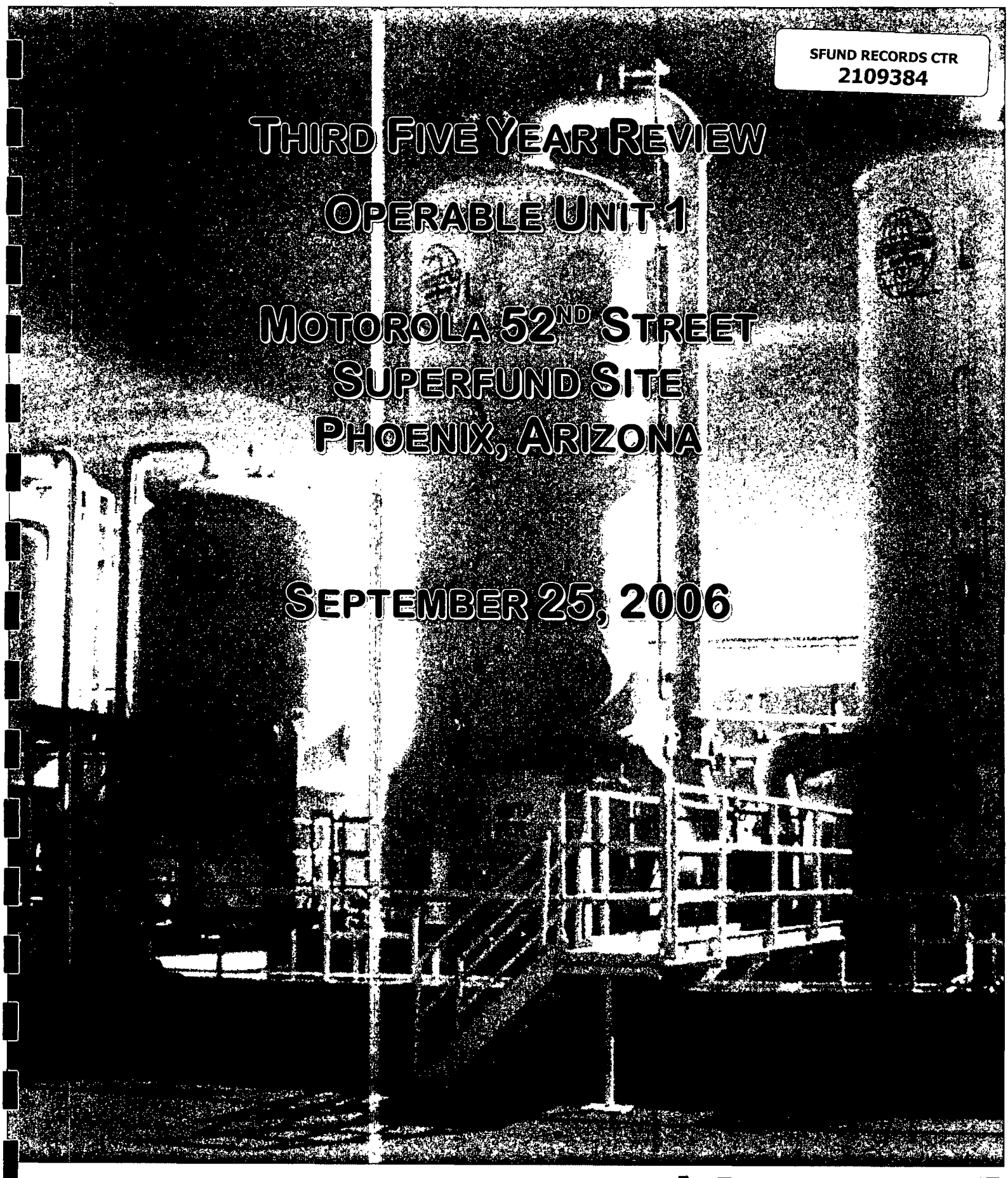
THIRD FIVE YEAR REVIEW

OPERABLE UNIT 1

MOTOROLA 52ND STREET SUPERFUND SITE

PHOENIX, ARIZONA

SEPTEMBER 25, 2006



LFR

ADEQ
Arizona Department
of Environmental Quality

REPORT PREPARATION, CERTIFICATIONS, AND APPROVALS

Report Title: Third Five-Year Review Report for Operable Unit 1, Motorola 52nd Street Superfund Site, Phoenix, Arizona

Report Date: September 25, 2006

Prepared by: Arizona Department of Environmental Quality and LFR Inc.

Kris Paschall, Remedial Project Manager
Arizona Department of Environmental Quality

9/25/06
Date

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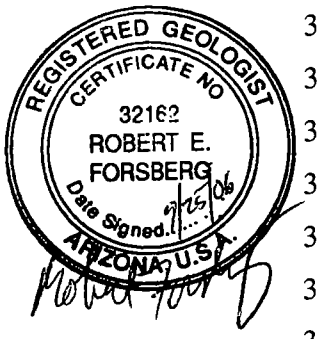
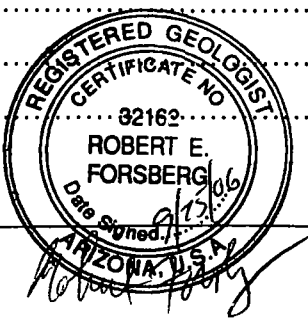


REGISTERED GEOLOGIST CERTIFICATE NO. 32162 ROBERT E. FORSBERG Date Signed 9/23/04 ARIZONA, U.S.A.



TABLES

FIGURES

APPENDICES

ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
µg/kg	micrograms per kilogram
µg/l	micrograms per liter
A.A.C.	Arizona Administrative Code
ADEQ	Arizona Department of Environmental Quality
ADHS	Arizona Department of Health Services
ADWR	Arizona Department of Water Resources
ARAR	Applicable or Relevant and Appropriate Requirements
A R.S.	Arizona Revised Statutes
AS	air sparging
ASRAC	Arizona Superfund Response Action Contract
AST	aboveground storage tank
ATP	Acid Treatment Plant
ATSDR	Agency for Toxic Substance and Disease Registry
AWQS	Aquifer Water Quality Standard
bgs	below ground surface
CAG	Community Advisory Group
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CIP	Community Involvement Plan
cis-1,2-DCE	cis-1,2-dichloroethylene or cis-1,2-dichloroethene
CO	Consent Order
COC	contaminant of concern
COP	City of Phoenix
COS	City of Scottsdale
1,2-DCB	1,2-dichlorobenzene
1,1-DCA	1,1-dichloroethane
1,1-DCE	1-dichloroethene
DNAPL	dense non-aqueous phase liquid
DO	dissolved oxygen
EPA	U.S. Environmental Protection Agency
ERA	Early Response Action
Freescale	Freescale Semiconductor, Inc.
FS	Feasibility Study
FSP	Field Sampling Plan
ft/day	feet per day
ft/ft	foot per foot
GAC	granular activated carbon
gpd/ft^2	gallons per day per square foot
GPI	Gutierrez-Palmenberg, Inc.
GPL	Groundwater Protection Limit
gpm	gallons per minute

HASP	Health and Safety Plan
IGWTP	Integrated Groundwater Treatment Plant
K_{OC}	organic carbon partition coefficient
lbs/day	pounds per day
LFR	LFR Inc.
LOD	Letter of Determination
MCL	maximum contaminant level
MDL	method detection limit
MEK	methyl ethyl ketone
mg/kg	milligrams per kilogram
mg/l	milligrams per liter
ml	milliliters
Motorola	Motorola Inc.
MRL	method reporting limit
msl	mean sea level
MTBE	methyl tertiary-butyl ether
NAAQS	National Ambient Air Quality Standards
NCP	National Contingency Plan
NFA	no further action
NIOSH	National Institute of Occupational Health and Safety
NPL	National Priority List
OSHA	Occupational Safety and Health Administration
OSWER	Office of Solid Waste and Emergency Response
OU1	Operable Unit 1
OU2	Operable Unit 2
OU3	Operable Unit 3
PA	Preliminary Assessment
PCE	tetrachloroethylene or tetrachloroethene
PID	photoionization detector
ppb	parts per billion
ppm	parts per million
ppmv	parts per million by volume
PQGWWP	Poor Quality Groundwater Withdrawal Permit
PRP	Potentially Responsible Party
PSC	Preliminary Site Characterization
psi	pounds per square inch
PTP	Pilot Treatment Plant
PVC	polyvinyl chloride
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
RAO	Remedial Action Objective
RAP	Remedial Action Plan
RCRA	Resource Conservation and Recovery Act
redox	oxidation-reduction
RI	Remedial Investigation
ROD	Record of Decision

RSRL	Residential Soil Remediation Level
SARA	Superfund Amendments and Reauthorization Act of 1986
scfm	standard cubic feet per minute
SI	*Site Inspection*
SRL	Soil Remediation Level
SRP	Salt River Project
SVE	soil vapor extraction
SVETS	Soil Vapor Extraction and Treatment System
SVM	soil vapor monitoring
SWPL	Southwest Parking Lot
TAG	Technical Assistance Grant
TBC	To Be Considered
TCA	1,1,1-trichloroethane
TCE	trichloroethylene or trichloroethene
TCLP	Toxicity Characteristic Leaching Procedure
TCZ	Target Capture Zone
TOC	total organic carbon
trans-1,2-DCE	trans-1,2-dichloroethylene or trans-1,2-dichloroethene
UST	underground storage tank
VOC	volatile organic compound
WQARF	Water Quality Assurance Revolving Fund

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EXECUTIVE SUMMARY

The Third Five-Year Review for the Motorola 52nd Street Superfund Site, Operable Unit 1 (OU1), located in Phoenix, Arizona was conducted by LFR Inc. (LFR) on behalf of Arizona Department of Environmental Quality (ADEQ). The second Five-Year Review for Operable Unit 2 (OU2) is being conducted concurrently by ADEQ and LFR.

ADEQ is the lead agency for OU1 and is required to conduct this five-year review pursuant to Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) §121 and the National Contingency Plan (NCP) Together, these regulations require that the remedial actions resulting in any hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure be reviewed every five years to assure protection of human health and the environment. Since hazardous substances, pollutants, or contaminants are left on site above levels that allow for unlimited use and unrestricted exposure, this review is required for OU1. The purpose of this five-year review is to determine whether OU1 continues to meet remedial action objectives and is protective of human health and the environment.

The five-year review consisted of the following activities: (1) review of relevant documents (Appendix A); (2) interviews with appropriate operations staff, state and federal agencies, local government officials, and concerned community members; and (3) a site inspection.

The assessment identified several issues in the review of the OU1 treatment system. Based on a conservative interpretation of the data, using converging lines of evidence, it appears that the target capture zone (TCZ) in bedrock and to the north is questionable. ADEQ is also concerned that the source area interim remedy is not significantly effective in reducing the levels of contaminants due to the dense non-aqueous phase liquid (DNAPL) in the fractured bedrock and that high concentrations of trichloroethene (TCE) will continue in the source area wells for a long period of time. In addition, groundwater concentrations in the shallow bedrock ports of DM-125 and DM-601 appear to be increasing suggesting that the on-site groundwater extraction system may not be reducing or eliminating contaminant migration from the source area.

Several data gaps need to be filled in order to fully evaluate the OU1 capture effectiveness. As the OU1 Area conditions continue to change, additional groundwater elevation and quality data are needed to adequately evaluate the OU1 interim remedy. The monitoring network needs to be evaluated and updated based on current site conditions and issues.

A review of applicable or relevant and appropriate requirements (ARARs) determined that there are no newly promulgated standards; however, new ARARs and To Be Considereds (TBCs) are likely to be determined for the final remedy.

A protectiveness determination of the OU1 interim remedy cannot be made at this time until further information is obtained. The necessary follow-up actions and recommendations identified in this Report are needed to evaluate protectiveness. The actions will require the efforts of Freescale and ADEQ to be completed. It is expected that these actions will take approximately 1 year to complete, at which time a protectiveness determination will be made.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION

Site Name: Motorola 52nd Street		
EPA ID: AZD009004177		
Region: 9	**State:** Arizona	**City/County:** Phoenix/Maricopa

SITE STATUS

NPL Status: ■ Final ☐ Deleted ☐ Other (specify)_____

Remediation Status: (choose all that apply) ■ Under Construction ■ Operating ☐ Complete

Multiple OUs? ■ Yes ☐ No **Construction Completion Date:** Interim Remedy

Has site been put into reuse? ■ Yes ☐ No (Site was never out of use)

REVIEW STATUS

Reviewing Agency: ☐EPA ■ State ☐ Tribe ☐ Other_____

Author Name: Robert Forsberg c/o LFR, Inc

Author Title: Senior Hydrogeologist	**Author Affiliation:** ADEQ Consultant

Review Period: September 2001 to July 2006

Date(s) of Site Inspection: June 8 and 9, 2006

Type of Review: ■ Statutory
☐ Policy ☐ Post-SARA ☐ Pre-SARA ☐ NPL-Removal Only
☐ Non-NPL Remedial Action Site ☐ NPL State/Tribe-Lead
☐ Regional Discretion

Review Number: ☐ First ☐ Second ■ Third ☐ Other_____

Triggering Action:

☐ Actual RA Onsite Construction at OU ☐ Actual RA Start at OU

☐ Construction Completion ■ Previous Five-Year Review Report

☐ Other (Specify)_____

Triggering Action Date:	September 28, 2001
Due Date (*five years after triggering action date*):	September 28, 2006

FIVE-YEAR REVIEW SUMMARY FORM

DEFICIENCIES/ISSUES AND NOTED CONCERNS

Groundwater Issues

1 Capture and containment can only be confirmed with an adequate monitor well network that provides both groundwater level data to demonstrate hydraulic capture and groundwater quality data to demonstrate overall reduction of mass within and outside the capture zone(s) Additional groundwater elevation and quality data are needed to adequately evaluate the OU1 system The monitoring network needs to be evaluated and updated based on current site conditions and issues

2. Based on a conservative interpretation of the data, using converging lines of evidence, it appears that capture of the TCZ in bedrock is uncertain Additional bedrock monitor wells are needed to address the uncertainty of capture in bedrock both downgradient of the on-site system (DM-125, DM-601, and DM-606 areas) and the OCC system (between OCC and DM-118, DM-119, DM-120, DM-122, DM-123, DM-502, and DM503 area) Freescale has installed one multiport bedrock well, however, an increased monitor well network is needed to support the assessment of capture in bedrock

3 Based on a conservative interpretation of the data, using converging lines of evidence, it appears the TCZ in the vicinity of EW-18 is questionable Additional alluvial and bedrock monitor wells are needed in the vicinity of EW-18 to address the extent of contamination and evaluate capture of the TCZ

4 Extraction primarily from the alluvial aquifer is credited for hydraulic capture at substantial depth in the bedrock aquifer ADEQ is concerned that declining groundwater elevations at the site due to both regional decline and OU1 pumping will reduce the effectiveness of bedrock capture As yield from the alluvial aquifer decreases, resulting changes in the predicted vertical capture needs to be addressed The potential finite capacity of the system to capture bedrock contamination as the regional aquifer continues to decline represents a potential remedy problem

5 Concentrations in extraction well DM-313 are currently very close to the MCL for TCE Concentrations in this well have been increasing slightly over the last three years If concentrations continue to increase and exceed the MCL, this well must be put back into operation

6 ADEQ is concerned that the source area interim remedy is not significantly effective in reducing the levels of contaminants due to the DNAPL in the fractured bedrock ADEQ is concerned that high concentrations of TCE will continue in the source area wells for a long period of time

7 Groundwater concentrations in the shallow bedrock ports of DM-125 and DM-601 appear to be increasing These data indicate that the onsite groundwater extraction system may not be reducing or eliminating contaminant migration from the source area

Soil Issues

8 Confirmatory soil sampling should be conducted at the Courtyard to obtain closure Soil sampling should be conducted once the Arizona Soil Rule and guidance has been finalized

