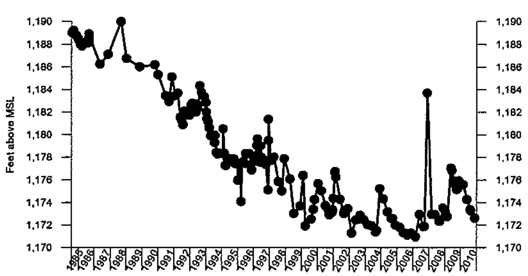


GW Elevation
MP09-B

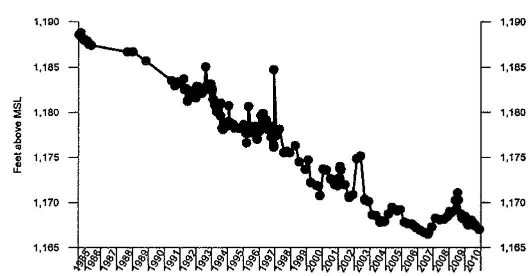


GW Elevation
MP09-D

GW Elevation
MP11-B



GW Elevation
MP11-D



GW Elevation
MP13-B

EXPLANATION

● - Measured Value
○ - Undetected (Displayed at RL)

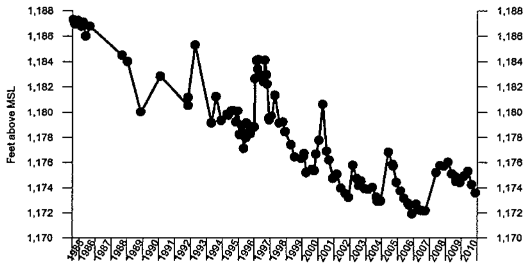
CLEAR CREEK ASSOCIATES

Project Name: 52nd Street Superfund Site

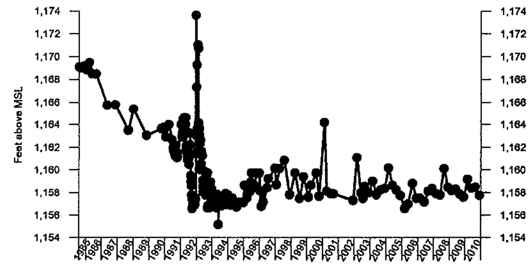
Job No: 00000-000-000 | Date: March 2011

Time-Series Graphs
GW Elevation
52nd Street Superfund Site
Phoenix, Arizona

GW Elevation
MP13-D



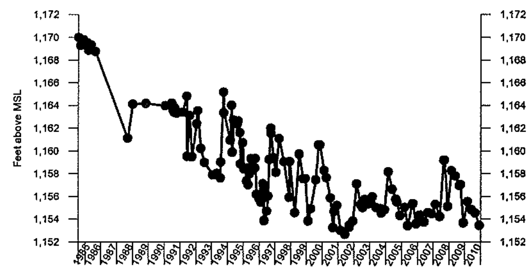
GW Elevation
MP16-A



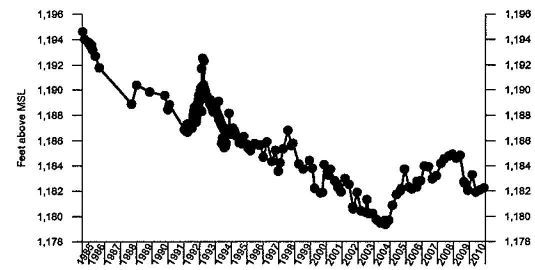
GW Elevation
MP16-B

GW Elevation
MP16-C

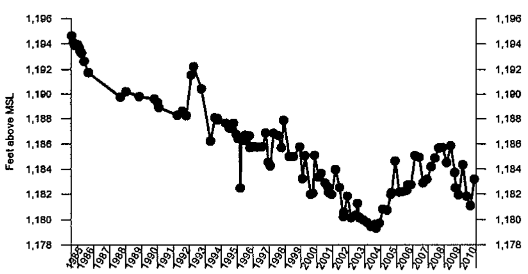
GW Elevation
MP16-D



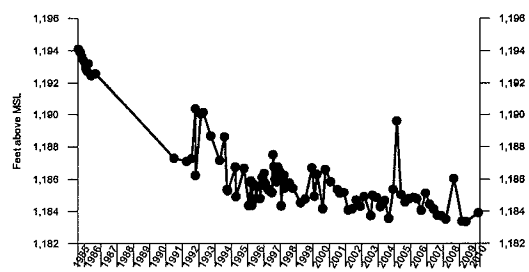
GW Elevation
MP20-A



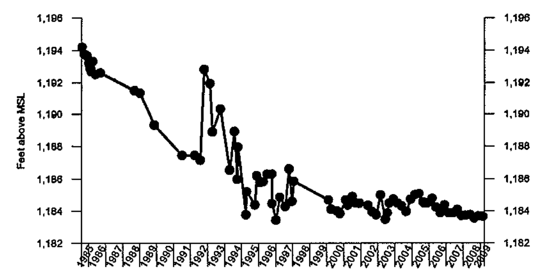
GW Elevation
MP20-B



GW Elevation
MP25-A



GW Elevation
MP25-B



EXPLANATION

● - Measured Value
○ - Undetected (Displayed at RL)

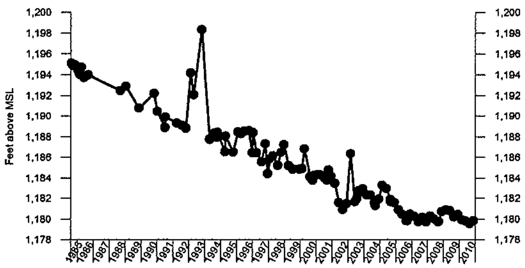
CLEAR CREEK ASSOCIATES

Project Name: 52nd Street Superfund Site

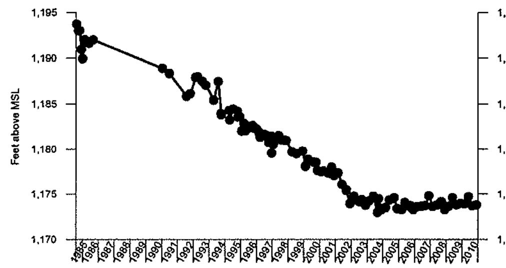
Job No: 00000-000-000 | Date: March 2011

Time-Series Graphs
GW Elevation
52nd Street Superfund Site
Phoenix, Arizona

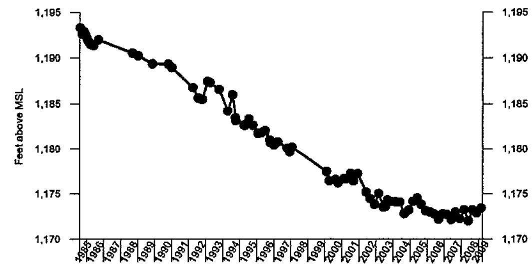
GW Elevation
MP25-D



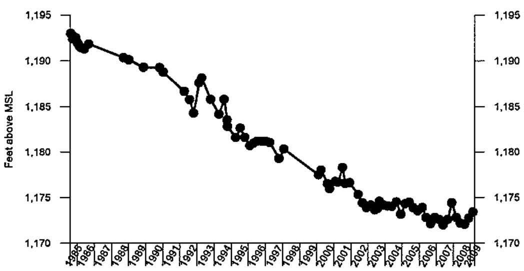
GW Elevation
MP28-A



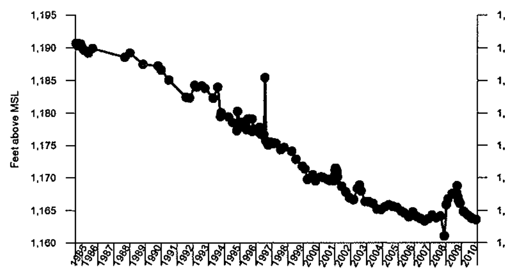
GW Elevation
MP28-B



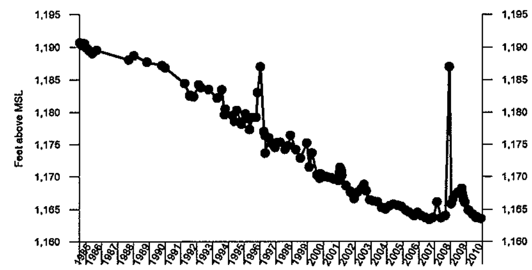
GW Elevation
MP28-D



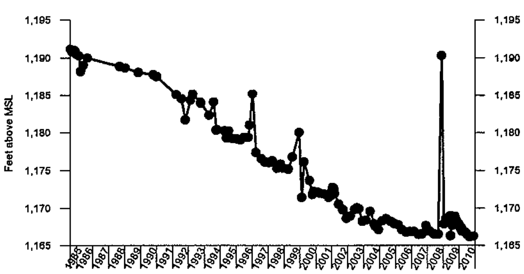
GW Elevation
MP30-A



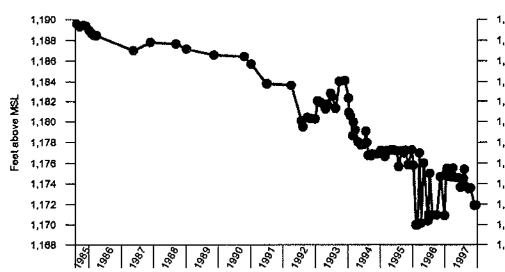
GW Elevation
MP30-B



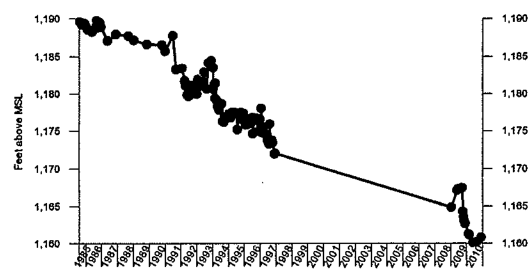
GW Elevation
MP30-D



GW Elevation
MP36-A



GW Elevation
MP36-B



EXPLANATION

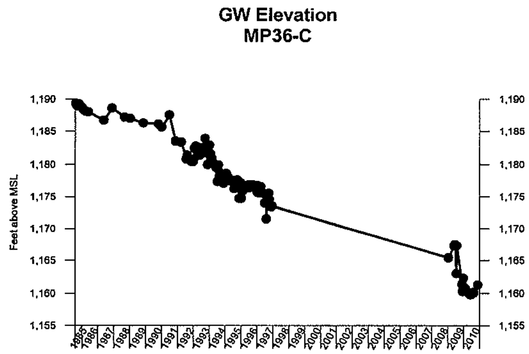
- ● - Measured Value
- ○ - Undetected (Displayed at RL)

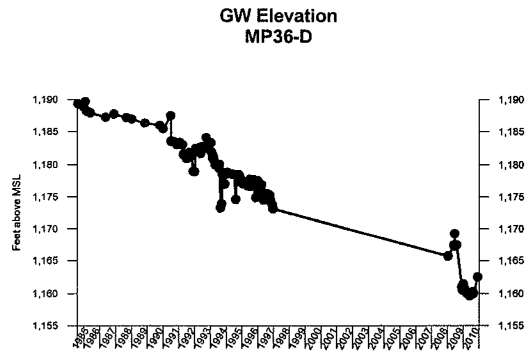
CLEAR CREEK ASSOCIATES

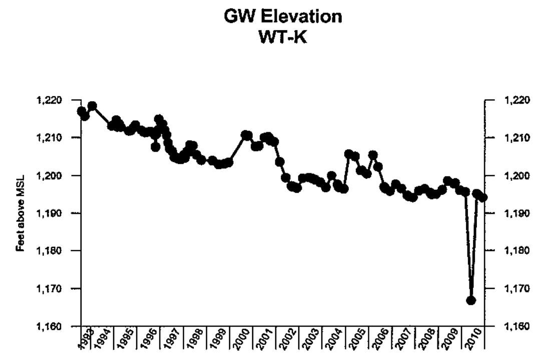
Project Name: 52nd Street Superfund Site

Job No: 00000-000-000 | Date: March 2011

Time-Series Graphs
GW Elevation
52nd Street Superfund Site
Phoenix, Arizona







EXPLANATION

- ● - Measured Value
- ○ - Undetected (Displayed at RL)

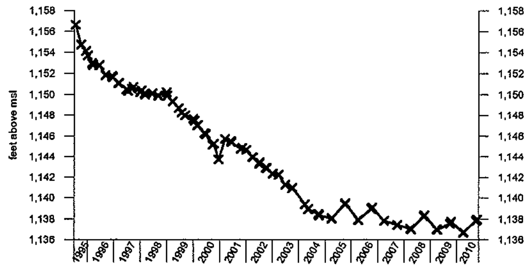
CLEAR CREEK ASSOCIATES

Project Name: 52nd Street Superfund Site

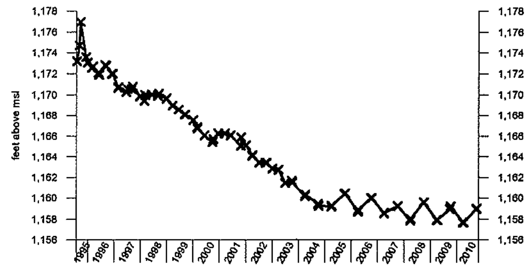
Job No: 00000-000-000 | Date: March 2011

Time-Series Graphs
GW Elevation
52nd Street Superfund Site
Phoenix, Arizona

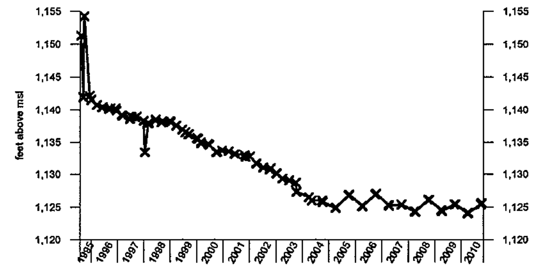
GW Elevation
DM-23



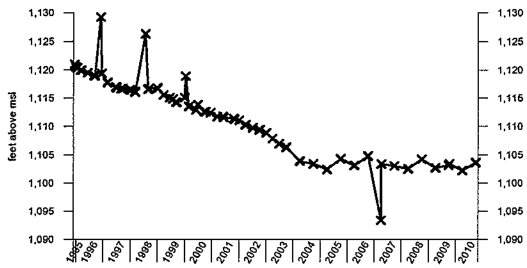
GW Elevation
DM-26



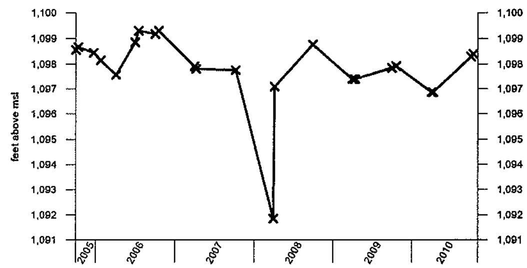
GW Elevation
DM-27



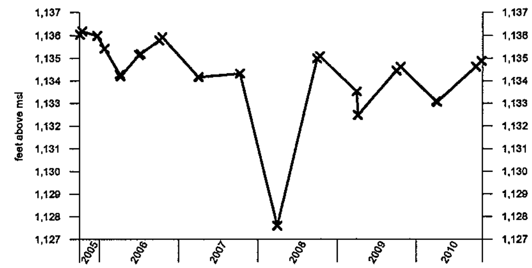
GW Elevation
DM-28



GW Elevation
DM-30



GW Elevation
DM-34



EXPLANATION

× - GW Elevation
U - Undetected (Displayed at DL)

CLEAR CREEK ASSOCIATES

Project Name: 56th Street Study Area

Job No: 00000-000-000 | Date: March 2011

Time-Series Graphs
GW Elevation
56th Street Study Area
Phoenix, Arizona

APPENDIX B

WELL EFFICIENCY CALCULATIONS

52ND STREET SUPERFUND SITE

APPENDIX B

Well Efficiency Calculations

Well efficiency relates the amount of drawdown in the well casing of a pumping well to the amount of drawdown observed in the aquifer a short distance from the well. Well efficiency is influenced by turbulent flow at the well screen openings, flow friction within the aquifer itself, and turbulent flow within the gravel pack surrounding the well screen. Well efficiency is represented as the percentage difference in water level inside the well and in the aquifer just outside the well. Well efficiencies for the OCC extraction wells were estimated during well testing conducted in January 2002. The efficiency-corrected water levels were calculated by first estimating a regional groundwater decline, and then subtracting that amount from the baseline (March - May 1992) measurements in the extraction wells to derive an initial head condition. The wells used to calculate the estimated regional decline and the calculations for correcting water levels in the OCC extraction wells are presented in Table 9 (refer also to Figure 1). The drawdown at each well was calculated by subtracting the 4th quarter 2009 water level from the initial head condition. To correct the drawdown value for well efficiency, the drawdown was multiplied by the well efficiency. The corrected water level was then derived by subtracting the revised drawdown from the revised initial head. Total drawdown refers to both regional decline from the multi-year drought and drawdown caused by OU1 pumping.

The efficiency calculations were based on "Clark, L., 1977. The Analysis and Planning of Step Drawdown Tests: Quarterly Journal of Engineering Geology, Volume 10, Pages 125-143." The water levels derived from the pumping wells using the efficiency calculation are considered approximate due to the need to estimate the regional decline portion of the correction factor. The additional monitor wells recently completed on the OCC will help evaluate the accuracy of the calculation. The efficiencies for the wells were calculated for a range of pumping rates and since water levels at the site have not changed significantly since 2002, a need to retest the wells in the foreseeable future is not anticipated. The efficiency calculation is not used to assist in contouring around the onsite extraction wells because of the greater density of monitor wells in the immediate vicinity of the extraction wells onsite. Contouring in the Courtyard can be done while ignoring the onsite extraction well water levels.

TABLE OF GROUNDWATER ELEVATIONS CORRECTIONS FOR WELL EFFICIENCY IN EXTRACTION WELLS ON THE OLD CROSSCUT CANAL

Well Efficiency Correction

	Baseline 1992		Dec-2010		Well Efficiency Correction					
Well	Date	Water Level Elevation (feet amsl)	Date	Water Level Elevation (feet amsl)	Water Level Drawdown Baseline - Dec 2010 (feet)	Well Efficiency (Percent)	Initial Head (1992 Head minus 11.21 feet to correct for Regional Decline) (feet amsl)	Drawdown Corrected for Regional Decline (feet)	Drawdown Corrected for Well Efficiency (feet)	2010 Water Level Elevation Corrected for Efficiency (feet amsl)
DM305	5/22/1992	1148.69	12/8/2010	1088.45	60.24	90.26	1136.98	48.53	43.81	1093.17
DM307	5/22/1992	1136.94	12/8/2010	1077.15	59.79	64.24	1125.23	48.08	30.89	1094.34
DM308	5/22/1992	1135.90	12/8/2010	1055.5	80.40	87.25	1124.19	68.69	59.93	1064.26
DM309	5/22/1992	1132.81	12/8/2010	1061.27	71.54	61.05	1121.10	59.83	36.52	1084.58
DM310	5/22/1992	1132.51	12/8/2010	1068.22	64.29	53.76	1120.80	52.58	28.27	1092.53

Calculation for Estimated Regional Decline

Well	Date Measured	Water Level Elevation (feet amsl)	Date Measured	Water Level Elevation (feet amsl)	Change in Water Level Elevation (in feet)
DM-09	3/25/1992	1200.46	10/1/2010	1185.43	15.03
DM-10	3/27/1992	1211.03	10/1/2010	1202.45	8.58
DM124	4/2/1992	1136.60	9/1/2010	1135.44	1.16
DM-12OW1	3/27/1992	1204.82	10/4/2010	1190.66	14.16
DM-13	3/27/1992	1204.33	10/1/2010	1190.97	13.36
DM-16	3/25/1992	1197.16	10/1/2010	1181.75	15.41
DM-17	3/23/1992	1201.05	10/1/2010	1186.69	14.36
DM501-147	4/22/1992	1080.65	9/8/2010	1067.96	12.69
DM504	3/31/1992	1085.80	9/2/2010	1071.05	14.75
DM505	4/2/1992	1075.33	9/2/2010	1063.34	11.99
DM506-100	4/23/1992	1073.37	9/13/2010	1062.34	11.03
DM508	4/2/1992	1072.48	9/2/2010	1065.82	6.66
EW02	4/27/1992	1084.82	9/2/2010	1071.37	13.45
MP20-A	3/19/1992	1186.34	9/1/2010	1182.08	4.26
				Average decline	11.21

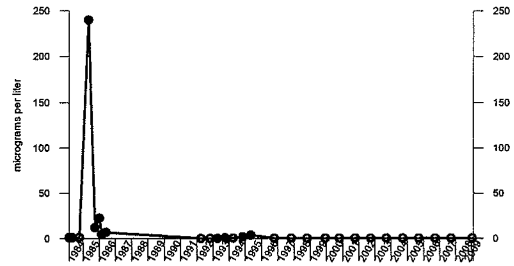
Note: The wells used for the regional decline estimate are assumed to not be impacted by OU1 pumping.
amsl = above mean sea level

APPENDIX C

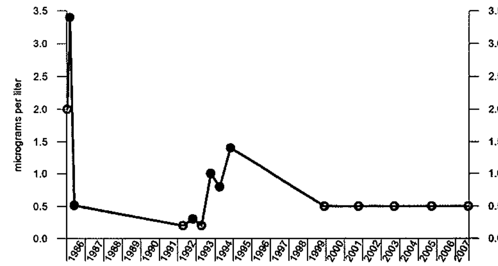
TCE CONCENTRATION TIME SERIES PLOTS

52ND STREET SUPERFUND SITE
OU1 MONITOR AND EXTRACTION WELLS

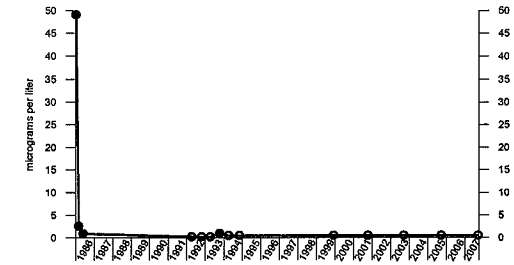
Trichloroethene
AZNGD-1



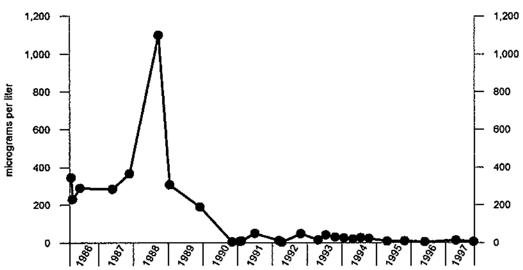
Trichloroethene
AZNGD-2A



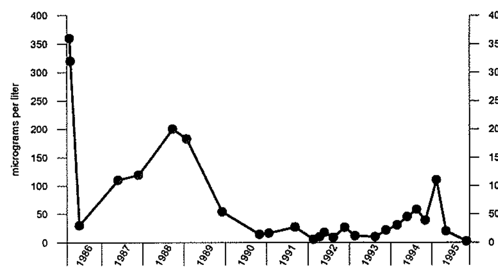
Trichloroethene
AZNGD-2B



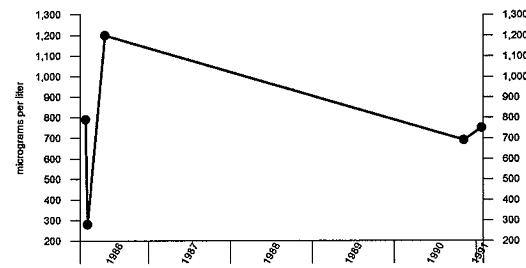
Trichloroethene
DM107



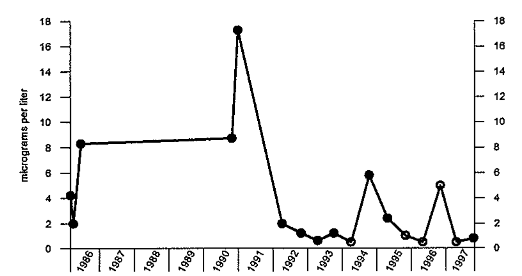
Trichloroethene
DM111



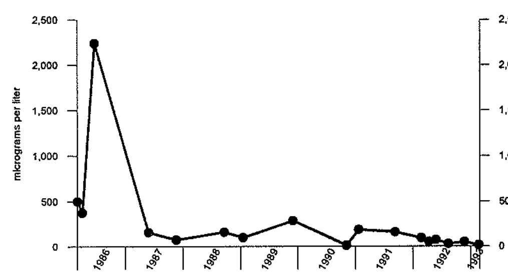
Trichloroethene
DM112



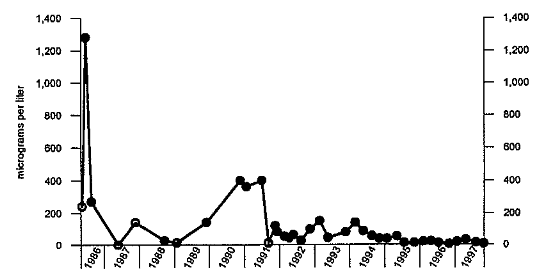
Trichloroethene
DM114



Trichloroethene
DM115



Trichloroethene
DM117



EXPLANATION

- ● - Measured Value
- o - Undetected (Displayed at RL)