9 The CO required that an SVE system be installed at the ATP No active soil remediation has been conducted in the ATP area to date Soil sampling should be conducted at the ATP to obtain closure once the Arizona Soil Rule and guidance has been finalized

Health Assessment Issues

10 Changes to the toxicity levels for certain contaminants have occurred since the last five-year review

11 New methodology is being developed for indoor air risk evaluation Once the methodology is finalized or EPA and ADEQ can agree to the process for evaluating the pathway, an indoor air risk evaluation should be performed for the OU1 area

12 The Baseline Risk Assessment and Health Assessments recommended to sample Mr Morgan's well Access may be an issue for sampling this well A plan should be developed regarding this well

13 There is a potential for unregistered, private wells to exist in the OU1 Area

Operations and Maintenance Issues

14 The secondary containment system's protective coating showed signs of weathering (eg , cracking, peeling, lifting)

15 All PVC piping, valves, and other appurtenances showed signs of ultraviolet light weathering (eg , brittle appearance)

16 The stainless steel steam pressure tanks were stress corroded and cracked

17 Most steel appurtenances showed signs of rusting and/or corrosion

FIVE-YEAR REVIEW SUMMARY FORM

General Issues

18 The COCs should be identified for the final remedy

19 Air emissions and influent/effluent analytical data are an important tool for evaluating the effectiveness of the treatment system and should be reported in the annual Effectiveness Reports

20 Additional upgradient sources to groundwater contamination may exist

CORRECTIVE ACTIONS AND RECOMMENDATIONS

Groundwater Issues Corrective Actions

1, 2, and 3 A work plan should be prepared and submitted to ADEQ to address the OU1 data gaps identified in Section 8 1 1. The work plan should include a summary of the current conceptual site model, a review of the existing OU1 groundwater monitoring well network and other available data, identify the data gaps, and propose the work necessary to fill the data gaps

4 A work plan should be prepared and submitted to ADEQ to address the bedrock hydraulic conductivity and extraction issues The work plan should include the installation of a deep bedrock extraction and monitor wells such that a bedrock extraction pilot study may be completed to evaluate bedrock hydraulic conductivity The results of the study should be incorporated into the feasibility study for the final remedy

5 Freescale should prepare a plan to monitor the concentrations in DM-313 If these concentrations continue to increase and exceed the MCL, the well should be put back into operation

6 Freescale submitted a Groundwater Remedial Alternatives Analysis report in September 2005 followed by an Addendum to the Groundwater Remedial Alternatives Analysis report in December 2005 evaluating treatment technologies for DNAPL The report is currently under review by ADEQ

7 Freescale should prepare a plan to evaluate the effectiveness of the source area treatment system

Soil Issues Corrective Actions

8 Freescale should develop a work plan to evaluate the vadose zone at the Courtyard area The work plan should include evaluation criteria for clean-up ADEQ will provide Freescale with the evaluation criteria once the Soil Rule and guidance is finalized

9 A work plan should also be developed for obtaining closure at the ATP The closure criteria will be established once the Soil Rule and guidance is finalized and should be included in the work plan

Health Assessment Issues Corrective Actions

10 A review of the toxicity values for COCs at the Site should be conducted before the final remedy is selected

11 Freescale has previously prepared a work plan to address the vapor intrusion to indoor air pathway Once the guidance for evaluating the vapor intrusion to indoor air pathway is finalized or EPA and ADEQ can agree to the process for evaluating the pathway, an indoor air risk evaluation should be conducted at the Site The work plan should be updated to meet the final guidance requirements

12 ADEQ and Freescale should develop a plan to collect groundwater samples from Mr Morgan's well and take further actions if necessary

13 ADEQ will include a note in the next fact sheet requesting land owners to notify ADEQ of any private well

Operations and Maintenance Issues Corrective Actions

14 The IGWTP secondary containment system's protective coating should be repaired

15 The PVC piping, valves, and other appurtenances that show signs of weathering should be replaced

16 The stainless steel steam pressure tanks should be replaced if they are brought back into use

17 Steel appurtenances that show signs of rusting and/or corrosion should be replaced

General Issues Corrective Actions

18 ADEQ and Freescale should establish a list of COCs for the Site Once the list has been established, Freescale should conduct a sampling round to evaluate the COC list for the RAOs for the final remedy

19 Freescale needs to include the air emission and groundwater influent/effluent analytical data in the annual Effectiveness Reports.

20 ADEQ will conduct a PRP search for upgradient sources and will evaluate whether these sources will impact the remedy

FIVE-YEAR REVIEW SUMMARY FORM

PROTECTIVENESS STATEMENT

A protectiveness determination of the OU1 interim remedy cannot be made at this time until further information is obtained The necessary follow-up actions and recommendations identified in this report are needed to evaluate protectiveness The actions will require the efforts of Freescale and ADEQ to be completed It is expected that these actions will take approximately 1 year to complete at which time a protectiveness determination will be made

1.0 INTRODUCTION

LFR Inc. (LFR) has prepared the Third Five-Year Review Report for Operable Unit 1 (OU1) at the Motorola 52nd Street Superfund Site in Phoenix, Arizona on behalf of the Arizona Department of Environmental Quality (ADEQ). The second Five-Year Review for Operable Unit 2 is being conducted concurrently. The work was performed under Arizona Superfund Response Action Contract (ASRAC) EV03-0073 and Task Assignment 04-0071 dated September 29, 2005. The review period was from September 30, 2001 through July 2006.

The purpose of the five year review is to determine whether OU1 meets remedial action objectives and is protective of human health and the environment. The methods, findings, and conclusions of the review are documented in this Report.

As the lead agency, ADEQ is required to conduct this five year review pursuant to Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) §121 and the National Contingency Plan (NCP). Together, these regulations require that the remedial actions resulting in any hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure be reviewed every five years to assure protection of human health and the environment. Since hazardous substances, pollutants, or contaminants remain above levels that allow for unlimited use and unrestricted exposure at OU1, this review is required for OU1.

This review was prepared according to Office of Solid Waste and Emergency Response (OSWER) Directive 9355.7-03B-P, Comprehensive Five-Year Review Guidance, June 2001.

OU1 has been evaluated, monitored, and remediated since 1983 by Motorola Inc. (Motorola) and by Freescale Semiconductor, Inc. (Freescale) on behalf of Motorola. In December 2004, Motorola spun off its semiconductor sector to form a new independent company (Freescale) who has agreed to continue remedial actions at OU1 and OU2. For the purpose of continuity, Freescale will be used to refer to both Motorola and Freescale throughout the Five-Year Review Report.

2.0 SITE CHRONOLOGY

A chronology of OU1 events is included in Table 1.

3.0 BACKGROUND INFORMATION

3.1 Site Location Information

The OU1 Area is part of the Motorola 52nd Street Superfund Site. The Motorola 52nd Street Superfund Site consists of three operable units: OU1, OU2, and Operable Unit 3 (OU3) (Figure 1). The Motorola 52nd Street Facility (formerly owned/operated by Motorola and currently owned/operated by ON Semiconductor) is located on the southwest corner of the intersection of 52nd Street and McDowell Road in the eastern part of Phoenix, Arizona. OU1 is defined by the contaminant plume to the north (Palm Lane) and south (Roosevelt Street) and by the zone of hydraulic capture to the west (46th Street). The property occupies approximately 90 acres and contains more than 20 buildings on-site. Major geographic features include: the Papago Buttes about one mile east of the Facility, the Salt River one mile south of the Facility, the Old Crosscut Canal located along 46th Street, and the Grand Canal located through the area west of 40th Street and Van Buren Street. The Phoenix Sky Harbor Airport is located approximately 1.5 miles southwest of the Facility. Figure 2 is a site plan of the Facility that shows the locations and names of the primary features and monitor wells. The following paragraphs provide a brief summary of the site activities associated with OU1 at the Motorola 52nd Street Superfund Site.

3.2 Land and Resource Use

The surrounding area is comprised of a mixture of residential, commercial, and industrial uses. The City of Phoenix provides drinking water to residents and does not currently use groundwater within the OU1 Area as a source of water.

3.3 Site History and OU1 Information

The following sections provide a summary of the main site activities associated with OU1. The majority of the site information was obtained from the review of key documents associated with OU1. The list of key documents is included in Appendix A. Table 1 provides a brief summary of the chronological history of OU1.

3.3.1 Site Discovery

The Motorola 52nd Street Facility commenced manufacturing operations in 1956. In November of 1982, Freescale discovered a discrepancy in the inventory for trichloroethane (TCA) in a 5,000 gallon underground storage tank (UST) located in the Courtyard Area (Figure 2). The UST was tested and determined to be leaking. The Arizona Department of Health Services (ADHS; ADHS was the precursor to ADEQ) was notified and a preliminary investigation of soil and groundwater contamination was initiated. Freescale discontinued the use of the tank and began to order solvents in 55-gallon drums.

3.3.2 Preliminary Investigation

In December 1983, a preliminary investigation report entitled "Preliminary Report - Chemical Leak Project," (Preliminary Report) was submitted to ADEQ that verified vadose zone contamination sources at the site and a groundwater contamination plume migrating west of the Facility. As part of the preliminary investigation, on-site and off-site monitoring wells were installed and sampled from February 1983 through November 1983. At many of these locations, multiple port wells (or Westbay™ Wells) were installed to allow sampling at different depths. In addition, private wells downgradient from the site were also surveyed and sampled.

The Preliminary Report identified twenty five combined possible sources of contamination in the Courtyard, Acid Treatment Plant (ATP), and Southwest Parking Lot (SWPL) areas. These sources included surface discharges, spills, tank and pipe leaks, and discharges to leach fields and dry wells. The principle source of contamination was determined to be the leaking TCA UST and a former dry well, both located in the Courtyard. This dry well was used for solvent disposal from 1963-1974 (prior to environmental regulations) and was abandoned in 1983. It was originally estimated that approximately 93,000 gallons of TCE was disposed to the dry well. The results of sampling on-site and off-site monitoring wells and private wells showed that volatile organic compounds (VOCs) were present at significant levels in the groundwater. The Report identified the following chemicals of concern (COCs): TCE, TCA, tetrachloroethene (PCE), 1,1-dichloroethene (1,1-DCE), trans 1,2-dichloroethene (trans-1,2- DCE), and cis-1,2-dichloroethene (cis-1,2-DCE).

3.3.3 Remedial Investigation/Feasibility Study

As a result of the preliminary investigation, a Remedial Investigation/Feasibility Study (RI/FS) was initiated and a task force was formed to monitor the progress of the RI/FS that included representatives of the U.S. Environmental Protection Agency (EPA), ADHS, the City of Phoenix (COP), the City of Scottsdale (COS), the Salt River Project (SRP), and Freescale. In addition, a Technical Subcommittee was also organized to provide review and guidance for the implementation of the RI/FS. This subcommittee included representatives of ADHS, Arizona Department of Water Resources (ADWR), EPA, SRP, Freescale, and Dames & Moore (Freescale's Consultant).

The RI/FS was conducted from October 1984 to January 1987. The purpose of the RI was to characterize potential sources of contamination, evaluate the physical environment in which contamination occurred, and identify potential pathways of exposure. The purpose of the FS was to evaluate different remedial alternatives that would address the on-site contaminated soil and the on-site and off-site contaminated groundwater. During the implementation of the RI/FS, several interim, or topical, draft reports were generated. Many of these reports included preliminary results from a particular aspect of the investigation. Other documents submitted included task specifications which described how a particular phase of the investigation would be completed.

The major RI activities performed during the period from October 1984 to January 1987 were as follows:

- Part of the RI activities involved installation of monitoring wells to further characterize horizontal and vertical hydrogeologic and water quality conditions on and off-site. Well installation activities commenced in November 1984 and continued through August 1986. The locations of these wells are shown in Figure 2.
- In November 1984 and February/March 1985, soil-gas investigations were conducted at the Site.
- Source verification investigations (Stage 1) were performed from October 1985 to February 1986. The distribution of the 18 sources was comprised of 3 sources in the SWPL area, 3 sources in the ATP area, and 12 sources in the Courtyard area.
- In September and October 1986, a well survey was conducted to identify existing monitoring wells, public supply wells, and private wells in an area downgradient from the Site. The area surveyed was bounded by Oak Street to the north, Washington Street to the south, 52nd Street to the east, and 24th Street to the west.

The chronology of the major FS activities performed during the period of October 1984 to January 1987 are as follows:

- During May 1986, Freescale voluntarily initiated an on-site groundwater treatment program. Two groundwater extraction wells, DM-301 and DM-302, were installed in the Courtyard area (Figure 4) to supply contaminated groundwater to the Pilot Treatment Plant (PTP). DM-301 was drilled next to existing well MP-3. MP-3 exhibited the highest concentrations of TCE, TCA, and other VOCs and contained dense nonaqueous phase liquid (DNAPL). Well DM-302 was installed in the Courtyard near the dry well, the major source of the VOC contamination.
- On August 8, 1986, the results of the preliminary screening of remedial action technologies and/or alternatives were submitted to ADEQ as a draft report. The preliminary screening process identified five technologies to be screened for detailed evaluation. These technologies included: (1) groundwater extraction and barriers; (2) water and soil treatment; (3) in situ processes; (4) waste containment and removal; and (5) water supply and drainage control. The preliminary screening of technologies was separated into "on-site source control" and "off-site management of migration". The following four alternatives (3 on-site and 1 off-site) were advanced to the detailed final alternatives evaluation:

    - on-site Source Control Alternatives: groundwater extraction in the alluvium and treatment; groundwater extraction in bedrock and treatment; and in situ soil vapor extraction; and

- off-site Management of Migration: groundwater extraction from the alluvium and bedrock and treatment of the water.

Other FS activities performed after the screening process included: a detailed cost estimate of the design and installation of each alternative; conduct a risk assessment to evaluate exposure pathways and to collect toxicological data on contaminants; a detailed capital and operations and maintenance cost estimate; and model simulations of remedial alternatives.

- On September 4, 1986, a work plan to implement the groundwater PTP was issued.
- The PTP was operated from September 15, 1986 until the time the Integrated Groundwater Treatment Plant (IGWTP) was put online (See Section 3.3.6 and 3.3.8).

3.3.4 Remedial Investigation Report

In June 1987, the results of the RI performed at OU1 were presented in a draft report and issued for public review and comment. The purpose of the RI Report is to summarize the results of source characterization and site investigation. The following conclusions reached in the RI Report were based on previous data collected during the preliminary investigation, field data collected during the RI activity and groundwater flow and transport modeling that was performed during the RI.

- The results of the source verification investigation showed contaminant concentrations at three source locations (Courtyard, ATP, and SWPL). At these locations, organic contaminants were found in both soil and groundwater. The dry well, located in the Courtyard, had the highest concentration of VOCs in soil and groundwater. The high levels of VOC concentrations in the saturated and unsaturated zones at the dry well and the TCA UST indicated the presence of DNAPL.
- Results of the geological studies from the RI, and more recent investigations, identified two distinct geological units. These include: (1) the unconsolidated alluvium, composed of loose sediment (i.e. - sand, clay, silt, cobbles, and boulders) and (2) the bedrock, consisting of Precambrian metarhyolite and granite as well as Tertiary volcanics and consolidated sediments. It has been demonstrated that groundwater and contaminants move between the alluvium and the bedrock. The shallow alluvium is unsaturated, and therefore, groundwater occurs only in the deeper alluvium, identified as basin fill. The alluvium varies in thickness from less than 20 feet at the Facility to over 150 feet at 40th Street. The alluvium generally becomes thicker to the west.
- Groundwater beneath the Facility lies at depths ranging from 20 to 25 feet below ground surface (bgs). Groundwater depths off-site ranged from 20 to 50 feet bgs. The saturated thickness of the alluvium varies from less than 10 feet at the Facility to more than 100 feet off-site. The hydraulic characteristics of the

alluvium and bedrock indicate that the hydraulic properties of these units vary, with the greatest change at the contact between the alluvium and bedrock. In the alluvium, hydraulic conductivity varies from about 2 feet per day (ft/day) to more than 60 (ft/day). The thickest alluvium has the highest hydraulic conductivity. The alluvial hydraulic conductivity in the vertical direction is believed to be about one-tenth as large as the hydraulic conductivity in the horizontal direction.