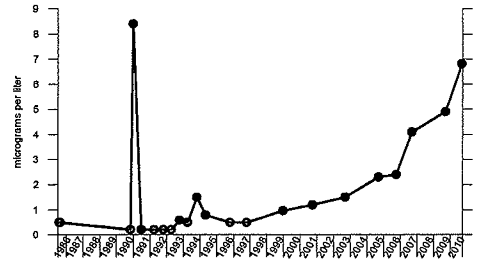
CLEAR CREEK ASSOCIATES

Project Name: 52nd Street Superfund Site

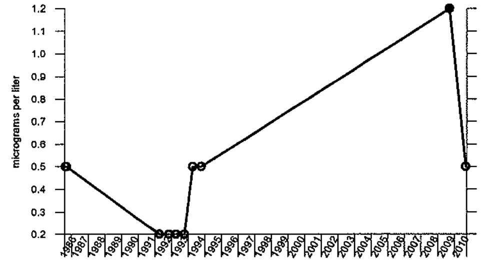
Job No: 00000-000-000 | Date: March 2011

Time-Series Graphs
Trichloroethene
52nd Street Superfund Site
Phoenix, Arizona

Trichloroethene
DM118

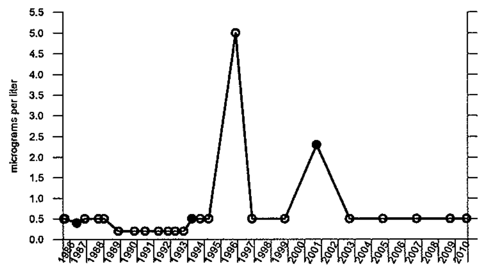


Trichloroethene
DM119-072

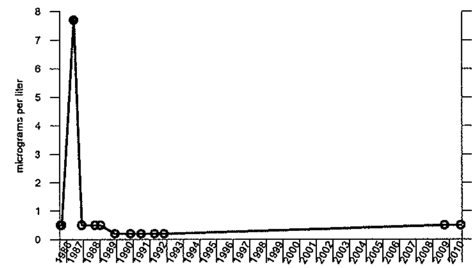


Trichloroethene
DM119-098

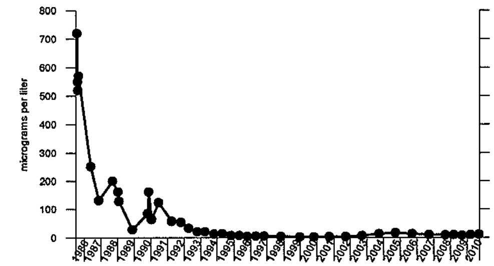
Trichloroethene
DM119-137



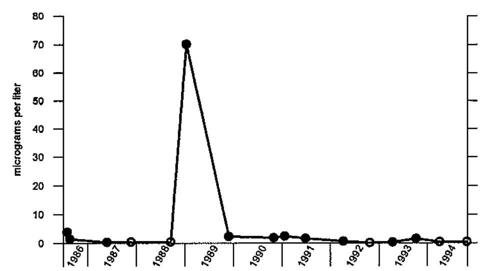
Trichloroethene
DM119-204



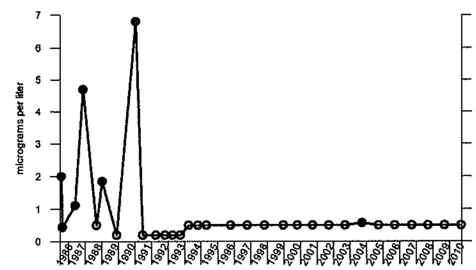
Trichloroethene
DM120



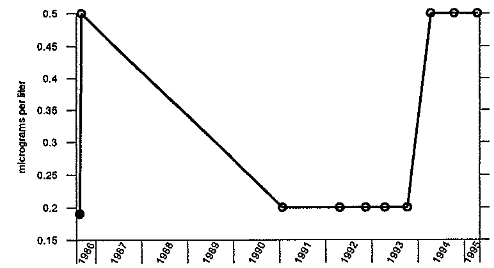
Trichloroethene
DM122-A



Trichloroethene
DM122-B



Trichloroethene
DM123-056



EXPLANATION

● - Measured Value
○ - Undetected (Displayed at RL)

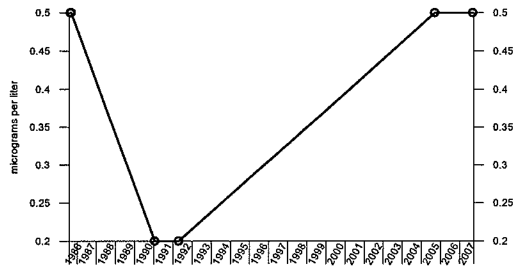
CLEAR CREEK ASSOCIATES

Project Name: 52nd Street Superfund Site

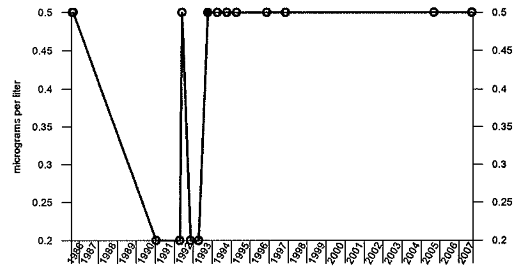
Job No: 00000-000-000 | Date: March 2011

Time-Series Graphs
Trichloroethene
52nd Street Superfund Site
Phoenix, Arizona

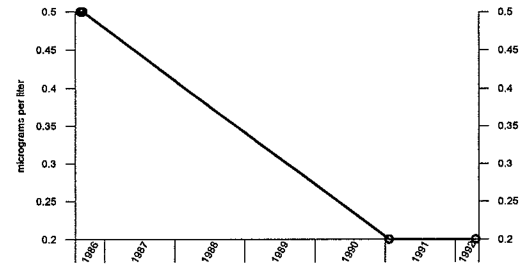
Trichloroethene
DM123-085



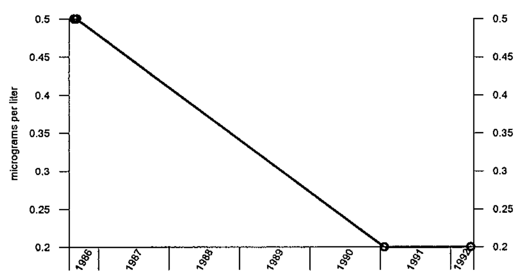
Trichloroethene
DM123-135



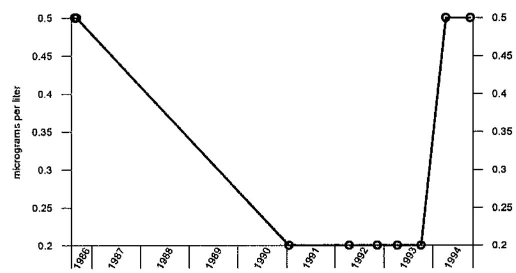
Trichloroethene
DM123-195



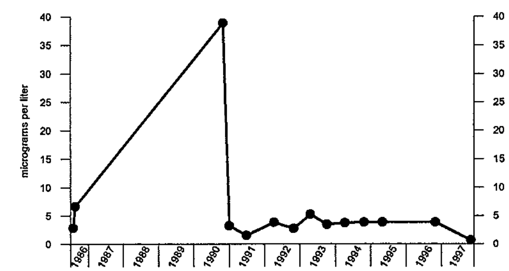
Trichloroethene
DM123-250



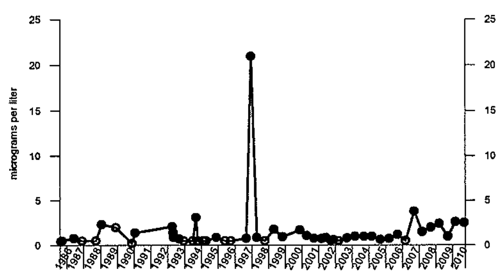
Trichloroethene
DM123-285



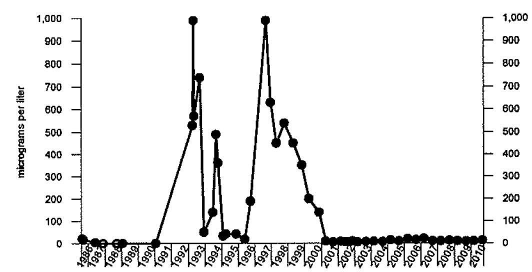
Trichloroethene
DM124



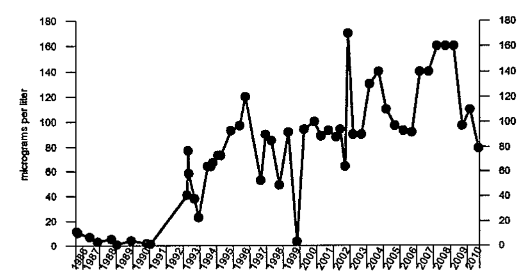
Trichloroethene
DM125-076



Trichloroethene
DM125-125



Trichloroethene
DM125-155



EXPLANATION

● - Measured Value
○ - Undetected (Displayed at RL)

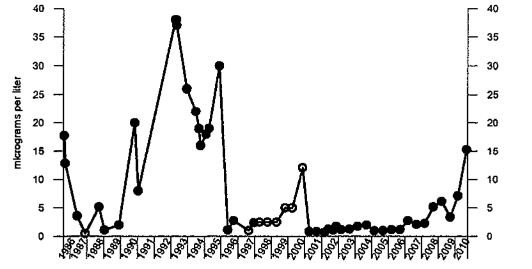
CLEAR CREEK ASSOCIATES

Project Name: 52nd Street Superfund Site

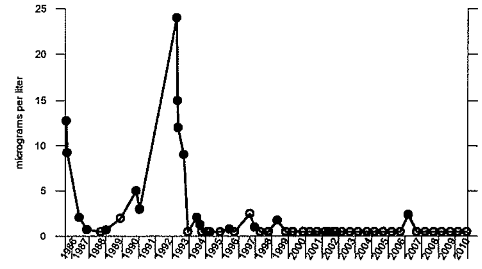
Job No: 00000-000-000 | Date: March 2011

Time-Series Graphs
Trichloroethene
52nd Street Superfund Site
Phoenix, Arizona

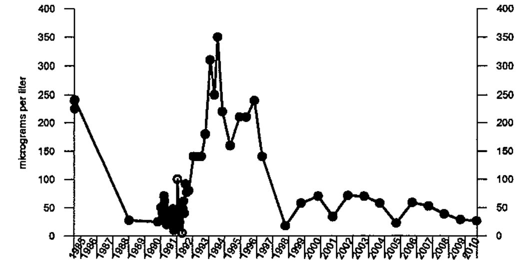
Trichloroethene
DM125-185



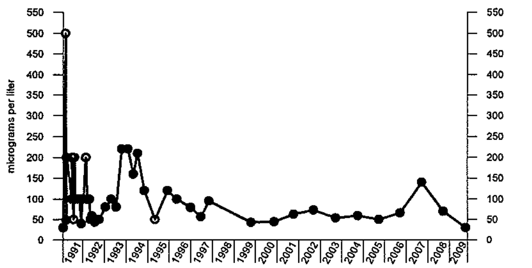
Trichloroethene
DM125-270



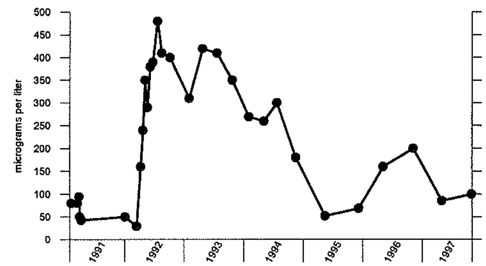
Trichloroethene
DM201



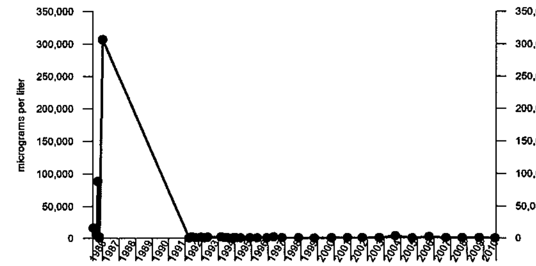
Trichloroethene
DM201-OB1



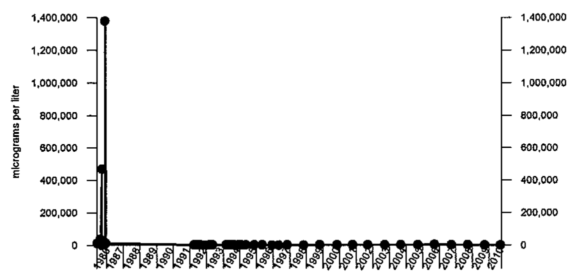
Trichloroethene
DM201-OB2



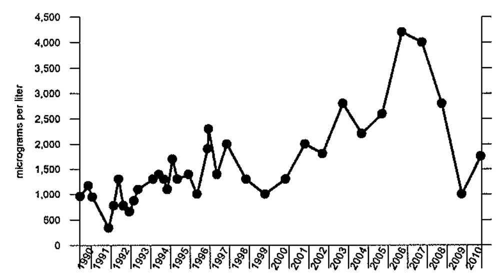
Trichloroethene
DM301



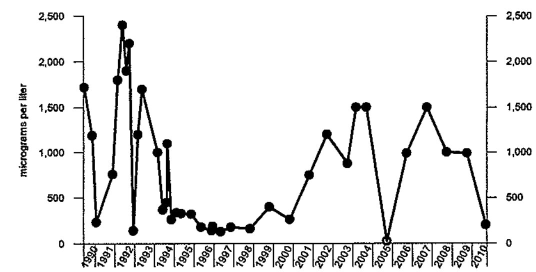
Trichloroethene
DM302



Trichloroethene
DM303



Trichloroethene
DM304



EXPLANATION

- ● - Measured Value
- ○ - Undetected (Displayed at RL)

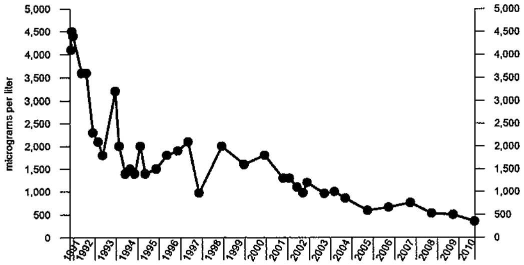
CLEAR CREEK ASSOCIATES

Project Name: 52nd Street Superfund Site

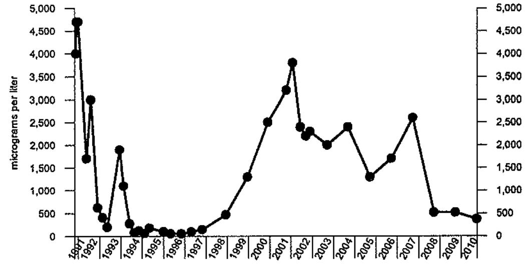
Job No: 00000-000-000 | Date: March 2011

Time-Series Graphs
Trichloroethene
52nd Street Superfund Site
Phoenix, Arizona

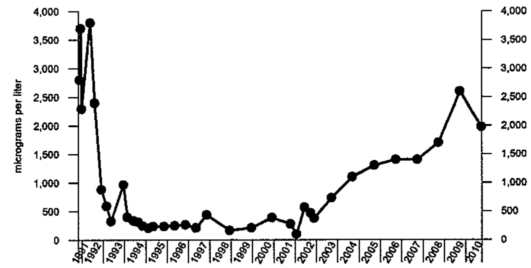
Trichloroethene
DM305



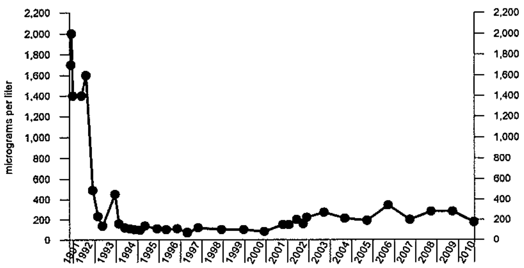
Trichloroethene
DM306



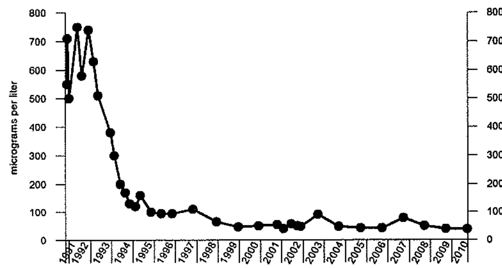
Trichloroethene
DM307



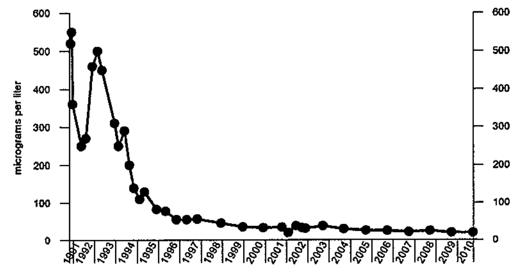
Trichloroethene
DM308



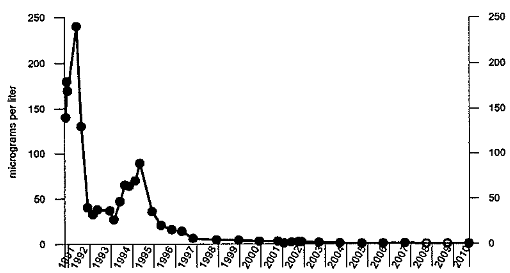
Trichloroethene
DM309



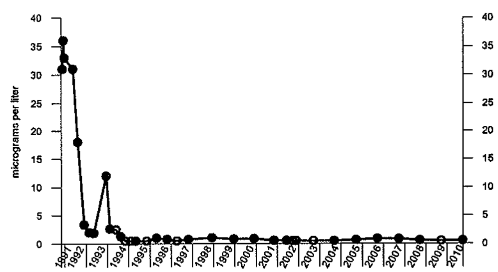
Trichloroethene
DM310



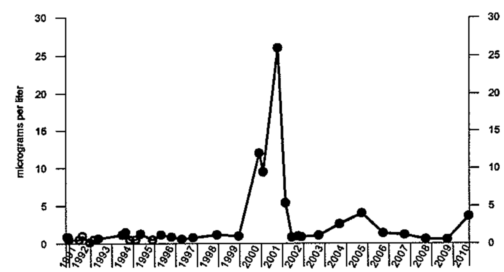
Trichloroethene
DM311



Trichloroethene
DM312



Trichloroethene
DM313



EXPLANATION

- ● - Measured Value
- ○ - Undetected (Displayed at RL)

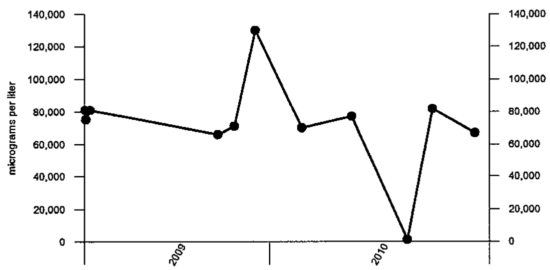
CLEAR CREEK ASSOCIATES

Project Name: 52nd Street Superfund Site

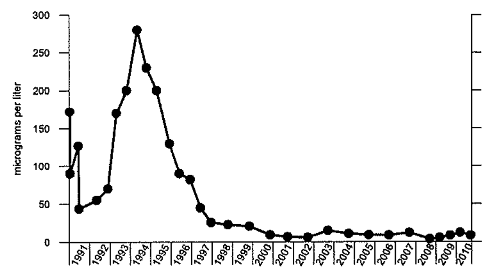
Job No: 00000-000-000	Date: March 2011

Time-Series Graphs
Trichloroethene
52nd Street Superfund Site
Phoenix, Arizona

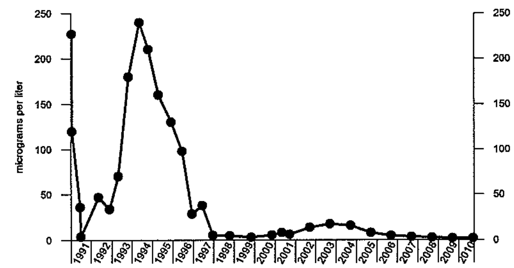
Trichloroethene
DM314



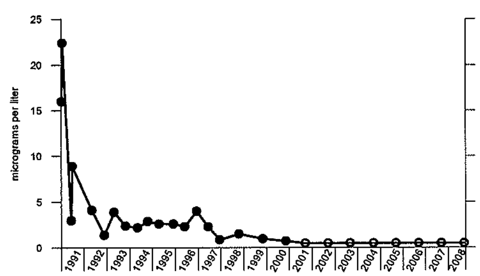
Trichloroethene
DM502-079



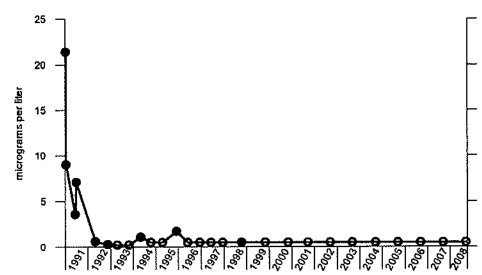
Trichloroethene
DM502-119



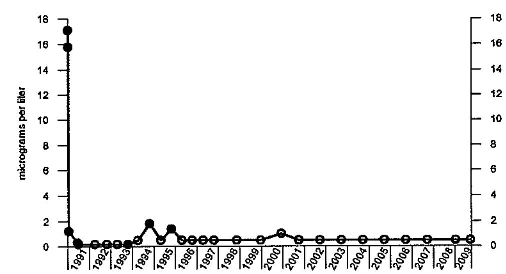
Trichloroethene
DM502-240



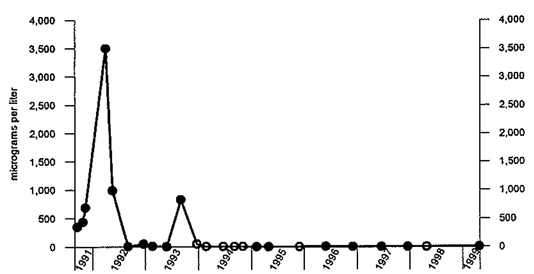
Trichloroethene
DM502-335



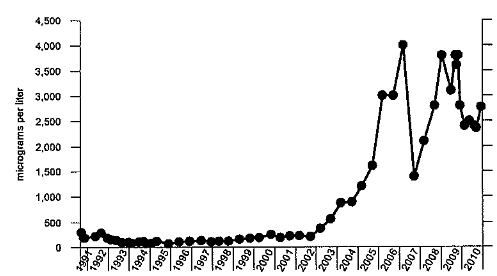
Trichloroethene
DM503



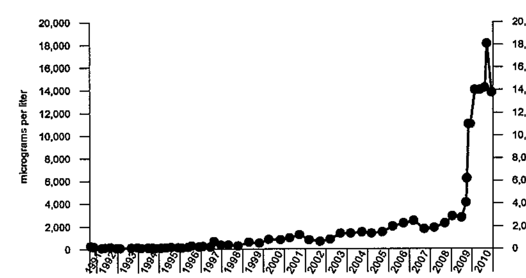
Trichloroethene
DM601-040



Trichloroethene
DM601-085



Trichloroethene
DM601-135



EXPLANATION

- ● - Measured Value
- ○ - Undetected (Displayed at RL)