- 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. Hydraulic conductivity in the bedrock is strongly influenced by the presence and frequency of fractures. Measurements of hydraulic conductivity in bedrock vary from 0.001 to 2 ft/day. The alignment of an apparent erosional channel in the Courtyard parallels a probable bedrock fault.
- Soil, groundwater, and bedrock contamination have been documented on-site. TCE is the major VOC contaminant. TCA contamination is more recent and is not as extensive as TCE contamination. Groundwater contamination extends to the west and then west-southwest of the Facility and consists primarily of VOCs. The DNAPL is thought to exist primarily within the fractures of the bedrock as a free-phase DNAPL. Since the DNAPL undergoes only limited degradation, it persists for long periods of time while slowly dissolving into the groundwater. The DNAPL is essentially immobile and recovery using pumping wells is extremely slow.
- Inorganic constituents were detected in groundwater samples collected during the investigation. The concentration of major inorganic constituents was about twice as high in the alluvium than in bedrock. Two zones of inorganic contamination were determined: (1) the Courtyard area where total dissolved solids (TDS) concentrations ranged from 1,000 parts per million (ppm) to 4,000 ppm and (2) SWPL where TDS concentrations ranged 2,000 ppm to 7,000 ppm. In addition, fluoride, nitrate, and heavy metals exceeded drinking water standards in on-site and off-site wells.
- A groundwater flow and contaminant transport model was used to predict existing and potential contaminant migration. These results were sufficient to allow the examination of remedial action alternatives in the FS Report. The nature and extent of contamination was defined and sufficient data existed to evaluate the relative benefits of the cleanup to protect public health, welfare and the environment.

3.3.5 Feasibility Study Report

In June 1987, the results of the FS performed at OU1 were presented in a draft report and released for public review and comment. The purpose of the Feasibility Study was

to: (1) establish remedial objectives; (2) identify alternative remedial approaches; and (3) to evaluate those remedial alternatives.

The OU1 remedial objectives that were identified in the FS were: (1) to protect human health and the environment; (2) reduce contamination levels in groundwater; (3) provide containment of contaminated groundwater at the Old Cross Cut Canal; (4) expedite recovery of contaminated groundwater; (5) assure beneficial use of contaminated groundwater that is extracted and treated; and (6) incorporate permanent solutions and innovative technologies in the cleanup process to the extent possible.

The FS Report presented the following eight remedial action alternatives: (A) Groundwater Recovery from Alluvium - Courtyard; (B) Groundwater Recovery from Alluvium and Bedrock - Courtyard; (C) Groundwater Migration Control - Courtyard and Old Crosscut Canal; (D) Groundwater Migration Control - Courtyard and Downgradient in the Alluvium; (E) Downgradient Alluvial Pumping plus Alluvial and Bedrock Pumping On-Site; (F) Source Removal/Containment; (G) Extensive Downgradient Pumping of Alluvium; and (H) Extensive Downgradient Pumping of Alluvium plus Recovery from Bedrock between 50th Street and the Old Crosscut Canal.

During the evaluation, each alternative was reviewed with the following criteria: (1) implementability; (2) cost; (3) technical feasibility; (4) time to accomplish the cleanup; (5) protective of human health and the environment; (6) satisfy applicable or relevant and appropriate requirements (ARARs) and/or remedial objectives; and (7) environmental impacts.

The result of this evaluation identified Plan C as the most feasible alternative that addressed all of the evaluation criteria. Plan C had the following advantages over the other alternatives evaluated in the study:

- effectively reduces the area with VOC contamination in excess of health-based criteria within 10 years of operation;
- provides a hydraulic barrier against further migration of VOC contamination from the area east of the Old Crosscut Canal;
- provides containment of inorganic contamination west of the SWPL area;
- is cost-effective relative to plans with more extensive pumping areas;
- is essentially equal in present worth and unit removal costs with Plan B, while reducing off-site contamination better than Plan B;
- decreases the area requiring non-drinking water use restrictions; and
- among the plans which include off-site construction, Plan C minimizes off-site impacts and permit requirements.

The FS Report concluded that Plan C satisfied the evaluation criteria mandated by CERCLA and the Superfund Amendments and Reauthorization Act of 1986 (SARA). Additionally, Plan C would eventually achieve the remedial objectives for groundwater

east of the Old Crosscut Canal. The FS Report further concluded that Plan C meets the SARA alternative technology requirement by employing soil-gas extraction as a supplement to ground-water pumping and treatment in the Courtyard, and as a replacement to pumping and treating groundwater in the areas of the ATP and SWPL areas. Due to the deep migration and high concentrations of VOCs in the Courtyard groundwater, soil-gas extraction could not replace pumping and treatment. In summary, Plan C was determined to be technically feasible, reliable, efficient, cost effective, and will protect the public health and the environment.

3.3.6 Remedial Action Plan

A draft Remedial Action Plan (RAP) was prepared by Freescale and submitted to ADEQ on June 24, 1988. The purpose of the RAP was to propose a remedy from the remedial alternatives evaluated in the FS and allow the public to review and comment on the selected plan. Alternative C was proposed as an operable unit, meaning a partial or interim remedial measure. The operable unit would serve as an interim remedy intended to reduce contaminant concentrations and provide capture of contaminated groundwater until a final remedy is selected. Consequently, OU1 was intended to be the first stage of an expanded program which would involve innovative technologies, such as in situ biodegradation of VOCs.

The RAP provided a detailed description of Plan C which consisted of on-site and off-site extraction wells, an 810 gallons per minute (gpm) groundwater treatment plant located on-site, and on-site soil gas treatment. The treatment plant would include air stripping for organics removal with air emissions control. Treated effluent would be piped for use at locations in the Freescale plant to replace water supplied by the City of Phoenix.

The RAP outlined a program to evaluate the effectiveness of OU1 which included: (1) regular sampling and testing of extraction wells, the treatment plant, and soil-gas extraction systems; (2) periodic groundwater quality and soil gas monitoring; (3) periodic performance assessments that would focus on actual versus predicted achievement of cleanup levels; (4) testing the assumptions made regarding the DNAPL in the Courtyard; (5) the length of time to achieve cleanup objectives would be evaluated on a regular basis; (6) semiannual or yearly effectiveness reports, and (7) as required by CERCLA, a complete reassessment of the operable unit every 5 years.

The well survey conducted during the RI concluded that there were no known wells used for drinking water purposes. Therefore, the implementation of the selected remedy would protect human health and the environment from all known current uses of the contaminated groundwater. The only potential use of groundwater identified in the OU1 area was for lawn irrigation and to fill swimming pools.

Freescale proposed to initiate implementation of Plan C as soon as possible. The remedial measures were begun in 1988 with the expansion of the PTP.

3.3.7 Letter of Determination, Record of Decision, and Consent Order

In September 1988, ADEQ issued a Letter of Determination (LOD) and the EPA issued a Record of Decision (ROD) for OU1. The LOD and ROD provided ADEQ's and EPA's approval of the RAP and outlined precisely what remedies are associated with OU1. The LOD and ROD also provided an explanation of how these remedies would be protective of human health and the environment. The LOD also provided a responsiveness summary of comments received during the public comment period of the OU1 RAP.

On June 20, 1989, Freescale signed a Consent Order (CO) with ADEQ agreeing to implement a groundwater and soil remedy for OU1. The purpose of the CO is to serve the public interest by protecting public health, welfare, and the environment from releases of hazardous substances at the Site. Freescale was identified as a responsible party and, as required by the LOD/ROD, ordered to contain and control the migration and reduce the level of contaminants in the groundwater. The work was to be conducted as described in the CO. On July 26, 1989, the Motorola 52nd Street CO was lodged with the Arizona Superior Court.

The CO was issued to establish an agreement between Freescale and ADEQ to: (1) design, construct, implement, and maintain a groundwater extraction, conveyance, and treatment system; and (2) to design, construct, and operate three SVE systems on-site. The CO acknowledged that the OU1 LOD/ROD does not constitute the final remedy for the Site, and no clean up level for the contaminated aquifer was established. The final remedy will be determined after completion of a Final RI/FS and ROD. However, in operating OU1, Freescale is still required to comply with Arizona treatment standards for all contaminants attributable to the Motorola 52nd Street Facility.

The following outlines the requirements of the CO that are required to be met by Freescale:

- OU1 shall maintain a zone of capture to contain the migration of contamination east of the Old Cross Cut Canal;
- OU1 shall reduce the levels of contamination in groundwater, including bedrock;
- all water from the groundwater extraction and treatment system will be beneficially used at the Motorola 52nd Street Facility consistent with the Groundwater Code, including applicable area management plans;
- the treatment plant discharges shall meet federal, state, and local standards for treatment plant discharge levels;
- the total concentration of VOC's shall not exceed 100 parts per billion (ppb) in discharges of treated groundwater;

- Total Toxic Organic (TTO) concentrations in the wastewater discharged from the Motorola 52nd Street Facility shall not exceed the average value measured (186 ppb) during the 3 years prior to the entry of this CO;
- should the 3-year average of TTO's be exceeded for 3 consecutive months, the total concentration of VOC's in the treated groundwater must not exceed 50 ppb of VOC's, of which there must be less than 5 ppb of TCE.
- an SVE system shall be designed to extract and treat soil gas throughout the thickness of the unsaturated zone until VOC concentrations are reduced to levels that stabilize at minimal concentrations of recovery, or are so low as to render extraction uneconomical as agreed to by ADEQ.

As a result of information provided in the RI/FS, ROD, LOD, and CO, the Site was placed on the EPA CERCLA National Priorities List (NPL) in October 1989.

3.3.8 Integrated Groundwater Treatment Plant

The groundwater PTP within the Courtyard area was in operation until July 1992 when the permanent IGWTP became operational (Figure 2).

- On March 12, 1991, the 100% completion design drawings for the off-site groundwater extraction and conveyance system were submitted to ADEQ.
- On May 6, 1992, a Baseline Report prior to the startup of the IGWTP was submitted to ADEQ. This Baseline Report was used to compare against the reports for subsequent years in order to evaluate the effectiveness of OU1.
- In July 1992, the IGWTP commenced operations.

Operation of the IGWTP was temporarily suspended in June 1993 due to a vinyl chloride air emission problem. After a six-month shutdown to fix the problem, the entire extraction system was put back into continuous operation on December 28, 1993. The effect of the shutdown was evaluated in the 1993 OU1 Effectiveness Report. The treatment system has been operated on a relatively continuous basis since December 1993. In December 2001, the treatment system was shut down for an ADEQ-approved system evaluation. The system was restarted in February 2002. The effect of this shutdown was evaluated in the 2001 OU1 Effectiveness Report. The system was shutdown again on April 1, 2003 following the discovery of cracks in the vapor phase activated carbon vessels. A new "roll-off" type of carbon unit was installed and the treatment system returned to operation on August 4, 2003. The effect of this shutdown was evaluated in the 2003 OU1 Effectiveness Report.

In August 2000, the updated Operation and Maintenance (O&M) Manual for the IGWTP was submitted to ADEQ. The O&M manual consisted of basic system design criteria, operation and maintenance requirements of major system components, and monitoring and reporting requirements. The OU1 system is controlled by computer through a main control panel located at the IGWTP and monitored by operational

personnel. The manual also established site specific health and safety requirements necessary for safe and efficient operation of the groundwater treatment system.

The on-site IGWTP Management Team is responsible for the safe operation and compliance with all safety, environmental, governmental, regulatory, and Freescale requirements. However, since the IGWTP is located on the ON Semiconductor campus, the Management Team must also coordinate certain activities and communications with personnel at ON Semiconductor.

The O&M Manual is intended to be used in conjunction with the OU1 Health and Safety/Emergency Response Plan (HASP). The OU1 HASP is revised occasionally to reflect changes in equipment, operations, and procedures

3.3.9 Poor Quality Groundwater Withdrawal Permit

On May 8, 1991, ADWR issued Poor Quality Groundwater Withdraw Permit (PQGWWP) # 59-530577, for the OU1 groundwater extraction program. The permit required quarterly monitoring and reporting for both extraction and monitoring wells. The purpose of the permit was to: (1) provide information about the quality of groundwater and determine when the groundwater ceases to be classified as "poor quality", and (2) ensure that groundwater withdrawal is consistent with the 1991 Phoenix Active Management Area Second Management Plan. The definition of "poor quality" is determined by comparing groundwater data to EPA maximum contaminant levels (MCLs), or ADEQ's aquifer water quality standards (AWQSs), for the contaminants of concern. If results of the collected groundwater data exceed the MCL/AWQS for one or more contaminants, the groundwater remains classified as "poor quality".

Beginning in October 1991, after appropriate monitoring plans were developed, quarterly groundwater monitoring of the OU1 wells in accordance with the PQGWWP was initiated. The first PQGWWP Progress Report was submitted on January 28, 1992. Quarterly PQGWWP monitoring and quarterly/annual reporting activities continued through the end of 1997. On January 5, 1998, Freescale submitted a Request for Modification to the PQGWWP to eliminate chloroform, 1,2-DCE, and carbon tetrachloride from the key parameters list, and to reduce the sampling frequency to semiannually. This modification request was approved by ADWR. An Amended PQGWWP is included in Appendix B.

3.3.10 Groundwater Monitoring and Progress Reporting

On May 12, 1987, a task specification document was submitted to ADEQ to establish a long-term groundwater monitoring plan for the Site. This plan was updated by Freescale and approved by ADEQ on January 26, 1998. Under this monitoring plan, wells associated with OU1 would be sampled on a semiannual or annual basis with water levels measured quarterly. The locations of the OU1 wells are shown in Figure 2.

In addition to the semiannual Groundwater Monitoring/PQGWWP Report, Freescale also submits an annual Effectiveness Report. The purpose of this report is to provide an assessment of the overall effectiveness of OU1 with respect to hydraulic containment of contaminated groundwater. Freescale concluded in each of their yearly evaluations that OU1 has maintained a capture zone adequate to contain the entire width and depth of the TCE contaminant plume (Appendix C). The total gallons pumped from OU1, from pre-1992 through 2005, were estimated to be 2.52 billion gallons. The total DNAPL removed at MP-03-D, from 1994 through 2005, was estimated to be 166 pounds. The total VOCs removed from the groundwater in OU1, from 1992 through 2005, was estimated to be 17,265 pounds. The reports further concluded that the overall trend of TCE concentrations in the groundwater remained consistent with the trends observed in previous years; initially high TCE concentrations were steadily decreasing. Additionally, the reports concluded that the reduction in TCE concentrations in the alluvium at and downgradient from the Old Crosscut Canal indicates that continuous pumping at OU1 has had a beneficial effect on the water quality in the alluvium. This was apparent when comparing the 1992 baseline TCE concentration maps to the September 2001, 2002, 2003, 2004, and 2005 TCE concentration maps (Appendix C). Freescale suggests that the increasing concentrations of TCE around the alluvium/bedrock interface indicates that TCE is slowly moving upward along fractures in the bedrock, increasing the concentration in shallow bedrock monitoring ports while migrating toward the extraction wells.

The conclusions presented in the *OU1 Effectiveness Report, 2005 Operations* dated March 2006 indicated that OU1 extraction systems maintained a capture zone adequate to contain the entire width and depth of the plume. Freescale indicated that the extent of vertical capture was at least 400 feet in depth. On-site extraction wells maintain capture in the alluvium and bedrock in the Courtyard area to a depth of approximately 150 to 200 feet bgs. Further evaluation of these findings is presented in Sections 7 and 8.