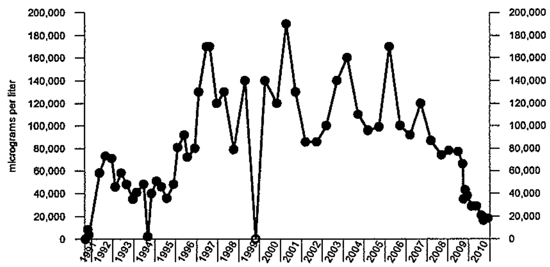
CLEAR CREEK ASSOCIATES

Project Name: 52nd Street Superfund Site

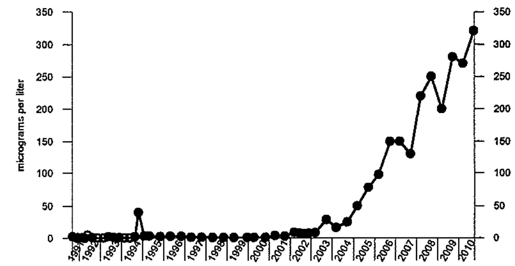
Job No: 00000-000-000 | Date: March 2011

Time-Series Graphs
Trichloroethene
52nd Street Superfund Site
Phoenix, Arizona

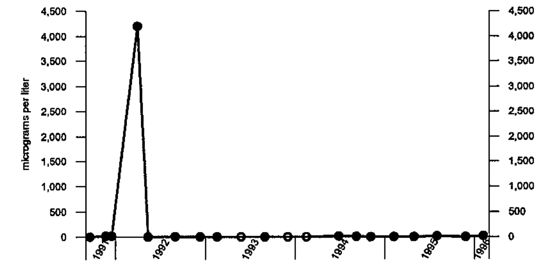
Trichloroethene
DM601-200



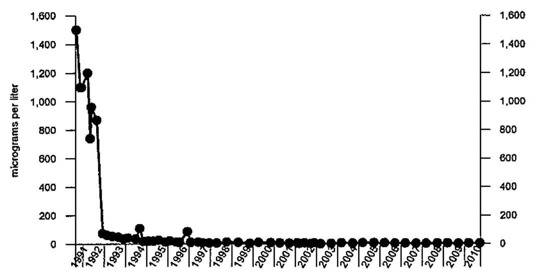
Trichloroethene
DM602



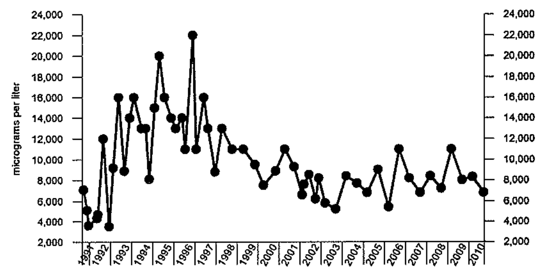
Trichloroethene
DM603-068



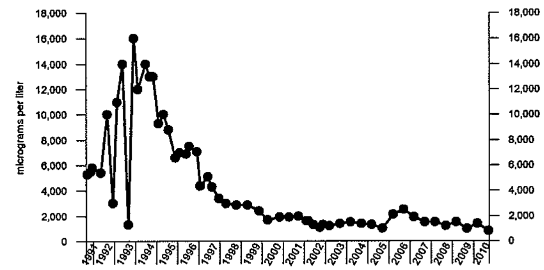
Trichloroethene
DM603-115



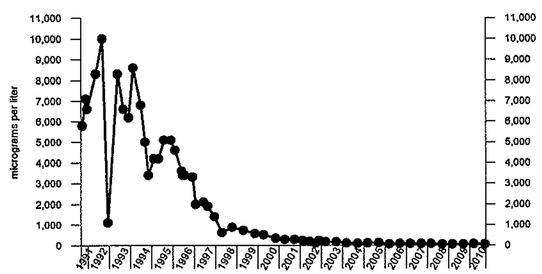
Trichloroethene
DM603-170



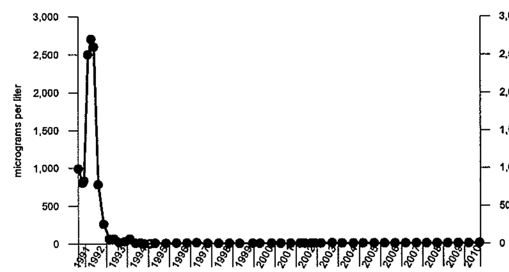
Trichloroethene
DM603-205



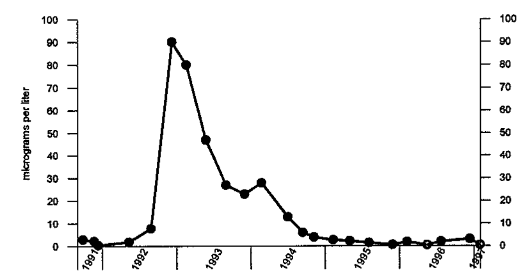
Trichloroethene
DM603-245



Trichloroethene
DM604



Trichloroethene
DM605-066



EXPLANATION

● - Measured Value
○ - Undetected (Displayed at RL)

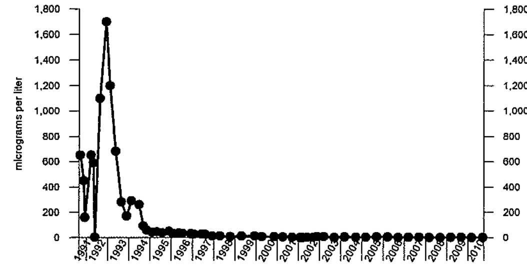
CLEAR CREEK ASSOCIATES

Project Name: 52nd Street Superfund Site

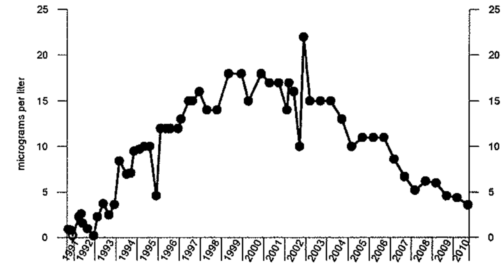
Job No: 00000-000-000 | Date: March 2011

Time-Series Graphs
Trichloroethene
52nd Street Superfund Site
Phoenix, Arizona

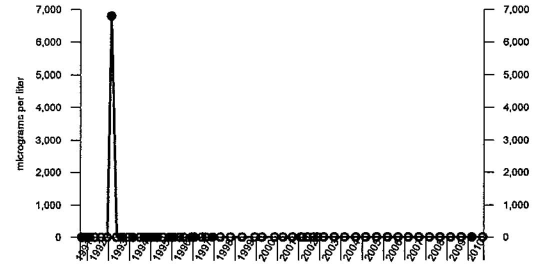
Trichloroethene
DM605-105



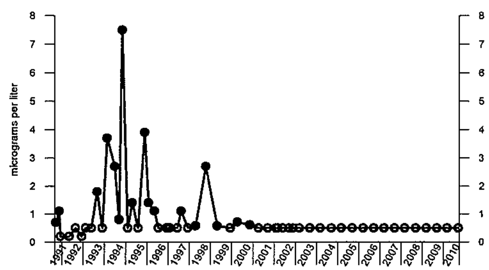
Trichloroethene
DM605-170



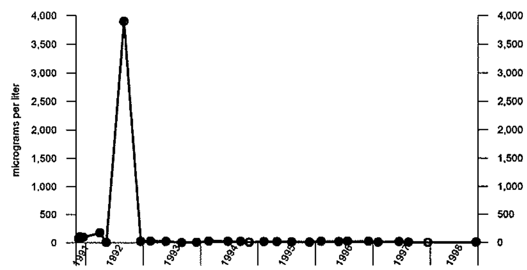
Trichloroethene
DM605-240



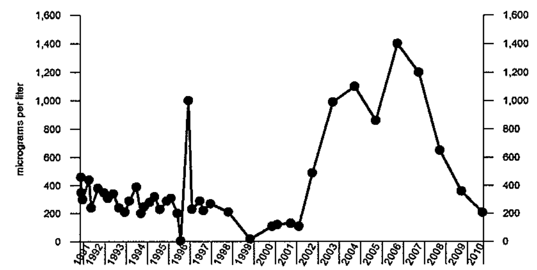
Trichloroethene
DM605-290



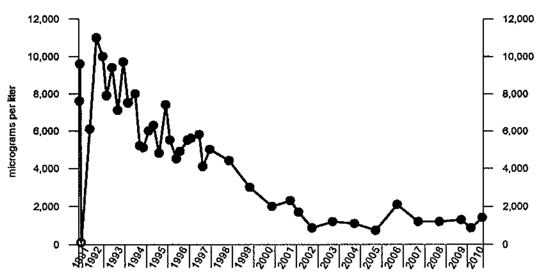
Trichloroethene
DM606-045



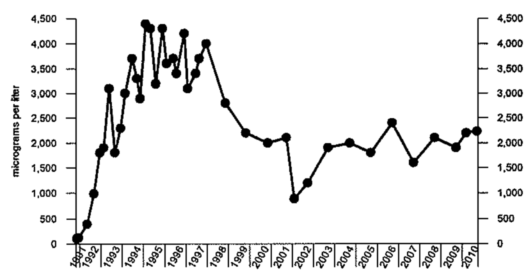
Trichloroethene
DM606-102



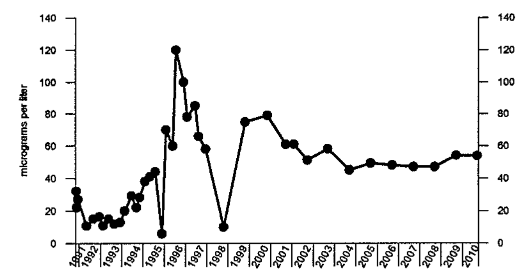
Trichloroethene
DM606-185



Trichloroethene
DM606-250



Trichloroethene
DM606-330



EXPLANATION

- ● - Measured Value
- ○ - Undetected (Displayed at RL)

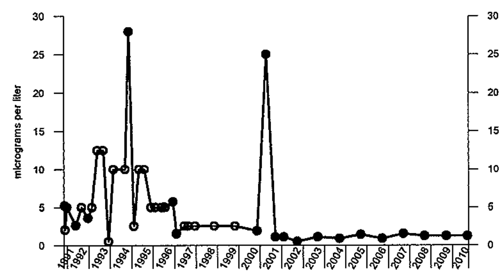
CLEAR CREEK ASSOCIATES

Project Name: 52nd Street Superfund Site

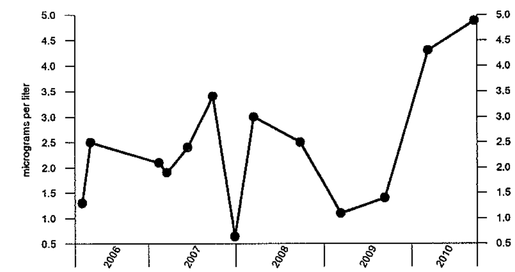
Job No: 00000-000-000 | Date: March 2011

Time-Series Graphs
Trichloroethene
52nd Street Superfund Site
Phoenix, Arizona

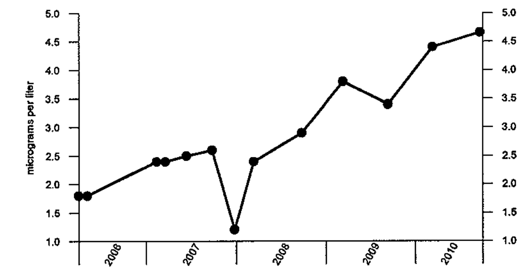
Trichloroethene
DM606-370



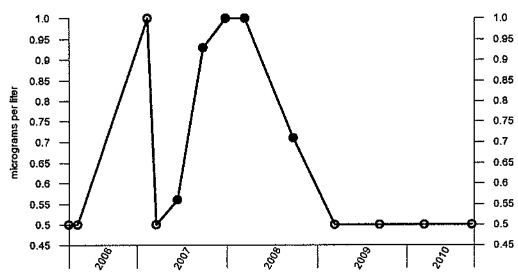
Trichloroethene
DM607-146



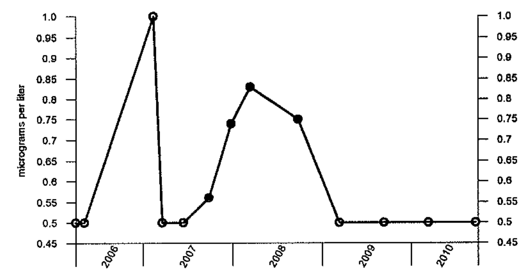
Trichloroethene
DM607-210



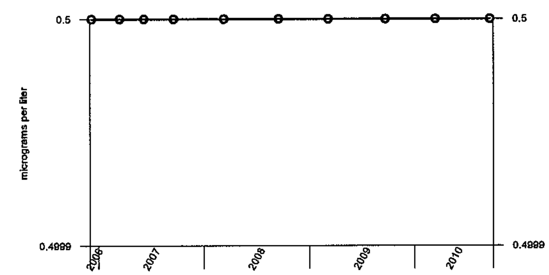
Trichloroethene
DM607-310



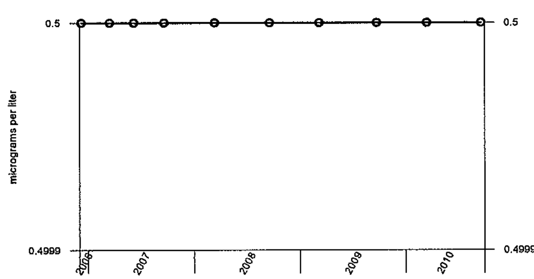
Trichloroethene
DM607-400



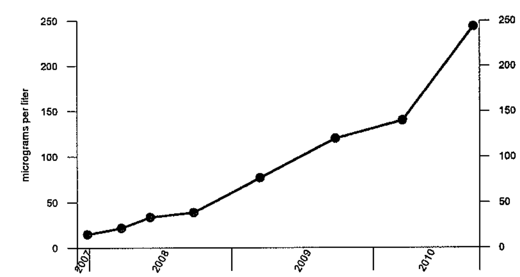
Trichloroethene
DM609



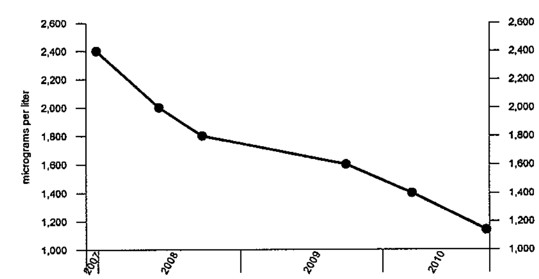
Trichloroethene
DM610



Trichloroethene
DM611



Trichloroethene
DM612



EXPLANATION

● - Measured Value
○ - Undetected (Displayed at RL)

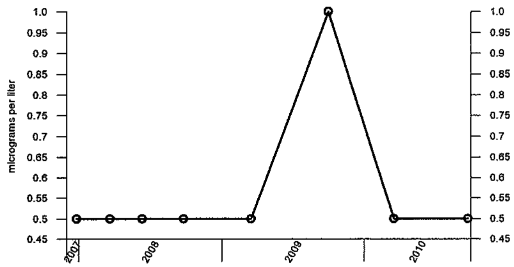
CLEAR CREEK ASSOCIATES

Project Name: 52nd Street Superfund Site

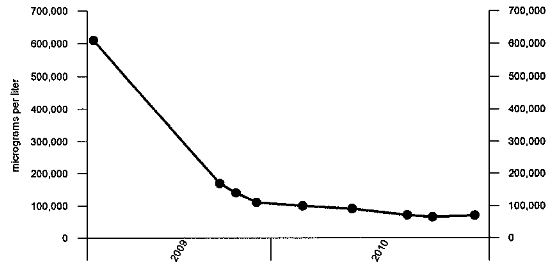
Job No: 00000-000-000 | Date: March 2011

Time-Series Graphs
Trichloroethene
52nd Street Superfund Site
Phoenix, Arizona

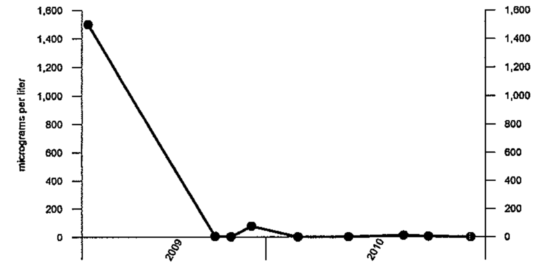
Trichloroethene
DM613



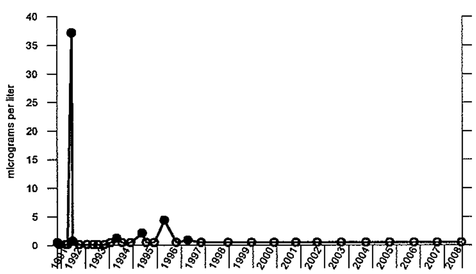
Trichloroethene
DM614



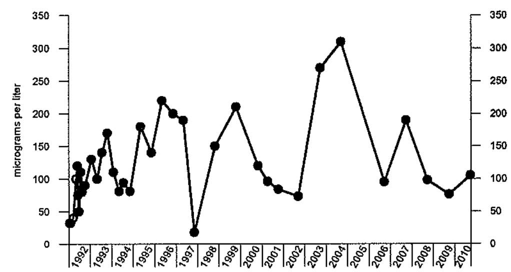
Trichloroethene
DM615



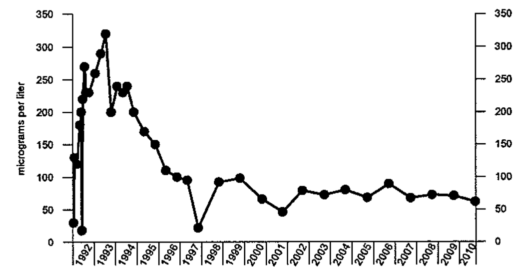
Trichloroethene
DM701



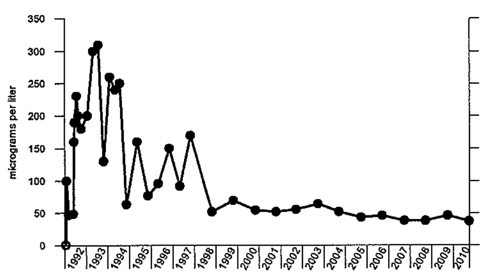
Trichloroethene
DM702



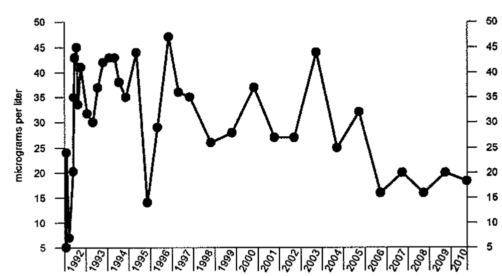
Trichloroethene
DM703



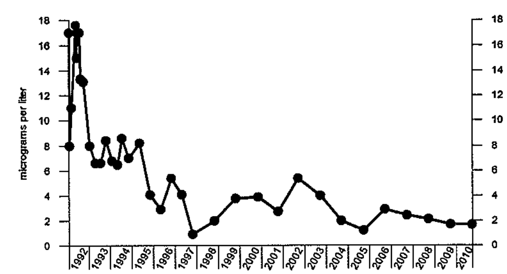
Trichloroethene
DM704



Trichloroethene
DM705



Trichloroethene
DM706



EXPLANATION

- ● - Measured Value
- ○ - Undetected (Displayed at RL)

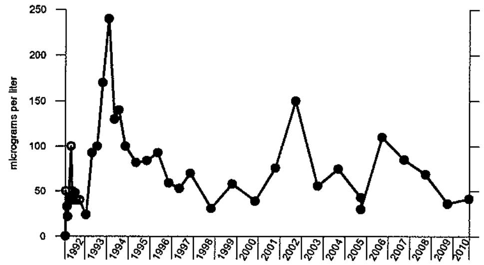
CLEAR CREEK ASSOCIATES

Project Name: 52nd Street Superfund Site

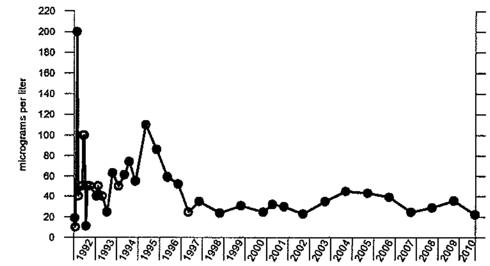
Job No: 00000-000-000	Date: March 2011

Time-Series Graphs
Trichloroethene
52nd Street Superfund Site
Phoenix, Arizona

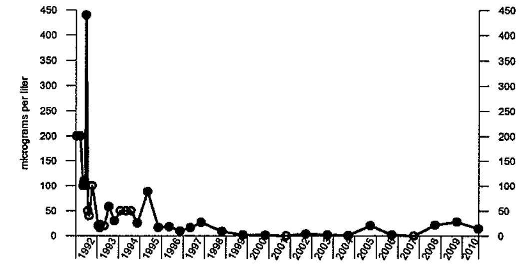
Trichloroethene
DM707



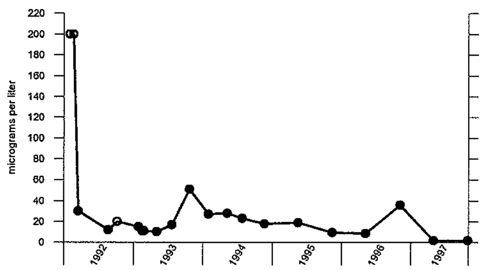
Trichloroethene
DM713



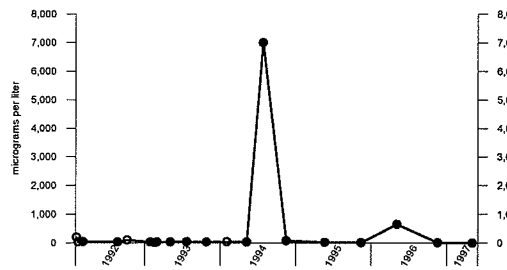
Trichloroethene
DM714



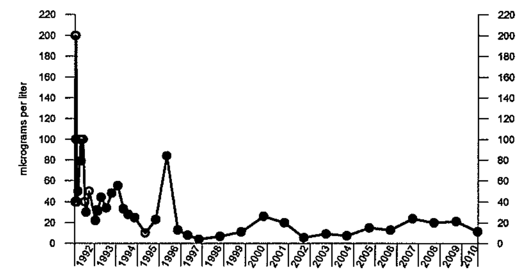
Trichloroethene
DM715



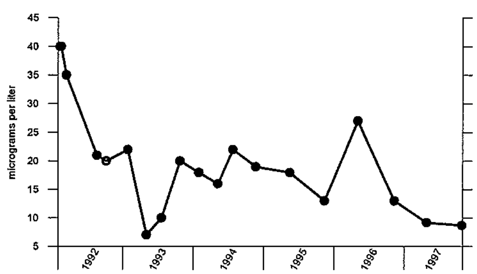
Trichloroethene
DM716



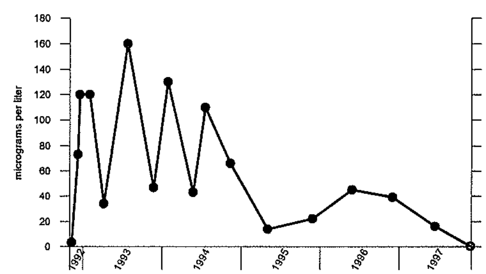
Trichloroethene
DM718



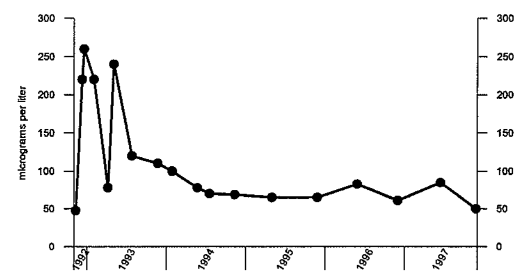
Trichloroethene
DM720



Trichloroethene
DM722-047



Trichloroethene
DM722-100



EXPLANATION

● - Measured Value
○ - Undetected (Displayed at RL)