In 1999, Freescale submitted the *Characterization of Inorganic Constituents in Groundwater, 52nd Street Superfund Site* Report. The Report described the nature and extent of inorganic constituents in groundwater at the 52nd Street Superfund Site based on data collected between 1983 and 1996. Freescale identified arsenic, fluoride, and nitrate as the only inorganic constituents warranting further evaluation. Following analysis, Freescale concluded that the elevated concentrations of arsenic, fluoride, and nitrate were likely attributable to historical land use and/or naturally occurring alluvial sources.

3.3.11 Health Assessment Studies

On May 2, 1988, the Agency for Toxic Substance and Disease Registry (ATSDR) submitted the results of a health assessment for contaminants associated with OU1. The health assessment was performed in accordance with SARA. The Health Assessment report surmised that: (1) the groundwater, soil, and soil gas at the Motorola 52nd Street Facility is contaminated with high concentrations of VOCs; (2) the COCs found in groundwater, soil, and soil gas at the site included TCE; 1,1-DCE; 1,1-DCA; and

PCE; (3) the contaminated groundwater had migrated off-site to the west; (4) low concentrations of the site-related VOCs, specifically 1,1,1-TCA, TCE, and PCE, were detected in some off-site wells that were currently in use; (5) off-site groundwater was known to be used for the irrigation of crops and lawns and filling swimming pools; (6) water from some on-site and off-site wells contained elevated concentrations of inorganic chemicals such as arsenic, cadmium, chromium, lead, and nitrate; and (7) the available information did not indicate whether these inorganics were naturally occurring in the water or whether their presence was related to industrial activities. In addition, the health assessment was conducted based upon the assumption that groundwater within the Site area would not be used for potable purposes. Environmental pathways for contaminants from the site included groundwater, soil, air, and food. Low concentrations of contaminants in surface water indicated that surface water and sediments were not pathways of concern for this Site.

The following exposure routes were evaluated: (1) ingestion or use of contaminated groundwater or contaminated agricultural products; (2) dermal contact of groundwater contaminants and ingestion of water during swimming; (3) inhalation of VOC contaminants and fugitive dusts; and (4) consumption of plants or animals which may have bioaccumulated groundwater contaminants.

The Health Assessment Report concluded that under current conditions (at the time of the Health Assessment) the Site is unlikely to pose any threats to human health. Although on-site and off-site groundwater is contaminated, contaminant levels at the points of groundwater extraction were below the levels of concern. However, the Report notes that future migration of groundwater contaminants may increase the level of contaminants at points of groundwater extraction and may render the groundwater unsuitable for even non-potable uses. The Report also concludes that soil and soil-gas contaminants should not pose a threat to human health.

The Health Assessment Report provided the following recommendations in order to ensure continued protection of human health: (1) continue to monitor off-site groundwater contamination to track the movement of the contaminant plume and define the extent to which the Site has impacted groundwater quality; (2) continue to monitor off-site wells in the impacted areas that are being used for irrigation or residential use; (3) workers conducting remedial activities should use adequate personal protective equipment which meets Occupational Safety and Health Administration (OSHA) standards and appropriate National Institute for Occupational Safety and Health (NIOSH) recommendations; (4) dust generated during remedial activities should be optimally controlled; (5) during remedial activities, real-time work site periphery air monitoring should be done in addition to on-site air monitoring; and (6) ambient air at the periphery of the Site should not exceed the National Ambient Air Quality Standards (NAAQS) or the NIOSH recommendations.

As a follow-up to the 1988 Health Assessment, ATSDR conducted a Site Review and Update in 1993 and 1996. Additionally, ADHS completed a Baseline Risk Assessment in November 1992. These assessments included both OU1 and OU2, however, for the purposes of this five year review, only the OU1 issues will be discussed.

The 1992, 1993, and 1996 assessments discussed two private wells within the OU1 area: Well 4626G (Morgan well) and the Turnage well. The Morgan well is located northwest of the Freescale facility at 4626 East Granada Street, just north of McDowell Road. It is a private water supply well registered for domestic use and has been primarily used for residential swimming pool water and for grounds irrigation. The well was also used for indoor domestic purposes for a period of about six months in the late 1980's. The Baseline Risk Assessment provided a summary of the analytical data from the Morgan well collected between 1987 and 1992. During this period, boron, fluoride, and lead were determined to exceed the MCLs. Four organic compounds were found in the samples but none exceeded the MCLs. The assessments recommended an increase in the frequency of monitoring the Morgan well.

The Turnage well is located at 1502 North 46th Street, just south of McDowell Road. This well was used as a domestic water source for about 20 years, from 1948 to 1969 or 1970. The well was sampled by ADEQ for VOCs during the period from 1984 to 1986. Ranges in reported concentrations were: TCE at 1,300 to 8,100 ppb; PCE at 14.2 to 60 ppb; 1,2-dichlorobenzene (1,2-DCB) at <2 to 45 ppb; 1,2-trans DCE at 3.1 to 98.7 ppb; and methylene chloride at <0.5 to 6,350 ppb. Sampling by ADEQ was discontinued in 1986 when Freescale installed monitor well DM-106 in close proximity to the Turnage well. In 1986, a locked steel housing was installed to protect the well and prevent its use. Access to the well was controlled by Freescale since installing the lock. The well was abandoned on January 25, 2005. The time at which the well became contaminated is not known and cannot be established. It is not possible to estimate past risk from domestic use of the well water for a 20 year period ending approximately in 1970. The risk can only be calculated for those periods of time that analytical data was collected. Therefore, since data was not collected until approximately 14 years after the well was removed from service, and there is no way to predict the VOC concentration levels from 1948 to 1970, it is not possible to estimate past risk. ADHS did not use the Turnage well in the quantitative risk assessment due to the lack of data and the fact that the well was not currently in use.

A list of recommendations that were made in the ATSDR 1993 Site Review and Update were reassessed in the 1996 Site Review and Update Report to ensure that they had been addressed. The 1996 Site Review and Update identified several issues specific to OU1 that still had not been addressed including (1) institutional controls were to remain in place, however, none of the agencies contacted were aware of any controls and (2) the frequency of monitoring the Morgan well had not been increased as recommended. ADEQ reported that it had not been sampled for years because Mr. Morgan did not want his well sampled any longer. Also, ATSDR reported that Mr. Morgan installed a new well in February 1996 because his original well went dry. Mr. Morgan's new well is registered with ADWR and is used for irrigation and domestic purposes.

In the early 1990s, ADEQ installed a monitor well, EW-18, directly east (upgradient) of the Morgan well. EW-18 was initially sampled in 1992 and had a TCE concentration of 23 ppb. EW-18 is sampled semiannually and TCE concentrations in the last five years have been between 18 ppb and 26 ppb. Since 2001, TCE concentrations have been relatively consistent each year.

The 1992 Baseline Risk Assessment includes a map which provides the locations of the monitor wells, domestic use wells, and public irrigation wells that are located in the OU1 and OU2 areas. A well located at 1050 North 46th Street (south of McDowell Road), referred to as the Willis well, is shown to be "closed". This well was abandoned in 1990 for construction of the Loop 202 and Hohokam freeways. There were no discussions regarding this well in the 1988, 1992, 1993, or 1996 health assessments.

ADEQ assigned a special task to ADHS to conduct an exposure assessment focusing on contaminated soil gas. Two exposure scenarios were used: indoor residential and outdoor residential. It was assumed that soil gas diffused from the soil to the ambient air and into residential structures through crawl spaces or via cracks in cement slabs. In April 1992, ADHS issued their report, *Addendum to Motorola 52nd Street Baseline Risk Assessment; Soil Gas Sampling,* which concluded that residential populations do not appear to be at risk of negative health effects from exposures to soil gases in the area west of the Motorola 52nd Street Facility. Concentrations of 1,1-DCE are high enough to suggest that further study of potential indoor exposures may be warranted. The November 1992 Baseline Risk Assessment does not address this issue nor do the ATSDR Site Reviews and Updates.

In April 2002, ADHS conducted a health assessment of the Motorola 52nd Street Superfund Site area to identify any current groundwater use that might result in human exposure to site contaminants. The Report updated the 1992 well use inventory for OU1 and OU2 and provided an evaluation of potential groundwater exposure pathways in OU3. The Report concluded that *for those wells whose status was verified, no exposure to contaminated groundwater was found; therefore, those wells pose no public health hazard. However, unregistered private wells might exist within the Motorola 52nd Street Superfund Site.*

Freescale submitted the *Potential Indoor Air Vapor Intrusion Risks for Motorola 52nd Street Superfund Site Operable Unit 1* memorandum to ADEQ on December 6, 2005 (Sciences International, 2005). The memorandum evaluated the risks from potential vapor intrusion into residences within the OU1 Area using soil gas data collected in 1995. Shallow soil gas samples were collected from a depth of approximately five feet bgs from twenty three locations. Screening levels were generally based on EPA's published cancer and non-cancer potency factors. If no EPA factors were available, California EPA inhalation potency factors were used. The results show low total potential risk levels that are within the presumptively acceptable risk range of 10^{-6} (or lower) to 10^{-4}. Most of the results were below the 10^{-6} risk level. TCE and PCE were the only COCs detected at concentrations above soil gas risk-based screening level concentrations. Only 2 of the 23 locations show estimated values above the 10^{-5} risk level. Freescale's evaluation is currently being reviewed by ADEQ and EPA and no determination of risk has been determined.

3.3.12 Groundwater Modeling of Capture in Alluvium and Bedrock

The April 1995 *OU1 Effectiveness Report for 1994* provided a discussion of capture analysis. The analysis was used to support deep bedrock capture by the OU1 system. The capture analysis focuses on interpretation of hydraulic head data to determine hydraulic capture. The main sections of the document are: discussions of the alluvial aquifer and fractured bedrock systems, a numeric model simulation of OU1, and analysis of hydraulic head data and hydraulic capture. Horizontal and vertical gradient (both before and during pumping) data were used in the capture analysis. A three-dimensional TARGET 3DS finite-difference code was used to construct a model to simulate the OU1 system. The model was designed to simulate the two layer system (alluvium and bedrock) at the Site. Two model simulations were included: one with isotropic bedrock permeability, another with anisotropic bedrock permeability. According to the capture analysis, the model is not intended to account for the full detail of the Site, but to improve understanding of capture in the alluvial aquifer and fractured bedrock systems at OU1.

Freescale submitted an *OU1 Evaluation Model Report* dated September 28, 2005. The purpose of the Report was to (1) simulate groundwater flow in the vicinity of the 52nd Street Facility and calibrate the model to conditions from 1992 through 2003 and (2) provide a tool to evaluate future changes in the operations of the OU1 system. The model was constructed based on field data collected over many years and using the knowledge from several previous models of the Site.

The model looked at the following future scenarios:

- continued current conditions;
- continued regional drought;
- continued current conditions with additional bedrock pumping at the Old Crosscut Canal;
- bedrock pumping only at the Old Crosscut Canal;
- increased on-site pumping; and
- continued current conditions with reinjection.

The conclusions drawn from the model results indicated that *with the exception of **bedrock pumping at the OCC** simulation all the scenarios predict that capture will be maintained into the future. The **continued current conditions** and the **continued regional drought** scenarios are essentially the same with respect to operations and show that the current operations will continue to be adequate for at least the next several years regardless of the drought.* The Report goes on to say in summary that *the model predictions indicate that the OU1 system will continue to maintain capture with current rates or gradually reduced rates into the foreseeable future. Increasing on-site pumping would enhance mass removal. The other scenarios are feasible, but do not significantly enhance the current system.*

A detailed review and assessment of the capture analysis is provided in Sections 7 and 8.

3.3.13 Recovery of Dense Non-Aqueous Phase Liquid

In 1994, Freescale initiated a program of weekly to bi-weekly recovery of DNAPL from a monitor well (MP-3-D) located in the Courtyard. MP-3-D is screened in the bedrock at a depth of 162 feet bgs. Through the calendar year 2005, approximately 9 gallons of DNAPL has been removed, which equates to approximately 166 pounds of TCE.

3.3.14 Courtyard Soil Remedy Implementation

From December 20, 1990 to May 4, 1993, an SVE pilot test was completed at the Courtyard Area. On May 7, 1992, the installation of the Courtyard SVE system was completed. The Courtyard SVE blowers were located within the groundwater PTP (Figure 2), and the extracted soil vapor was treated through the existing vapor phase carbon vessels used during the initial groundwater PTP testing. From May 8 through May 13, 1992, the baseline data was collected for the Courtyard SVE system. The pilot program was then initiated on September 21, 1992 and completed on March 31, 1993. Upon completion of the pilot program, the Courtyard SVE system was never restarted.

Numerical models were used to evaluate the Courtyard SVE pilot test and to estimate the potential for residual VOCs in the vadose zone beneath the Courtyard to impact shallow groundwater. The results of the groundwater impact model were. (1) TCE and PCE concentrations in the vadose zone near the SVE well are nearly in equilibrium with current groundwater concentrations; (2) SVE was ineffective in eliminating TCE and PCE from vadose zone soils located near the SVE well; (3) VOCs in this zone presumably reside in low-permeability soils that are not amenable to remediation by SVE; and (4) predicted TCE groundwater concentrations at the property boundary, that would result from the residual vadose VOCs in the Courtyard, are nearly two orders of magnitude less than existing shallow groundwater concentrations beneath the Site.

In April 1997, a report on the evaluation of the Courtyard SVE system was submitted to ADEQ. The Report concluded that additional SVE in the Courtyard area was considered to have no significant remedial benefit because: (1) SVE was demonstrated to be ineffective in eliminating the residual vadose VOCs believed to be present in the low permeability soils located near the SVE well, (2) the potential impact of residual vadose VOCs on existing shallow groundwater conditions would be negligible; and (3) it was demonstrated that continued SVE operations were not economically feasible. Freescale submitted a letter requesting closure of the Courtyard SVE on April 30, 1998. ADEQ reviewed Freescale's request and recommended preparing a workplan for collection of soil or soil gas samples. Once the workplan is finalized, ADEQ will determine an evaluation criteria based on Arizona's Soil Rule. Arizona's Soil Rule is in the process of being revised. Once the Soil Rule is promulgated, the CO will be amended to include the new provisions.

3.3.15 Voluntary SWPL Groundwater Remedy Implementation

In 1991, Freescale initiated the investigation of groundwater and the implementation of a voluntary groundwater extraction program within the SWPL Area. The voluntary program was implemented because the results of the periodic sampling of well DM-201, located within the SWPL Area (Figure 2), indicated that TCA and 1,1-DCE were increasing in concentrations.

The following RI activities were performed in the SWPL Area:

- a soil gas investigation was conducted at 23 locations within the SWPL area;
- on June 28, 1991, a pump was installed in well DM-201-OB1 and groundwater extraction activities were initiated;
- during the months of January and February 1992, groundwater extraction wells were installed and completed;
- during the month of May 1992, the extraction wells were put into operation;
- on September 11, 1992, a Final Draft of the SWPL RI Work Plan was submitted to ADEQ. The Work Plan provided additional investigative activities to characterize the lateral and vertical extent of VOCs in the SWPL area and to develop a technical foundation for future remedial activities.

In May 1993, the results of the investigative activities performed at the SWPL area were presented in a draft report. The specific objectives of the SWPL RI were: (1) to delineate the lateral and vertical extent of VOCs in the groundwater; (2) characterize the groundwater flow patterns in soil and bedrock; and (3) develop remedial alternatives for SWPL. The following contains summaries of key findings to the May 1993 Report.