CLEAR CREEK ASSOCIATES

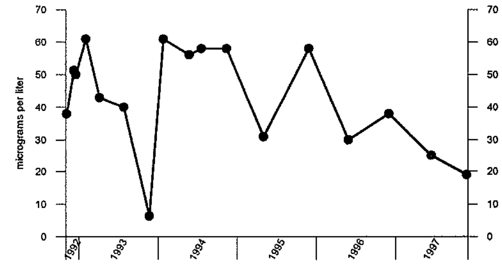
Project Name: 52nd Street Superfund Site

Job No: 00000-000-000 | Date: March 2011

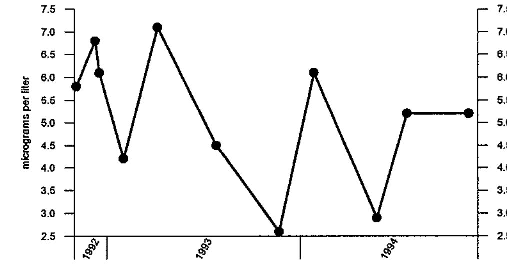
Time-Series Graphs Trichloroethene 52nd Street Superfund Site Phoenix, Arizona

Trichloroethene
DM722-145

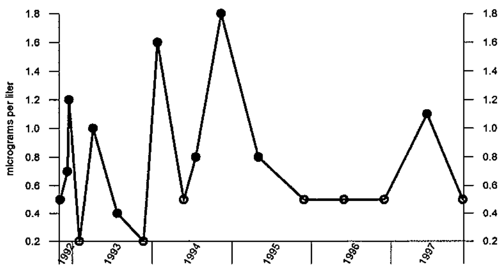
Trichloroethene
DM722-190



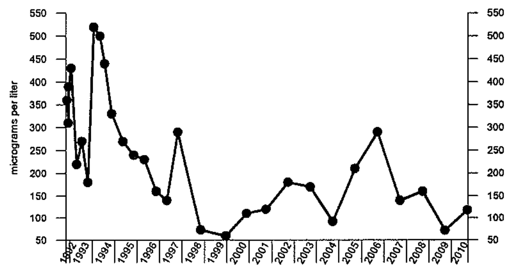
Trichloroethene
DM722-240



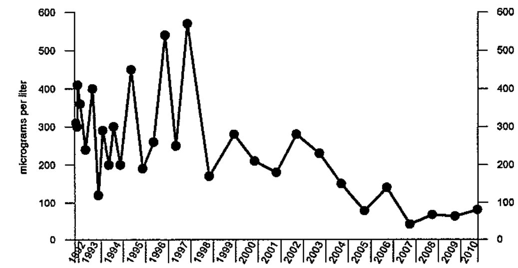
Trichloroethene
DM722-280



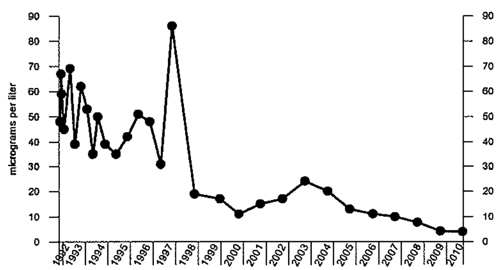
Trichloroethene
DM723



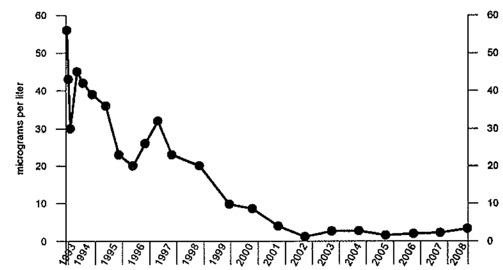
Trichloroethene
DM724



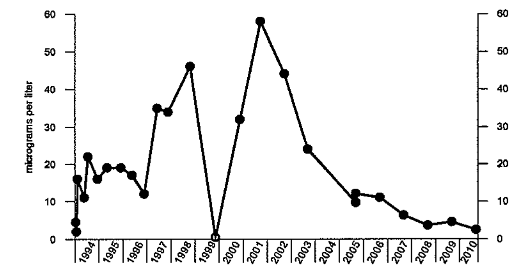
Trichloroethene
DM726



Trichloroethene
DM728



Trichloroethene
DM729-050



EXPLANATION

- ● - Measured Value
- ○ - Undetected (Displayed at RL)

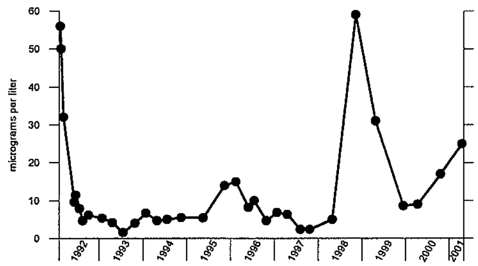
CLEAR CREEK ASSOCIATES

Project Name: 52nd Street Superfund Site

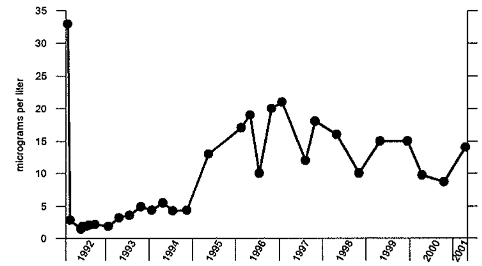
Job No: 00000-000-000 | Date: March 2011

Time-Series Graphs
Trichloroethene
52nd Street Superfund Site
Phoenix, Arizona

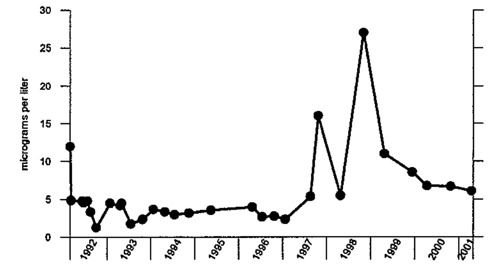
Trichloroethene
DM730



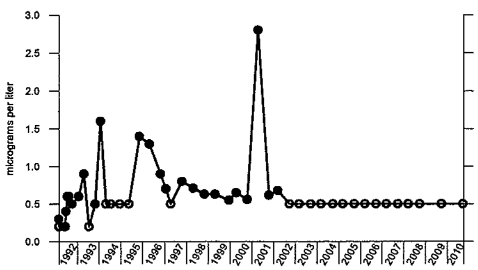
Trichloroethene
DM731



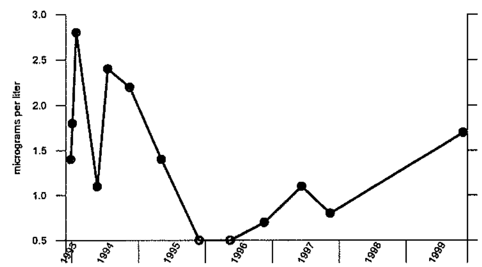
Trichloroethene
DM732



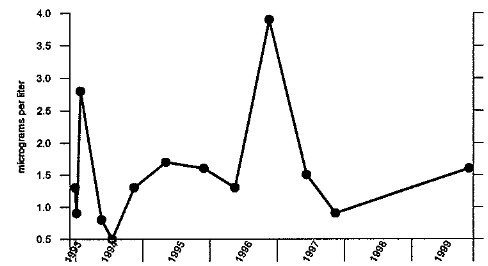
Trichloroethene
DM733



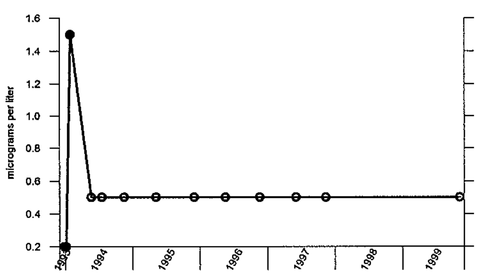
Trichloroethene
DM734-045



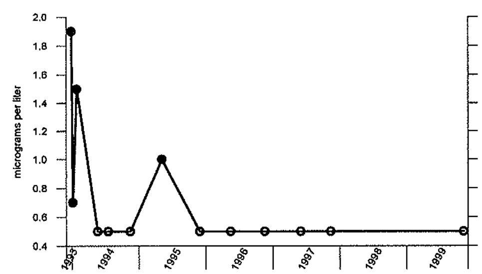
Trichloroethene
DM734-110



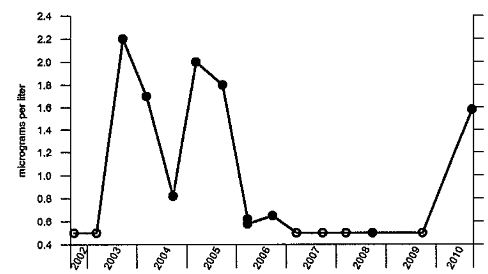
Trichloroethene
DM734-200



Trichloroethene
DM734-280



Trichloroethene
DM735



EXPLANATION

- ● - Measured Value
- ○ - Undetected (Displayed at RL)

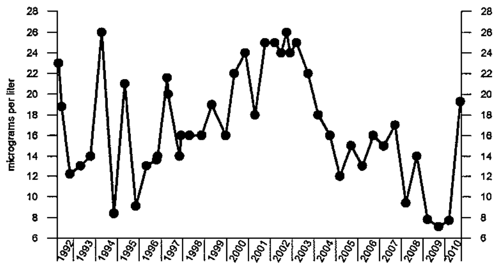
CLEAR CREEK ASSOCIATES

Project Name: 52nd Street Superfund Site

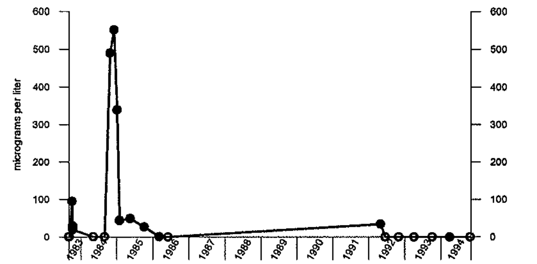
Job No: 00000-000-000 | Date: March 2011