- The groundwater flow gradient in the SWPL Area is to the southwest and is currently altered by groundwater pumping. Groundwater flow in the alluvial aquifer is controlled by the saturated thickness of the alluvium and by the contoured bedrock surface. Groundwater flow in the bedrock is controlled by structural discontinuities in the rock mass. Zones of increased bedrock fracturing typically strike northwest/southeast and dip relatively steeply to the southwest.
- The former sump in the Building A-D chemical mixing and bottling room appears to be the principal source of TCA and DCE found in the groundwater at the SWPL Area. The source of PCE and TCE contamination in the SWPL Area is unknown. The lateral extent of TCA, DCE, and PCE in groundwater is defined to the northeast, northwest, and southwest directions but not toward the southeast. The lateral extent of TCE in groundwater appears to be adequately defined to the southwest, but not in the other directions. The vertical extent of VOC concentrations is defined at the southern boundary of the SWPL Area.

- Elevated concentrations of the inorganic constituents (arsenic, fluoride, and nitrate) were identified in groundwater in the SWPL Area and immediately downgradient. However, the Report states that there is no demonstrated connection between this observation and Freescale's disposal practices in the SWPL Area. These elevated concentrations may be related to background or agricultural activities conducted in the area prior to Freescale acquiring the site.
- The RI Report also provided an evaluation of the SWPL groundwater extraction system which indicated that the current extraction wells are effective in containing and remediating VOCs in the groundwater.

3.3.16 SWPL Soil Remedy Implementation

The SVE system was required by the OU1 ROD. On September 23, 1992, a draft *In-Situ AS/SVE System Field Test (Pilot Test) Plan* was submitted to ADEQ for the SWPL Area. ADEQ approved this plan and in January 1993, three SVE wells (TW-001 through TW-003) and one air-sparging (AS) well (AS-002) were installed within the SWPL Area.

From February 11 through February 25, 1993, the SWPL SVE and AS/SVE pilot tests were conducted in the parking lot and Building A-D. The results were reported to ADEQ on April 21, 1995. The pilot tests confirmed that these technologies proved effective in reducing VOC contamination in the vadose zone at the SWPL Area. In addition, during the 4.5 days of testing, 265 pounds of VOCs were recovered around Building A-D. Based on these findings, ADEQ recommended that Freescale evaluate applying the AS/SVE technology on a larger scale in the Building A-D area to remove residual VOCs in the vadose zone and reduce VOC contamination in the groundwater. It was also recommended that the current SWPL groundwater treatment system be maintained to continue containment of VOC contamination on-site and keep the water table lowered to enhance the effectiveness of the AS/SVE operations.

On April 25, 1995, the design report, plans, and specifications detailing the proposed permanent SVE/AS system were submitted to ADEQ. The CO required that Freescale implement the SVE system; however, Freescale independently proposed the use of an AS system to enhance the remediation of VOCs in the groundwater at the SWPL Area. Freescale operated the AS system voluntarily following approval by ADEQ in a letter dated June 1, 1995.

Construction of the SWPL AS/SVE system was conducted during June through November 1996 at which time the system was started-up and continued operations through April 1997. After shutdown in April 1997, the system was never restarted. Detailed descriptions of the SWPL AS/SVE systems are provided in Section 4.1.2 of this Report.

On December 22, 1998, a report on the evaluation of the SWPL SVE system was submitted to ADEQ. The purpose of this Report was to evaluate the construction, start-up, and operation of the SWPL SVE system and assess its effectiveness in reducing

VOCs within the vadose zone. The Report specified that the SWPL SVE system was operated for a period of five months. During that time period, extracted VOC concentrations in the extraction wells declined to concentrations less than 2 parts per million by volume (ppmv). Cyclical SVE operations within the source area did not generate a substantial increase in VOC mass removal and minimal rebound was observed. Extracted VOC concentrations decreased to steady state levels within 12 hours of cyclical operation commencement. The Report concluded that based on the reduction in extracted VOC concentrations and the reduced vadose zone concentrations, SVE operations have successfully achieved the objective of removing residual VOCs in the soil. Freescale submitted a letter to ADEQ on March 21, 2001, requesting closure of the SWPL SVE system. On November 15, 2002, ADEQ granted closure for soil cleanup in the SWPL Area (Appendix D).

3.3.17 First Five Year Review

In September 1995, ADEQ completed the First Five-Year Review Report for the Motorola 52nd Street Superfund Site. Although the review concluded that the interim remedy was effective in the alluvial portion of the aquifer, ADEQ expressed concerns about the groundwater containment system attaining complete capture of the plume within bedrock. Specifically, well DM-603, immediately downgradient from the extraction wells, had a 40% increase in the concentration of TCE from the sampling port below the bedrock/alluvium interface during the past three quarters. TCE increased from 8,100 µg/L to 20,000 µg/L. Review of TCE concentration data from 1991 to 1995 indicated that the current concentration (at the time of the 1995 review) was at a historic high. It was believed that the increasing concentrations of TCE were coming from a source upgradient to DM-603 (most likely migrating from the Motorola 52nd Street Facility) rather than being drawn back from downgradient as an artifact of the extraction wells. On November 16, 1995, EPA accepted and approved the Five-Year Review Report.

3.3.18 MI52 Model Documentation Report

In February 1996, Freescale submitted the MI52 Model Documentation Report for Motorola Inc. The purpose of the Report was to define the maximum extent of groundwater contamination by VOCs attributable to the Motorola 52nd Street Facility. The Report presented models of predicted groundwater flow and contaminant transport of VOCs from Freescale and other sources.

3.3.19 Second Five Year Review

In September 2001, ADEQ completed the Second Five-Year Review Report for the Motorola 52nd Street Superfund Site. Although the review concluded that the interim remedy was effective in the alluvial portion of the aquifer, ADEQ identified the following concerns:

- the pump and treat system was not significantly effective in reducing the levels of contaminants due to the DNAPL in fractured bedrock;
- a downward gradient and increasing TCE concentration trend at monitor well DM-606 may indicate that deep bedrock capture in that area is inadequate;
- increasing concentration in the northernmost three extraction wells may indicate that the system may need modification to address capture of contaminants within the bedrock;
- increasing concentrations in shallow bedrock ports in monitor wells DM-603 and DM-605 may be indicative of TCE contaminant migration from deeper bedrock fractures;
- no monitor wells are located immediately downgradient of the capture zone that can be used to confirm that the plume is contained. This is a concern especially since the alluvial aquifer is becoming dewatered;
- concentrations of TCE detected in monitor wells EW-18 and DM-125 suggest that the northern boundary of the plume is not completely defined;
- groundwater data indicated that vinyl chloride was detected more frequently and at higher concentrations in some of the monitor wells associated with OU1; and
- as water levels decline and the alluvium is dewatered, ADEQ was concerned that the effectiveness of the bedrock capture may be reduced.

On September 28, 2001, EPA accepted and approved the Second Five-Year Review Report. Freescale provided comments on the Second Five-Year Review Report in a letter dated March 28, 2002.

ADEQ issued a Letter Report Update to the OU1 Second Five-Year Review on August 14, 2003. The Letter Report provided a summary of: (1) the established remedial action objectives (RAOs), (2) the findings from the Second Five-Year Review, (3) work conducted since the Second Five-Year Review, (4) current and future protectiveness statements, and (5) additional actions to be taken with a proposed schedule. Freescale conducted an evaluation of the OU1 system during shut down for maintenance in December 2001 through February 2002. In addition, Freescale evaluated the extraction wells at the Courtyard. After evaluating the work Freescale conducted in 2001 and 2002, ADEQ determined the following for OU1:

- the OU1 remedy was protective of human health and the environment;
- the remedy is currently meeting the RAOs (to capture contaminants in groundwater and to reduce the concentration of contaminants in groundwater).

However, ADEQ noted the following concerns:

- if current site conditions persist, the remedy may not be protective long-term;

- the issue of dewatering the alluvium will require both extraction and treatment system design changes in order to handle the reduced flow and yet continue to provide capture of bedrock contamination;
- the indoor air pathway assessment will need to be completed before a future protectiveness statement can be determined.

3.3.20 Treatment System Shutdown

In April 2003, Freescale shutdown the OU1 treatment system after discovering cracks in the carbon vessels that serve as air emission controls. As a result of the shutdown, ADEQ requested that Freescale conduct an evaluation of the potential impacts on groundwater flow and contaminant migration. The data used for this evaluation was collected during a previous shutdown from December 2001 to February 2002. Freescale reviewed the data and determined that *the shut down is not expected to have any adverse impacts on downgradient water quality conditions as the system will recapture the low level VOCs west of the extraction system.* The evaluation showed that *after more than one month, groundwater in the vicinity of the downgradient DM-600 series wells was still flowing in a southeasterly direction.* In addition, Freescale determined that *the maximum distance groundwater could travel during the shutdown would still be within the previous capture zone* and that *the capture zone would be re-established quite quickly after the wells are turned on again.*

3.3.21 Groundwater Remedial Alternative Analysis

Freescale submitted a Groundwater Remedial Alternatives Analysis (GRAA) Report on September 30, 2005 and an Addendum to Groundwater Remedial Alternatives Analysis in December 2005. The GRAA provided a focused evaluation of groundwater remedial alternatives at the former Motorola 52nd Street Facility based on current contaminant distribution and remediation progress.

Freescale also developed a groundwater flow model to analyze future system effectiveness under continuing groundwater decline. The model evaluated the following future scenarios: (1) continued current conditions, (2) continued regional drought, (3) continued current conditions with additional bedrock pumping at the Old Crosscut Canal, (4) bedrock pumping only at the Old Crosscut Canal, (5) increased on-site pumping, and (6) continued current conditions with reinjection. The only simulation that did not predict that capture would be maintained in the future was the *bedrock pumping only at the Old Crosscut Canal* scenario.

ADEQ is currently in the process of reviewing these documents. ADEQ met with Freescale on March 7, 2006 to discuss the Reports. At that meeting, Freescale agreed to prepare a work plan for a pilot aquifer test in bedrock.

4.0 REMEDIAL ACTIONS

4.1 Remedy Selection

ADEQ's LOD and CO, and EPA's ROD describes the selected remedy as the Alternative "C". Alternative "C" is an interim remedy designed to meet the following RAOs which were established to provide a cleanup consistent with a more comprehensive, final solution:

- protect public health and the environment by recovering and treating contaminated groundwater;
- reduce current contamination levels in groundwater;
- provide containment of contaminated groundwater encountered east of the Old Crosscut Canal;
- expedite recovery of contaminated groundwater between the Old Crosscut Canal and the Freescale plant on 52nd Street;
- assure beneficial use of contaminated groundwater that is extracted and treated;
- incorporate permanent solutions and alternatives and innovative technologies in the cleanup process to the extent possible.

In accordance with the LOD and ROD, Alternative C consists of the following basic components:

- on-site extraction and treatment of groundwater from the Courtyard and 50th Street Area designed to reduce or eliminate contaminant migration;
- on-site extraction and treatment of vapor phase organic contaminants from soils from the Courtyard and 50th Street area, the ATP, and SWPL area;
- off-site extraction of groundwater designed to contain contaminant migration at the Old Crosscut Canal;
- on-site treatment of extracted groundwater from on-site and off-site wells; and
- use of all treated groundwater at the Motorola 52nd Street Facility.

The OU1 interim remedy evaluated during this five-year review consists of: (1) a SVE remediation system within the Courtyard that included one extraction well; (2) a SVE remedial system within the SWPL Area; and (3) four on-site extraction wells and nine off-site extraction wells which are all piped to the IGWTP. In addition to these OU1 remedial systems, Freescale voluntarily initiated a groundwater remediation program within the SWPL Area that included AS wells combined with the SVE wells and twelve groundwater extraction wells, all of which are also connected to the IGWTP. The general locations of these remedial systems are shown in Figure 2.

4.1.1 Groundwater Remedy

The groundwater extraction system consists of 16 on-site and 9 off-site extraction wells. The 16 on-site extraction wells are intended to reduce the high concentrations within the source areas. The 9 off-site extraction wells provide hydraulic containment west of the site to approximately the Old Crosscut Canal. There are also a total of 68 monitoring wells within OU1, 27 of which are multiport or Westbay wells.

The IGWTP system consists of two air strippers, four liquid phase GAC vessels and one vent scrub canister. Figure 3 provides a process flow diagram of the IGWTP. Groundwater from the extraction wells is pumped at a current average rate of 283 gpm to the IGWTP where the groundwater enters one of two 17,080 gallon storage (surge) tanks. From the storage tanks, acid and biocide treatment is applied to the groundwater to inhibit hardness and bio-fouling in the primary air stripper (AS-201). The water then passes through a static mixer and enters AS-201. Effluent water from AS-201 is then pumped to a secondary air stripper AS-301 for additional treatment. Effluent water from AS-301 is then pumped through two liquid phase GAC vessels connected in series for VOC polishing. After VOC polishing is completed, the water is then routed to a storage tank and used in the Facility RO/DI plant and/or for use in the Facility cooling towers. The stripped effluent vapor from AS-201 is routed through a dehumidifier to reduce the relative humidity of the vapor stream VOC laden vapors are then treated by one vapor phase vent scrub canister. The spent vapor phase GAC is shipped off-site for regeneration by the vendor. Vapors from the discharge of the GAC are routed to AS-301. The spent liquid phase GAC and all recovered waste solvents are shipped off-site as a hazardous waste. Based on a review of hazardous waste manifests submitted by Freescale, the quantity of recovered solvents generated on a monthly basis ranges from 100 to 150 pounds.

4.1.2 Soil Remedy

The Courtyard SVE remedial system was never modified from the pilot treatment system because the effectiveness evaluation performed by Freescale (See Section 3.3.14) concluded that additional SVE in the Courtyard area was considered to have no significant remedial benefit. The Courtyard SVE system consisted of one SVE well (EX-1) that was connected to a vapor treatment system within the PTP area. The process flow diagram for this system shows that the extracted vapor from the well was routed to the vapor treatment system consisting of two vapor phase GAC vessels which remove the VOCs prior to discharge into the atmosphere (Figure 4). The system was designed to produce an effective radius of influence of 25 feet. The SVE system was in operation from September 21, 1992 to March 31, 1993.

The CO required treatment of soil vapor at the ATP. No active soil remediation has been conducted in the ATP area to date. Data collected by Freescale suggests that soil vapor extraction is not needed at the ATP; however, ADEQ and Freescale have agreed to conduct a soil investigation pending the revision of Arizona's Soil Rule.

The SWPL soil remediation system consisted of six combined SVE/AS wells and six GAC vessels. The process flow diagram for this system is attached as Figure 5. Air is injected via the AS wells into the groundwater with an air compressor. Prior to injection, the air goes through an oil filter and air dryer. The VOCs in the groundwater were volatilized and migrate up to the vadose zone. VOCs in the vadose zone were then extracted by the SVE wells that were connected to a blower and routed to the vapor treatment system housed within Building A-D. The vapor treatment system consists of six vapor phase GAC vessels which remove the VOCs The treated air is then routed to a heat exchanger prior to discharge into the atmosphere. The SVE system was designed to produce an effective radius of influence from 30 to 40 feet. The AS system was designed to produce an effective radius of approximately 90 feet of sparging influence. The SVE/AS system was in operation from November 1996 through April 1997.

4.2 Remedy Implementation

The history overview of the implementation of the IGTWP is provided in Section 3.3.8. The IGWTP has been in operation since July 1992. The groundwater extraction system is designed to treat approximately 810 gpm and receives groundwater from 23 extraction wells. Currently, due to dewatering of the alluvium, the IGTWP is operated at approximately 283 gpm. Wells DM-313, DM-312, and DM-311 were taken off-line (with ADEQ's approval) in the summer of 1993, November 1995, and April 2004, respectively, because VOC concentrations decreased to below the MCLs. These wells are currently being used as monitor wells. As of December 31, 2005, the on-site treatment system processed approximately 2.5 billion gallons of groundwater, from which approximately 17,265 pounds of VOCs have been removed.

The history overview of the implementation of the Courtyard SVE system is provided in Section 3.3.14. Since the completion of the pilot test (March 31, 1993) the system has not been in operation and recommendations have been made by Freescale not to conduct any further SVE remediation within the Courtyard Area. Evaluation of the Courtyard SVE is provided in Section 6.4.5 of this Report.