Time-Series Graphs
Trichloroethene
52nd Street Superfund Site
Phoenix, Arizona

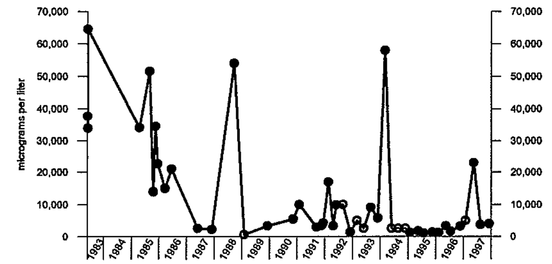
Trichloroethene
EW18



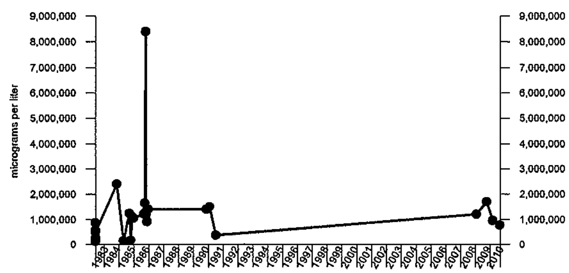
Trichloroethene
LANGMADE



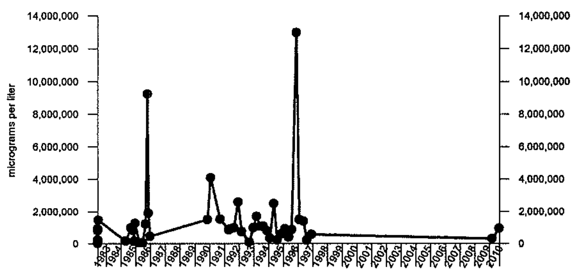
Trichloroethene
MP03-B



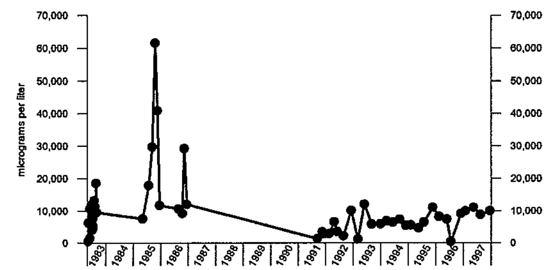
Trichloroethene
MP03-C



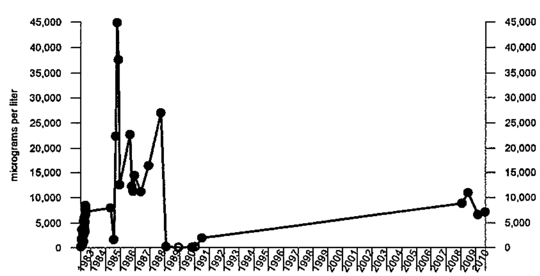
Trichloroethene
MP03-D



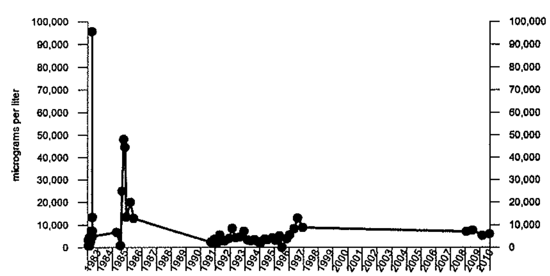
Trichloroethene
MP09-B



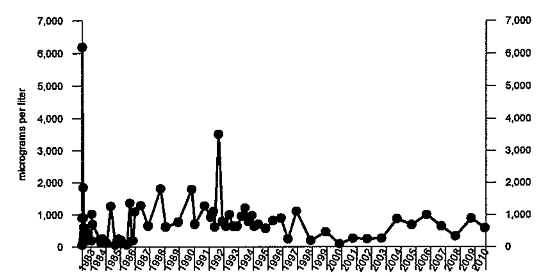
Trichloroethene
MP09-C



Trichloroethene
MP09-D



Trichloroethene
MP11-B



EXPLANATION

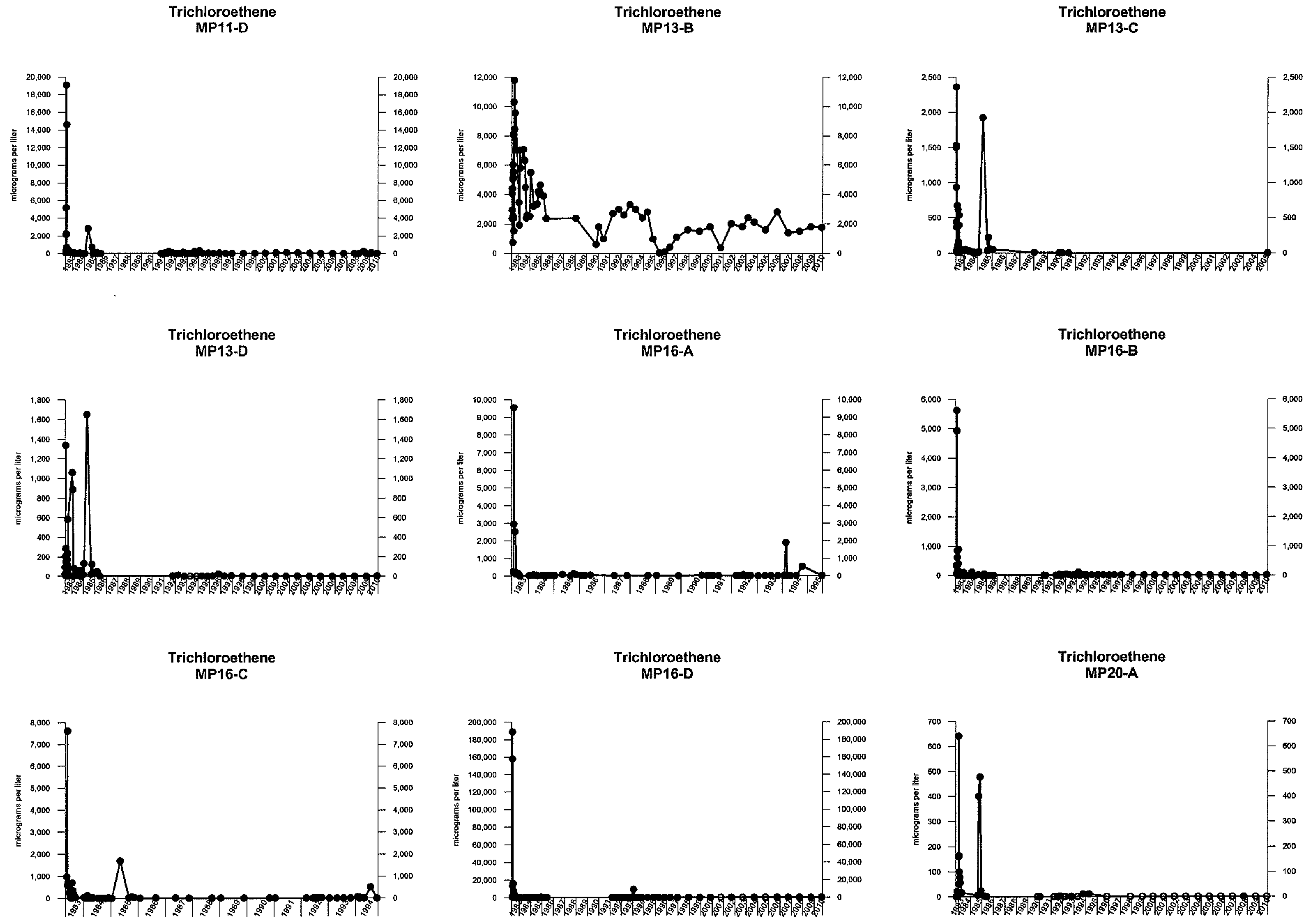
- ● - Measured Value
- ○ - Undetected (Displayed at RL)

CLEAR CREEK ASSOCIATES

Project Name: 52nd Street Superfund Site

Job No: 00000-000-000 | Date: March 2011

Time-Series Graphs
Trichloroethene
52nd Street Superfund Site
Phoenix, Arizona



EXPLANATION

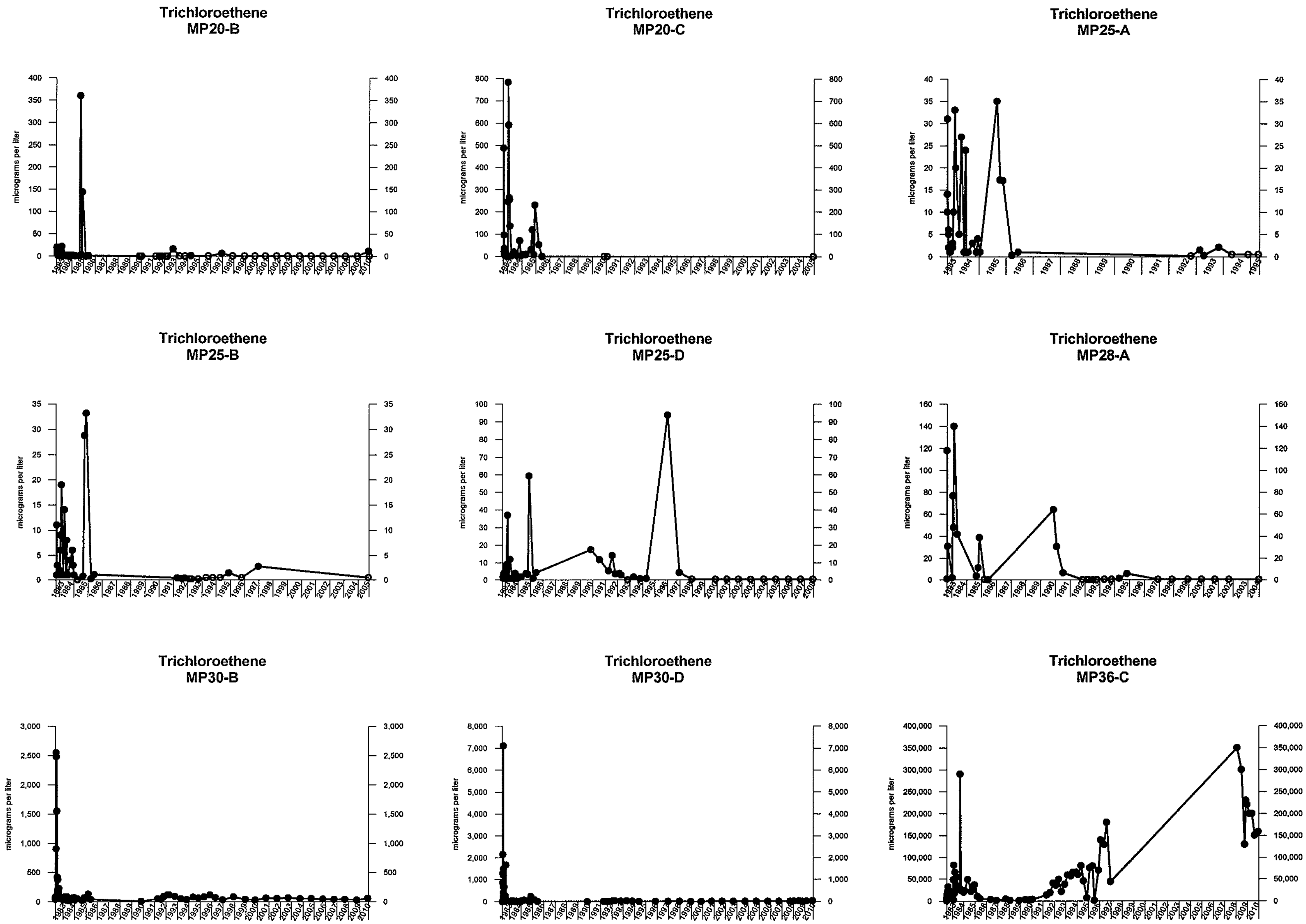
- ● - Measured Value
- ○ - Undetected (Displayed at RL)

CLEAR CREEK ASSOCIATES

Project Name: 52nd Street Superfund Site

Job No: 00000-000-000 | Date: March 2011

Time-Series Graphs Trichloroethene 52nd Street Superfund Site Phoenix, Arizona



EXPLANATION

- ● - Measured Value
- ○ - Undetected (Displayed at RL)

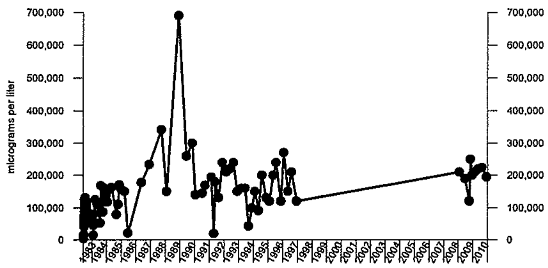
CLEAR CREEK ASSOCIATES

Project Name: 52nd Street Superfund Site

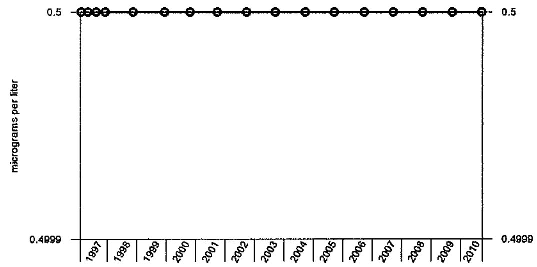
Job No: 00000-000-000 | Date: March 2011

Time-Series Graphs
Trichloroethene
52nd Street Superfund Site
Phoenix, Arizona

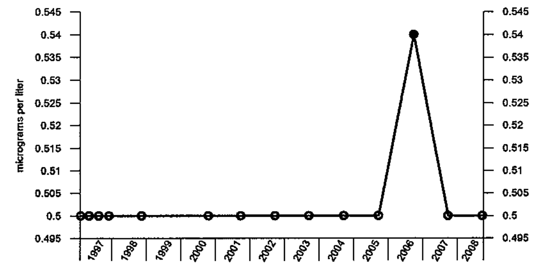
Trichloroethene
MP36-D



Trichloroethene
WT-K



Trichloroethene
WT-L



EXPLANATION

- ● - Measured Value
- o - Undetected (Displayed at RL)

CLEAR CREEK ASSOCIATES

Project Name: 52nd Street Superfund Site

Job No: 00000-000-000 | Date: March 2011

Time-Series Graphs
Trichloroethene
52nd Street Superfund Site
Phoenix, Arizona