The history overview of the implementation of the SWPL SVE/AS system is provided in Section 3.3.16. The SWPL SV/AS system was operated from December 3, 1996 to January 20, 1997. The system was operated with all extraction wells open at all times until March 3, 1997 when cyclical operation of the SVE/AS system was initiated. Cyclical operation of the system within the source area did not generate a substantial increase in VOC mass removal and minimal VOC concentration rebound was observed SVE/AS operation was completed on April 18, 1997 when apparent asymptotic concentrations were achieved. After SVE treatment, soil gas VOC concentrations decreased substantially when compared to the soil gas concentrations prior to treatment. On March 21, 2001, Freescale provided a written request for a No Further Action (NFA) of the continued soil remediation at the SWPL Area. ADEQ determined that the soil cleanup in the SWPL Area was complete in a letter dated November 15, 2002 (Appendix D).

4.3 System Operations

The Courtyard SVE and SWPL AS/SVE systems are not currently in operation. For the operation of the IGWTP system, Freescale retained the services of Clear Creek Associates to conduct all monitoring activities described in Section 3.3. Daily maintenance activities are performed by Gutierrez-Palmenberg, Inc. (GPI) in accordance with the updated August 2000 O&M Manual for the IGWTP.

From 2001 to 2002, O&M costs for the IGWTP increased from approximately $577,703 to $1,206,523. Freescale stated that the increase was related to the ON Semiconductor-Motorola separation and represented the accrual of land and utility costs not previously captured since the remedy was integrated into the manufacturing operations at the former Motorola 52nd Street Facility. From 2002 to 2005, the O&M costs were generally consistent. Table 2 provides the annual O&M costs from 2001 to 2005. These costs do not include other response costs that were incurred for OU1 (e.g., agency oversight).

5.0 PROGRESS SINCE THE LAST FIVE YEAR REVIEW

5.1 Protectiveness Statement from Second Five-Year Review

The Second Five-Year Review for OU1 was completed by ADEQ on September 28, 2001. At the time of the Report, a protectiveness determination of the OU1 remedy could not be made until further information was obtained. ADEQ provided a list of actions that needed to be competed before a protectiveness statement could be issued.

A follow-up Letter Report was issued by ADEQ on August 14, 2003. ADEQ issued a protectiveness statement after evaluating the work conducted by Freescale in 2001 and 2002. ADEQ issued the following statement with regard to the OU1 remedy:

> *ADEQ has determined that the OU1 remedy is currently protective of human health and the environment. The remedy is currently meeting the Remedial Action Objectives: to capture contaminants in groundwater and to reduce the concentration of contaminants in groundwater. However, if current site conditions persist, ADEQ cannot state that the remedy will continue to be protective in the long-term. The issue of dewatering the alluvium will require both extraction and treatment system design changes in order to handle the reduced flow and yet continue to provide capture of bedrock contamination. Additionally, the indoor air pathway assessment will need to be completed before a future protectiveness statement can be determined.*

5.2 Status of Recommendations and Follow-up Actions from Last Review

Table 3 presents a summary of the status of the recommendations and follow-up actions from the Second Five-Year Review. Most of the recommendations and follow-up actions were addressed by Freescale; however, several of the issues raised continue to be problematic. Monitor well coverage downgradient and to the north of the Old Crosscut Canal (EW-18 area) remains sparse, especially in bedrock. Additionally, the vertical gradients observed in DM-606 remain a concern to ADEQ.

ADEQ is concerned that Freescale is operating from a fundamentally different conceptual site model for OU1, particularly with regard to bedrock. ADEQ and Freescale have discussed these issues at a recent meeting to discuss the *Groundwater Remedial Alternative Analysis, Motorola 52nd Street OU1, Phoenix, Arizona* Report. Freescale is preparing a workplan to address the bedrock conductivity issues.

Finally, the status of soil remediation projects at the ATP and Courtyard are currently incomplete. Once the Arizona Soil Rule is finalized, ADEQ will develop evaluation criteria that will be used to determine whether the Courtyard Area soils can be closed out. After the Soil Rule is promulgated and the CO amended, Freescale should prepare a workplan to evaluate the Courtyard Area.

Freescale has indicated that soil data in the ATP Area suggests that SVE remediation may not be applicable. ADEQ and Freescale have agreed to investigate the ATP Area following completion of the Courtyard investigation. The evaluation criteria established for the Courtyard will also be applied to the ATP Area.

5.3 Results of Implemented Actions

The following paragraphs discuss some of the results of the implemented actions from the Second Five-Year Review. Table 3 provides a list of the actions taken and outcomes for each issue raised during the Second Five-Year Review.

Freescale provided an evaluation of several of the issues raised during the Second Five-Year Review in the 2001 Effectiveness Report for OU1.

Freescale also provided an evaluation of soil data in the SWPL Area to ADEQ and requested closure on March 21, 2001. ADEQ determined that soil cleanup in the SWPL Area was complete and issued a No Further Action letter in November 2002.

Freescale provided documentation regarding the abandonment of the Turnage and Willis wells.

Freescale also addressed the issues regarding the IGWTP following the site inspection. GPI conducts routine maintenance activities and replaces worn or damaged equipment as needed.

5.4 Other Progress Made During the Review Period

The following progress was made in the operation of OU1 since the last review:

- continued operation of the IGWTP resulting in additional recovery of VOCs in the groundwater. As of December 31, 2005, approximately 17,265 pounds of VOCs have been removed. Approximately 3,871 pounds have been removed during this review period;
- additional recovery of DNAPL from well MP-03-D; approximately 9 gallons of DNAPL have been recovered as of December 31, 2005. This equates to approximately 166 pounds of VOCs. Approximately 3.4 gallons have been removed during this review period;
- DM-311 was taken off-line (with ADEQ's approval) in April 2004 because VOC concentrations decreased to below MCLs.

6.0 FIVE-YEAR REVIEW PROCESS

6.1 Administrative Components

Section 121(c) of CERCLA requires that the lead regulatory agency conduct a review of any remedial action selected that results in any hazardous substances, pollutants, or contaminants remaining at the Site no less often than every five years. The 1988 LOD and ROD for the Motorola 52nd Street Superfund Site allow the hazardous substances to remain on Site; therefore, five year reviews are required by statute. Guidance for this review is provided in OSWER Directive 9355.7-03B-P Comprehensive Five-Year Review Guidance, dated June 2001, EPA 540-R-01-007.

The first five-year review was completed on September 5, 1995. The second five-year review was completed on September 28, 2001. The purpose of the five-year review is to determine whether human health and the environment are adequately protected by the existing remedial action. The five-year review will be submitted to EPA for approval. Once approved, EPA will provide a concurrence letter on the findings.

The Motorola 52nd Street five year review was lead by Kris Paschall, Project Manager of ADEQ, who provided oversight of the review process that was conducted by LFR (ADEQ's consultant). The following team members took part in the review:

- Kris Paschall, ADEQ Project Manager;
- David Haag, ADEQ Project Hydrologist;
- Robert Forsberg, LFR Project Manager;
- Brad Cross, LFR Principal Hydrogeologist;
- Ned Overs, LFR Professional Engineer;
- Michael Nesky, LFR Senior Engineer;
- John Kivett, LFR Senior Hydrologist;
- Laura Malone, LFR Senior Project Scientist;
- Nadia Hollan, EPA Project Manager.

The five-year review consisted of the following activities: (1) development of a work plan and review of relevant documents (Appendix A); (2) interviews with appropriate operations staff, state and federal agencies, local government officials, and concerned community members; and (3) a site inspection. The review period was from September 30, 2001 through July 2006.

6.2 Community Involvement

A public notice regarding the initiation of the forthcoming review was mailed to the Motorola 52nd Street Superfund Site mailing list in April 2006 (See Appendix E). The final report is available at ADEQ and the local site repositories which are located at the Central Branch and the Saguaro Branch of the City of Phoenix public libraries. ADEQ will provide a brief summary of this Report to community members by holding a public meeting and/or distributing a fact sheet.

Additional community involvement activities during this five-year review period included periodic Community Advisory Group (CAG) meetings, update of the Community Involvement Plan (CIP), and involvement with the Technical Advisory Grant (TAG) Gateway Neighborhood Coalition.

The CIP was update in March 2002 and again in July 2004. ADEQ conducted several interviews with the OU1 community to gather information for both of these updates. The primary concerns of the community in OU1 related to having access to enough information about the project, health impacts, the current status of contamination, and understanding the proposed cleanup.

Both EPA and ADEQ worked with the TAG recipient Gateway Neighborhood Coalition during this review period. In addition, EPA and ADEQ have held periodic CAG meetings to discuss activities and the status of OU1. Minutes from these CAG meetings are available for review in the repositories and ADEQ's website.

6.3 Document Review

The following primary site documents have been reviewed:

- Baseline Health Risk Assessment, Motorola 52nd Street Facility, Phoenix, Arizona, prepared by ADHS, November 1992
- Letter of Determination, Operable Unit One, September 1988
- Record of Decision, Operable Unit One, September 1988
- Consent Order, Operable Unit One, June 20, 1989
- Technical Memorandums and supporting information prepared by Clear Creek Associates on behalf of Freescale
- Integrated Groundwater Treatment System Operation and Maintenance Manual, Revision 7, August 2000
- The following routine documentation: Semiannual PQGWWP Groundwater Monitoring Reports, Annual OU1 Effectiveness Reports (2001 - present)

6.4 Data Review

The following sections briefly discuss the main data sources reviewed for the five-year review evaluation. A review of ARARs is discussed in Tables 3, 4, and 5.

6.4.1 Groundwater Data Review

The groundwater monitoring program conducted at the OU1 Area includes the network of monitor wells identified in the *Groundwater Monitoring Plan, 52nd Street Superfund Site, Operable Unit 1 Area*, prepared by Dames & Moore, dated January 1998. These monitor wells are used to collect groundwater elevation and water quality data from the alluvium and bedrock upgradient, downgradient, and cross-gradient from the site. The locations of the wells are shown on Figure 2. Groundwater samples collected from these wells are analyzed for VOCs and selected inorganic compounds semiannually in March and September. Hydrographs of groundwater elevations and concentrations for selected wells are provided in Appendix F.

The main analytes that are detected most frequently exceeding their respective MCLs are TCE, PCE, 1,1-DCE, cis-1,2-DCE, vinyl chloride, and TCA. Since the CO did not establish groundwater cleanup ARARs, the exceedances of groundwater standards of any compound in any well used to monitor OU1 was not recognized as a deficiency in this review. Since the interim remedy was primarily implemented to reduce the concentration of contamination at the source and to capture the migrating plume at the Old Crosscut Canal, the groundwater data review evaluated trends in groundwater concentrations and elevations in key areas on and off site. Data from monitor wells downgradient of the Old Crosscut Canal extraction wells were used to evaluate the effectiveness of capture and to determine whether the plume was being contained at the Old Crosscut Canal.

6.4.2 Treatment Plant Data Review

Treatment plant influent and effluent data are collected on a bi-monthly basis. The effluent results were compared to the requirements of the ROD, LOD, and CO. Based on the data provided by Freescale, the treated effluent met the requirements of the ROD, LOD, and CO.

Available copies of historical design and engineering documents, record drawings, treated effluent monitoring plan, the PQGWWP, the IGWTP effluent monitoring records/data and air emissions data, carbon change out records, waste profiling data, and manifests of the spent carbon and recovered solvents sent off-site for regeneration and recycling were reviewed. During the inspection, LFR reviewed the IGWTP records, including: daily/bi-weekly/monthly operating logs, pH/ORP calibration logs, maintenance logs, and other documents to assess operation and maintenance compliance.

6.4.3 OU1 Evaluation – Shutdown and Monitoring Report

This Report evaluated the potential impacts of the treatment system shutdown on groundwater flow and contaminant migration. The data in this Report was used to evaluate the effectiveness of capture.

6.4.4 OU1 Evaluation Model Report

LFR reviewed the *OU1 Evaluation Model Report* dated September 2005. Model results were used to evaluate the long term effectiveness and sustainability of the existing treatment system.

6.4.5 SVE Evaluation Remedial Completion Evaluation

Motorola's SVE evaluation reports and requests for an NFA determination for the Courtyard and SWPL SVE treatment systems were reviewed. ADEQ granted closure for soil cleanup at SWPL in a letter dated November 15, 2002. ADEQ requested additional information regarding the closure request for the Courtyard; confirmatory soil and/or soil gas samples must be collected. The results of the sampling will be compared to the appropriate standards to determine if closure can be granted. Arizona's Soil Rule is in the process of being revised. Once the Soil Rule is promulgated, the CO will be amended to include the new provisions.

6.5 Interviews

The following individuals were interviewed for OU1 during this five-year review process by personal contact or by telephone:

- Bob Atkinson, Director of Health & Safety, ON Semiconductor – Telephone interview on May 8, 2006.
- Tom Suriano, Remediation Project Manager, Freescale Semiconductor – Interviewed on May 10, 2006 at the ADEQ office.
- Nadia Hollan, Project Manager, EPA – Interviewed on May 10, 2006 at the ADEQ office.
- Martha Breitenbach, CAB Member – Telephone interview on May 23, 2006.
- Karen O'Regan, Environmental Programs Director for the City of Phoenix – Interviewed May 25, 2006 at the ADEQ office.
- George Ring, Robert Frank and Phil Burke of CH2M Hill (representing Troy Meyer of Honeywell) – Interviewed on May 30, 2006 at the ADEQ office.
- Larry Rodriquez, Supervisor, GPI – Provided a written response.
- Leo Wilson, Operator, GPI – Provided a written response.
- Donn Stoltzfus, Environmental Program Specialist, City of Phoenix –

Telephone interview on July 21, 2006.

The following individuals were invited to interview and ADEQ either received a decline to interview or did not receive a response:

- Steve Brittle - Don't Waste Arizona
- Daniel Casiraro - Salt River Project
- Mario Castenada - Gateway TAG technical consultant
- Jeff Conover - Walker Power
- Janet Corrigan - Paul McCoy's Laundry
- Gine Flury - AdobeAir
- Andrew Frisbie - Wabash National
- Linda Furlough - Arvin Meritor
- Richard Guimond - Motorola
- John Held - Phoenix Newspapers
- Mark Hess - Cooper Industries
- Judith Heywood - APS
- Kenneth Hodson - BDR Liquidating
- Ed Honig - Union Pacific Railroad
- Michael Johnson -City of Phoenix Councilman
- John Maris - D-Velco
- Scott Miller - AZ. Department of Water Resources
- Teresa Olmstead - ITT Industries
- Tommy Padgett - Citizen - Requested interview, but was not available
- Cynthia Parker - City of Phoenix Aviation Department
- Stephen Smith - BDR Liquidating
- Greg Stanton -City of Phoenix Councilman
- Douglas Watson - Joray

The detailed accounts of the interviews are presented in Appendix G, which are briefly summarized in the following paragraphs.

Bob Atkinson, Director of Health and Safety, ON Semiconductor. During Mr. Atkinson's interview, he did not identify any issues associated with OU1. He did state that the project (OU1) appeared to be going quite well and is managed appropriately by Motorola.

Mr. Tom Suriano, Remediation Project Manager, Freescale Semiconductor. Mr. Suriano is responsible for overseeing all O&M, monitoring, and reporting activities performed at OU1. Excerpts of his responses are as follows. He is familiar with all aspects of the project and was familiar with all O&M and monitoring activities for OU1. The OU1 remedy has been successful at achieving the remedial action objectives. There have been no significant O&M problems or difficulties within the last 5 years that have affected the protectiveness or the effectiveness of the remedy. Approximately 3 years ago, a change out of air controls occurred and the vapor phase carbon was replaced, but these actions in no way affected the protectiveness of the system. Flow rates have been decreased due to the declining water levels. None of these changes have adversely impacted the ability of OU1 to maintain capture.

Nadia Hollan, Project Manager, EPA Region 9. Ms. Hollan provides support to ADEQ for the OU1 activities. Excerpts of her responses to the interview are as follows. The OU1 remedy is an interim containment remedy, selected in 1989 and operated by Freescale. OU1 is effective for containing alluvium contamination; however, there are some concerns of its effectiveness in bedrock. Parts of the remedy have yet to be evaluated for effectiveness and OU1 is not a final remedy and does not address all aspects. Periodically, there have been inquires made to EPA on OU1. Specific details could not be remembered, however, the majority of the inquiries were minor issues and these were referred to ADEQ. The only potential changes to future EPA guidance may be for the selection of institutional controls. No other opinions were given on the O&M of OU1. In terms of comments and recommendations to improve the effectiveness of OU1, Ms. Hollan stated that the public record reflects EPA's issues. Ms. Hollan also stated that the evaluation of the vapor intrusion pathway is an issue and needs to be completed. Ms. Hollan stated that EPA continues to work with ADEQ regarding on-going capture optimization.

Martha Breitenbach, CAG Member. Ms. Breitenbach has been a member of the CAG for approximately 5 years and participates in the CAG meetings. Excerpts of her responses to the interview are as follows. The OU1 remedy is meant to pump and treat the groundwater and understands that the treated water is sold to ON Semiconductor for use in the plant. Overall impression of the system is not favorable as she stated that the plume is growing. Ms. Breitenbach is extremely upset and disappointed that there isn't a more aggressive approach to cleaning up the contamination. She expressed concern over the soil contamination that continues to be a source of groundwater contamination and would like to see this issue addressed. She also expressed concern that the sludge in the bedrock is still contaminated and that this is an outstanding issue. Ms. Breitenbach stated that she has been kept well informed of the issues at OU1. Recommendations were made to be more aggressive in the approach and she would like to see the treated water returned to the ground since we're in a drought.

Karen O'Regan, Director of the Environmental Programs Department, City of Phoenix. Ms. O'Regan is a representative of the City of Phoenix and is involved in issues surrounding the redevelopment of the Site. Excerpts of her responses to the interview are as follows. OU1 is a groundwater containment system. The treated water is sold to ON Semiconductor for use in the plant. OU1 is fairly effective, but there is a

concern that the system is dewatering the aquifer. The City of Phoenix is copied on associated OU1 reports. The City has not received any citizen complaints regarding OU1. Ms. O'Regan stated that she was unaware of any new regulations/guidance that would affect OU1. She did state, however, that vapor intrusion is a top issue for the City, along with OU3 and the declining water levels. In regards to vapor intrusion, there aren't any standards and the guidance is controversial and she would appreciate some appropriate guidance on how to handle this issue. She stated that the TI Waiver is also a big concern for the City. Ms. O'Regan recommended that Councilman Mattox, Cynthia Parker, and Donn Stoltzfus be interviewed.

George Ring, Robert Frank and Phil Burke, Hydrogeologists with CH2M Hill. Mssrs. Ring, Frank and Burke were retained by and represented Troy Meyer of Honeywell. Excerpts of their responses to the interview are as follows. The main issue raised during the interview process concerned the effectiveness of OU1 in capturing the contamination in the bedrock and that data has not been provided to support full capture. The monitoring well network to show hydraulic capture is not adequate. The effect of OU1 has kept high levels of VOC contamination from migrating to the Honeywell Facility and OU2, and the effectiveness has a great impact on the future operation and longevity of OU2. Another key concern is the adequate characterization on the north side of the plume. They also stated that at one time Honeywell was kept fairly well informed on the activities at OU1, however, Honeywell hasn't been as well informed on document submittals from Freescale over the last few years. Honeywell is concerned that issues raised in the last 5 year review have not been addressed and that similar issues have been discussed during this interview. On June 12, 2006, ADEQ received a supplement to the interview which offers some additional details regarding Honeywell's concerns of the effectiveness of the OU1 system (Appendix G).

Larry Rodriquez, Supervisor, GPI. Mr. Rodriquez provided a written response to the interview questions. Excerpts of his responses to the interview are as follows. OU1 was designed to remove VOC contaminants from the upper status of the water table by creating a cone of depression with extraction wells along the crosscut canal and 46th Street. Since implementation, 3 wells have been taken off-line which suggest to him that the contaminant levels have dropped. The reports show a separation of plumes. Mr. Rodriquez is responsible for providing assistance to O&M personnel, set up of daily routines for equipment maintenance and acts as a liaison to other parties involved in the project. Significant changes to OU1 have included the temporary setup of the Vapor-Pac 10 and the addition of hexametaphosphate to the air stripper to control scaling. O&M difficulties have included the declining water table, hairline cracks found in the vapor phase carbon vessel, and scale buildup. Mr. Rodriquez recommended that extraction in the courtyard area should be increased and that the treated water should be re-injected. Mr. Rodriquez also made a recommendation regarding computer set-up and overall communication technology.

Leo Wilson, Operator, GPI. Mr. Wilson provided a written response to the interview questions. Excerpts of his responses to the interview are as follows. OU1 was designed to obtain and maintain a capture zone to allow the pump and treat of the well water.

Mr. Wilson stated that the remedy is doing what it was designed for. Mr. Wilson operates OU1 during the week and is on call as well. Mr. Wilson stated that general maintenance activities (i.e., pump replacement, floor coating, etc.) have occurred over the last 5 years. Significant changes to OU1 have included installing the Vapor Pac 10 instead of the vapor phase units and the addition of the hexametaphosphate. Mr. Wilson also stated that the drought and the failure of the vapor phase units were some of the difficulties that were encountered. Optimization of OU1 has included changing out pumps and piping to have a control valve on each series of pumps.

Donn Stoltzfus, Environmental Program Specialist, City of Phoenix. Mr. Stoltzfus is a representative of the City of Phoenix and is involved in issues surrounding the redevelopment of the site. Excerpts of his responses to the interview are as follows. OU1 is a treatment system in the Courtyard Area and an SVE system was implemented in the parking lot to the south. OU1 is a containment remedy. Mr. Stoltzfus stated that he would like to see more investment in the removal of DNAPL at OU1. Mr. Stoltzfus stated that there haven't been any communications from his office regarding OU1 and that there also has not been any complaints received on OU1. He is not aware of any community concerns regarding OU1. He stated that he feels that he has been kept reasonably well informed about the project. He is aware that there are re-development plans for the area and the City is concerned about groundwater resources in the area. Mr. Stoltzfus stated that he thought that the appropriate O&M and monitoring have been implemented for OU1.

6.6 Site Inspection

Representatives of ADEQ, LFR, ON Semiconductor, and Freescale conducted a site inspection of the OU1 Treatment System on June 8 and 9, 2006. The inspection was lead by Kris Paschall, Project Manager for ADEQ, and Robert Forsberg, Project Manager for LFR. Other inspection participants included Michael Nesky and Ned Overs from LFR, David Haag from ADEQ, and Tim Jones from ON Semiconductor. The inspection was supported by Tom Suriano, Project Manager for Freescale and Larry Rodriguez, Operations Supervisor of GPI, who guided the inspection team around the OU1 systems and answered questions from the inspection team. The site inspection was performed using a checklist prepared by LFR. The completed checklist is included in Appendix H.

The site inspection involved the following activities:

- conducting interviews with on-site operators;
- reviewing documents that are maintained off-site and on-site;
- visual inspection of the OU1 Treatment System.

Weather conditions during the inspection were favorable, sunny with high temperatures. No problems were encountered with access to relevant site features

inspected. The treatment inspection was conducted to provide information regarding the O&M status and document the conditions of the treatment plant.

Prior to performing the site inspection, LFR reviewed available copies of historical design and engineering documents, record drawings, treated effluent monitoring plan, the PQGWWP, the IGWTP effluent monitoring records/data and air emissions data, carbon change out records, waste profiling data, and manifests of the spent carbon and recovered solvents sent off-site for regeneration and recycling. During the inspection, LFR reviewed the IGWTP records, including: daily/bi-weekly/monthly operating logs, pH/ORP calibration logs, maintenance logs, and other documents to assess operation and maintenance compliance. No significant issues with record keeping were discovered and all operation and maintenance activities were being performed in compliance with original and/or modified design specifications.

A review of the air emissions data was conducted as part of the site inspection. Air emissions effluent data indicated that all effluent sample results were less than 3 pounds per day. Between 2001 and 2003, influent and effluent air emissions were analyzed using a handheld photoionization detector (PID). From August 2003 through current, influent and effluent air emissions were sampled and submitted to an analytical laboratory for testing. Air samples are collected routinely (typically every two weeks). The air samples are collected to monitor the removal efficiency of the carbon and to determine when the carbon needs to be replaced. The carbon is changed out and replaced with fresh carbon when it is determined that the carbon efficiency is low.

In general, the *OU1 IGWTP remediation system* was in fair condition and operating within specified ranges. However, all components of the IGWTP are significantly weathered and aged and likely nearing the end of their serviceable life, such that replacement rather than routine maintenance should be evaluated on a lifecycle basis.

7.0 TECHNICAL ASSESSMENT

In accordance with the *Comprehensive Five Year Review Guidance* (Guidance), dated June 2001, the five-year review should determine if the remedy is protective of human health and the environment and that it satisfies the performance criteria set forth in the decision documents. In order to assess the protectiveness of the remedy, the technical assessment should address three questions:

Question A: Is the remedy functioning as intended by the decision documents?

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

Pursuant to Guidance, these questions were developed as the framework for organizing and evaluating data and information and ensure that all relevant issues are considered when determining the protectiveness of the remedy.

The following subsections will examine each of these questions in detail.

7.1 Question A: Is the remedy functioning as intended by the decision documents?

The following sections discuss the performance of the OU1 remedy. The technical assessment included reviewing the following:

- remedial action performance and monitoring results;
- system Operations/O&M;
- costs of the system operations/O&M;
- opportunities for optimization;
- early indicators of potential remedy problems; and
- implementation of institutional controls and other measures.

The relevant decision documents are summarized in Section 3.3.7. Based on these documents, the performance standards for the OU1 interim remedy are:

- soil vapor extraction in identified source areas to remove VOCs in the unsaturated soils to levels agreed upon by ADEQ;

- establish a zone of capture at the Old Crosscut Canal to hydraulically contain groundwater contamination. The system should also have a beneficial impact on groundwater quality within bedrock;
- source area (on-site) groundwater extraction to reduce or eliminate contaminant migration;
- end use of all extracted groundwater at the former Motorola 52nd Street Facility (now ON Semiconductor);
- treatment of extracted groundwater to meet federal, state, and local standards for the designated end-use.

7.1.1 Remedial Action Performance and Monitoring Results

Soil Remedy

The Courtyard SVE and SWPL AS/SVE systems were not in operation during this five-year review period. Freescale submitted a letter requesting closure of the Courtyard SVE on April 30, 1998. ADEQ reviewed Freescale's request and recommended preparing a workplan for collection of soil or soil gas samples. Once the workplan is finalized, ADEQ will determine an evaluation criteria based on Arizona's Soil Rule. Arizona's Soil Rule is in the process of being revised. Once the Soil Rule is promulgated, the CO will be amended to include the new provisions.

On March 21, 2001, Freescale provided a written request for an NFA of the continued soil remediation at the SWPL Area. ADEQ determined that the soil cleanup in the SWPL Area was complete in a letter dated November 15, 2002.

No active soil remediation has been conducted in the ATP Area to date. Data collected by Freescale suggests that soil vapor extraction is not needed at the ATP; however, ADEQ and Freescale have agreed to conduct a soil investigation pending the revision of Arizona's Soil Rule.

Groundwater Remedy

The groundwater extraction system consists of 16 on-site and 9 off-site extraction wells. The 16 on-site extraction wells are intended to reduce the high concentrations within the source areas. The 9 off-site extraction wells provide hydraulic containment west of the site to approximately the Old Crosscut Canal. There are also a total of 68 monitoring wells within OU1, 27 of which are multiport or Westbay™ wells.

Extracted groundwater is treated in the IGWTP and transferred to the ON Semiconductor plant for use in their processes providing a beneficial end use for the water. Treatment plant influent and effluent data are collected on a bi-monthly basis. The effluent results were compared to the requirements of the ROD and LOD. Based on the data reviewed, the treated effluent met the requirements of the ROD and LOD.

In order to effectively assess groundwater contaminant capture, the OU1 interim remedy was evaluated based on a systematic approach developed by EPA using six basic steps for systematic capture zone analysis using "converging lines of evidence" and an iterative approach (Capture Zone Analyses for Pump-and-Treat System, EPA Training Course hand-outs, presented to the State of Arizona, May 25, 2005). The following guidance documents were used to perform the analysis:

- *Methods for Monitoring Pump-and-Treat Performance, U.S. EPA, Office of Research and Development, 1994 (EPA 600-R-94-123)*
- *Elements for Effective Management of Operating Pump and Treat Systems, U.S. EPA, Office of Solid* Waste and Emergency Response, 2002 (EPA 542-R-02-009)

The above described EPA six step approach for the OU1 capture zone is summarized in the following subsections.

7.1.1.1 Step 1: Review Site Data, Site Conceptual Model, and Remedy Objective

The review of site data was summarized in Section 5.4.

Conceptual Site Model

The Site is located in the eastern part of the City of Phoenix. There is a mixture of residential, commercial, and industrial land use in the area overlying the site. Releases of hazardous substances from the former Motorola 52nd Street Semiconductor Products Plant impacted soil and groundwater and the releases from multiple sources have created an extensive groundwater contaminant plume (see Figure 1). Additional potentially responsible parties may have also contributed to the groundwater plume. The primary COCs are TCE, TCA, and their reductive daughter products. These contaminants seeped in the subsurface, though the vadose zone, and have mixed into and spread with the groundwater.

The Site is situated in the western Salt River Valley of the Basin and Range Physiographic Province characterized by alluvial-filled basins bounded by fault-block mountain ranges (Reynolds and Bartlett, 2002). OU1 occurs near the eastern basin margin with outcrops of bedrock a relatively short distance to the east, northeast, and southeast. Two primary hydrogeologic units have been identified at OU1: an upper alluvial unit and underlying bedrock. The alluvial unit is further subdivided into several subunits elsewhere in the basin, but at OU1 is relatively thin and characteristic of the finer-grained or "basin fill" alluvium subunit.

Data collected from groundwater monitor wells installed during investigations of the Site starting in 1983, indicates that the groundwater table is encountered at depths ranging from approximately 40 ft bgs beneath the former Motorola Facility to approximately 75 feet bgs at the Old Crosscut Canal. Potentiometric maps developed based on that data indicate groundwater flow under OU1 is generally to the west-

southwest although locally it may vary significantly due to areas of groundwater extraction and, in the alluvium, as a result of bedrock subcrops that intersect the water table and alter or impede groundwater flow. Groundwater flow in bedrock is thought to occur predominately as fracture flow.

The COCs have been identified in both alluvium and bedrock. TCE concentrations in groundwater in the alluvial unit generally peak between 1,000 and 3,500 µg/l in the source area, and in the vicinity of the Old Crosscut Canal. In bedrock, TCE concentrations in groundwater are greater than 10,000 µg/l in the source area and greater than 5,000 µg/l beneath the vicinity of the Old Crosscut Canal. There is a high likelihood that DNAPL is present when dissolved-phase concentrations in groundwater in the vicinity of the source exceed 1 to 5 percent of the solubility limit. Source area concentrations of TCE indicate the presence of DNAPL and DNAPL has been observed in monitor well MP-03-D.

Remedial Action Objectives

In summary, the remedial action objectives of the OU1 interim remedy regarding groundwater are:

- establish a zone of capture at the Old Crosscut Canal to hydraulically contain groundwater contamination. The system should also have a beneficial impact on groundwater quality within bedrock;
- Source area (on-site) groundwater extraction to reduce or eliminate contaminant migration.
- End use of all extracted groundwater at the former Motorola 52nd Street facility (now On Semiconductor).
- Treatment of extracted groundwater to meet federal, state, and local standards for the designated end-use.

7.1.1.2 Step 2: Define the Site-specific Target Capture Zone

The site-specific Target Capture Zone (TCZ) is defined as the entire width and depth of the OU1 contaminant plume, primarily TCE, in the vicinity of Old Crosscut Canal. This means that the width of the contaminant plume in both the alluvium and bedrock units.

The OU1 remedy was designed to reduce or eliminate contaminant migration in groundwater under the Courtyard and SWPL Areas and establish a zone of capture at the Old Crosscut Canal to hydraulic contain groundwater contamination. The design includes a total of 25 groundwater extraction wells: four in the Courtyard, twelve in the SWPL Area, and nine at the Old Crosscut Canal. The majority of these 25 groundwater extraction wells were constructed with screens that extend across the alluvial/bedrock interface. This screen design allows groundwater to be extracted from alluvium and bedrock. Because the bedrock has a hydraulic conductivity that is typically one or more

orders of magnitude lower than the alluvium, the majority of extracted water from the wells comes from the alluvium. According to Freescale, extraction of alluvial groundwater creates an upward vertical gradient in bedrock. Based on this theory, establishing a zone of capture in the alluvium creates a zone of capture in the bedrock. With the exception of the issues regarding capture below, Freescale has shown that locally, adequate alluvial capture creates the necessary vertical gradients to provide a supporting line of evidence for capture in bedrock.

7.1.1.3 Step 3: Interpret Water Levels Using Potentiometric Surface Maps and Water Level Pairs

Potentiometric Surface Maps and Hydrogeologic Cross Sections

Groundwater levels have been interpreted for the OU1 remedy in Groundwater Monitoring Reports and Annual Effectiveness Reports. Alluvial water level elevation maps and water level elevation cross sections have been completed by Freescale for each fall sampling event. Copies of the maps and cross sections from the Annual Effectiveness Reports for 2001, 2002, 2003, 2004, and 2005 operations are included in Appendix C. These figures depict the groundwater elevation contours and zone of capture as interpreted by Freescale. It should be noted that Freescale uses water levels adjusted for well efficiency from the extraction wells in each of the elevation maps.

Review of these Annual Effectiveness Reports has consistently identified two primary issues associated with capture.

EW-18

TCE concentrations in EW-18 began to increase in the late 1990's and have been approximately 20 µg/L for the last five years. These concentrations are a concern because the well is located north of the primary alluvial groundwater contamination migrating around the north end of the local bedrock ridge. The presence of TCE above the Arizona Aquifer Water Quality Standard (5 µg/L) has not been adequately addressed by the conceptual site model. Additionally, there are no wells in the immediate vicinity to better define the extent of contamination north and west of the well. Also, the well is located near the margin of the zone of capture; meaning that potential groundwater contamination north and west of the well may not be captured by the Old Crosscut Canal extraction wells.

Uncertainty of Vertical Capture

The OU1 system depends on effective alluvial capture for bedrock capture. In theory, extracting groundwater in the alluvium creates a local lower pressure condition at the alluvium/bedrock interface. The result is an induced upward vertical gradient in the underlying bedrock and thereby capture in bedrock. The theory depends on adequate pumping in the alluvium and saturated conditions at the alluvium/bedrock interface. This concept of bedrock capture has been supported by upward vertical gradients

indicated in several multiport/Westbay™ wells in OU1; however, one of the wells, DM-606, has consistently indicated a downward vertical gradient.

Freescale has maintained that the downward vertical gradients are induced by the system and at depth become upward vertical gradients that are ultimately captured by the Old Cross Cut Canal extraction wells. This issue was specifically identified during review of the 2003 Annual Effectiveness Report. Freescale responded by referencing a flow net from 1992 which indicates that groundwater moving past the deepest DM-606 port (330 ft bgs) is within the zone of capture. The following response was provided by ADEQ:

The downward vertical gradient in DM606 may adversely affect deep bedrock capture. Freescale's response indicates that water moving past the deeper DM606 ports is deflected upward toward the extraction system citing upward vertical gradient data near the extraction system as support. An upward vertical gradient is indicated by the DM603 data however; the deepest port in this well is only 245 ft bgs (approximately 938 ft msl). The two lowermost ports of DM606 are deeper at 330 ft and 370 ft bgs (approximately 865 ft and 825 ft msl, respectively). The shallower ports of DM603 provide less support for capture of groundwater flowing past the deeper DM606 ports. Furthermore, the 1992 flow net provided in the Responses illustrates that groundwater moving past the 330 ft port of DM606 is just within the zone of capture.

In summary, additional data are needed to support vertical capture in the vicinity of DM-606. Freescale's new multiport groundwater monitor wells should provide additional data useful in evaluating vertical capture, but more data is needed in the vicinity of DM-606.

7.1.1.4 Step 4: Perform Calculations (if appropriate based on Site complexity)

ADEQ's review of the 2003 Annual Effectiveness Report included a request for Freescale to develop flow nets based on vertically distributed groundwater elevation data and incorporating changes in aquifer properties between the alluvial aquifer and bedrock aquifer as a means to more closely examine the issue of vertical capture. Freescale responded by referencing a flow net from 1992 which indicated that groundwater moving past the deepest DM-606 port (330 ft bgs) was within the zone of capture. ADEQ's response, provided above, indicated that the flow net illustrated that capture was minimally demonstrated and additional data were needed to support vertical capture.

Freescale also recently developed a numeric groundwater flow model to analyze capture and longevity of the interim remedy. ADEQ has performed a review of the model and determined that several problems exist. ADEQ notes that it is problematic to attempt to model fractured bedrock conditions in a porous medium model; however, ADEQ does not feel the bedrock conductivity values used in the model are representative of the Site and may overestimate capture. ADEQ and Freescale are currently working through actions related to the final feasibility study to address the bedrock conductivity issue.

7.1.1.5 Step 5: Evaluate Concentration Trends

Groundwater chemistry plots provided by Freescale in the Annual Effectiveness Reports are presented in Appendix F. The graphs provide supporting evidence for the reduction of mass in alluvial groundwater monitor wells; however, concentration trends in groundwater extraction wells and groundwater monitor wells screened in bedrock are complex and not easily interpreted.

Several of the groundwater extraction wells, which are typically screened across both alluvium and bedrock, show increasing concentration trends. Freescale has indicated that these trends provide evidence to support that the OU1 system is causing contamination in bedrock to migrate upward, toward the alluvium. Freescale has also indicated that the increasing trends are a result of an increasing portion of extracted water from bedrock versus alluvium. The overall concentration trend increases because the bedrock concentrations are higher than the alluvial concentrations. Freescale also indicates that the increasing trends in specific wells screened only in bedrock are an indication that the OU1 system is causing contamination in deeper bedrock to migrate upward into shallow bedrock.

While it may be appropriate to consider each of these concepts and the impact on the OU1 system, they provide a limited supporting line of evidence for capture. The data are limited because alternate interpretations exist, based on the available data. As discussed in the preceding sections, additional data are needed to more fully evaluate this line of evidence.

It was also noted that groundwater concentrations in the shallow bedrock ports of DM-125 and DM-601 appear to be increasing. These data indicate that the on-site groundwater extraction system may not be reducing or eliminating contaminant migration from the source area.

7.1.1.6 Step 6: Interpret Actual Capture Based on Steps 1-5, Compare to Target Capture Zone, and Assess Uncertainties and Data Gaps

ADEQ is concerned that the source area interim remedy is not significantly effective in reducing the levels of contaminants due to the DNAPL in the fractured bedrock. ADEQ is concerned that high concentrations of TCE will continue in the source area wells for a long period of time.

Based on increasing groundwater concentrations in the shallow bedrock ports of DM-125 and DM-601, the on-site groundwater extraction system may not be reducing or eliminating contaminant migration from the source area.

Based on a conservative interpretation of the data, using converging lines of evidence, it appears that capture of the TCZ in bedrock is uncertain.

Concentrations in extraction well DM-313 are currently very close to the MCL for TCE. Concentrations in this well have been increasing slightly over the last three years.

If concentrations continue to increase and exceed the MCL, this well must be put back into operation.

Based on a conservative interpretation of the data, using converging lines of evidence, it appears the alluvial portion of the OU1 system may not be meeting the remedy objectives in the area of EW-18/Old Crosscut Canal. Adequacy of capture in this area is further complicated by the lack of groundwater elevation and quality data in the vicinity of EW-18.

Alternative interpretations of capture are possible; they are related to alternative interpretation of capture in bedrock and bedrock conductivity. Additional data are needed to address the TCZ in alluvium and bedrock.

7.1.2 System Operations/O&M

In general, the OU1 IGWTP remediation system was in fair condition and operating within specified ranges. However, all components of the IGWTP are significantly weathered and aged and likely nearing the end of their serviceable life, such that replacement rather than routine maintenance should be evaluated on a lifecycle basis.

7.1.3 Costs of System Operations/O&M

From 2001 to 2002, O&M costs for the IGWTP increased from approximately $577,703 to $1,206,523. Freescale stated that the increase was related to the ON Semiconductor-Motorola separation and represented the accrual of land and utility costs not previously captured since the remedy was integrated into the manufacturing operations at the former Motorola 52nd Street Facility. From 2002 to 2005, the O&M costs were generally consistent. Table 2 provides the annual O&M costs from 2001 to 2005. These costs do not include other response costs that were incurred for OU1 (e.g., agency oversight).

7.1.4 Monitoring Activities

Capture and containment can only be confirmed with an adequate monitor well network that provides both groundwater level data to demonstrate hydraulic capture and groundwater quality data to demonstrate overall reduction of mass within and outside the capture zone(s). A review of the existing monitor well network indicated several areas where lack of data hinders the evaluation of the effectiveness of the remedy. Additional alluvial and bedrock monitor wells are needed in the vicinity of EW-18 to address the extent of contamination and evaluate capture of the TCZ. Additional bedrock monitor wells are also needed to address the uncertainty of capture in bedrock both downgradient of the on-site system and at the Old Crosscut Canal system. Freescale has installed one multiport monitor well downgradient of the Old Crosscut Canal; however, additional monitor wells are needed to support the assessment of capture in bedrock.

7.1.5 Opportunities for Optimization

A review of the IGWTP treatment system indicated that there may be an opportunity to increase the air stripper's efficiency by changing the type, size and configuration of packing within the air stripper columns. Such a change likely has the most potential to provide significant increases in air stripper treatment operational efficiencies.

Moreover, a lifecycle cost analysis should be performed to determine if optimization of the existing system versus replacing the existing treatment and/or extraction system is preferable. New extraction well and/or extraction pump designs and specifications should be evaluated against long-term groundwater capture and remedial objectives.

7.1.6 Early Indicators or Potential Remedy Problems

Potential Capture Problems

Extraction primarily from the alluvial aquifer is credited for hydraulic capture at substantial depth in the bedrock aquifer. As yield from the alluvial aquifer decreases, resulting changes in the predicted vertical capture needs to be addressed. Freescale has indicated that adequate capture in bedrock is readily maintained by the current system despite current or future declining groundwater levels.

As previously stated by ADEQ in Effectiveness Report comments and during meetings with Freescale, declining groundwater elevations at the Site due to both regional decline and OU1 pumping, potentially aggravate the existing uncertainty of bedrock capture. The potential finite capacity of the system to capture bedrock contamination as the regional aquifer continues to decline represents a potential remedy problem.

In response to the issues raised by ADEQ regarding the potential remedy problem, Freescale developed a groundwater flow model to analyze future system effectiveness under continuing groundwater decline. The results of the model were included in the *Groundwater Remedial Alternative Analysis, Motorola 52nd Street OU1, Phoenix, Arizona* Report prepared by GeoTrans, Inc., dated September 30, 2005 (GRAA). Review of the Report indicates that Freescale believes the groundwater modeling effort adequately demonstrates that continued decline of regional groundwater levels will not result in a failure of the Old Crosscut Canal system to capture the TCZ. The GRAA also recommends increased bedrock extraction at the Courtyard to optimize reduction of mass and increase bedrock capture.

The model and GRAA are currently under review; however, preliminary findings indicate several issues with the model and the Report exist. ADEQ and Freescale met to discuss ADEQ's initial review. ADEQ is concerned that a fundamental difference in the conceptual site models of ADEQ and Freescale exists. The difference is centered on the nature of bedrock conductivity and contamination. Freescale indicates that bedrock conductivity is very low (i.e., less than 0.1 ft/day and likely as low as 0.025 to 0.0025 ft/day) and that concentrations in bedrock can only be minimally impacted by

groundwater extraction. ADEQ believes that site data indicate that the bedrock is more conductive and that bedrock concentrations have been significantly impacted and may be more readily impacted by increased bedrock extraction. ADEQ feels that the bedrock hydraulic conductivity data gap must be addressed to effectively evaluate future remediation of OU1.

ADEQ and Freescale agreed that a pilot test is needed to develop a better understanding of bedrock conductivity. Freescale is currently developing a workplan to address this data gap.

System Operations Problems

Downsizing and frequent cycling of groundwater extraction pumps due to lower than anticipated water production rates is an early indicator of either improper well construction or declining groundwater elevations (e.g., drought), or both, which could result in failure of the remedy to perform adequate capture.

7.1.7 Implementation of Institutional Controls and Other Measures

Institutional controls have been implemented by ADEQ regarding access to contaminated groundwater. Since WQARF was revised in 1997, ADEQ and ADWR have developed a procedure whereby ADWR notifies ADEQ when a NOI to Drill a Monitor Well within the Motorola 52nd Street Superfund Site has been filed. ADEQ can then notify the property owner of the risk involved with using the groundwater.

7.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?

7.2.1 Changes in Standards and To Be Considered

No ARARs were established in the OU1 ROD and LOD. However, there were standards established for work on the Site in the CO. OU1 is currently in compliance with the requirements of the CO (Table 4 and 5). No chemical-specific soil or groundwater clean-up levels were established in the ROD and LOD. However, new ARARs and TBCs will be determined for the final remedy as described in the forthcoming Remedial Action Objectives Report for OU1. The purpose of the RAO Report is to establish remedial objectives for the OU1 Area that are based on current and reasonably foreseeable uses of the groundwater and property. The remedial objectives will be based on the ARARs and TBCs developed for the Site. Chemical-specific ARARs that should be considered for the final remedy are discussed below.

Standards for soil will likely include Arizona Soil Remediation Levels (SRLs), Arizona Groundwater Protection Limits (GPLs), Arizona Health Based Guidance Levels (HBGLs), or EPA Preliminary Remediation Goals (PRGs). The SRLs are statewide clean-up levels and apply to all environmental regulatory programs administered by ADEQ. Because COCs in the vadose zone have leached into and impacted the

groundwater, it is possible that calculated GPLs would be more stringent than the SRLs. If ADEQ remediation standards are not established for particular compounds, the use of HBGLs would be relevant and appropriate. If HBGLs are not available, EPA Region IX PRGs for industrial soils would then be relevant and appropriate.

Standards for groundwater will likely include Arizona AWQSs, EPA MCLs, and PRGs. The AWQSs provide numeric standards for drinking water protected use, which are applicable to all groundwater remediation activities conducted in the State of Arizona. If AWQSs standards are not established for particular compounds, the use of MCLs would be relevant and appropriate. If MCLs are not established for particular compounds than the use of HBGLs would be relevant and appropriate. If HBGLs are not available, EPA Region IX PRGs would then be relevant and appropriate.

7.2.2 Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics

Land use at the Site has remained relatively the same and no new human health or ecological routes of exposure have been identified.

Since the 1992 health evaluation, there have been a number of changes to the toxicity values for certain contaminants of concern at the Site (Table 6). Revisions to the toxicity values for 1,1-DCE and vinyl chloride indicate a lower risk from exposure to these chemicals that previously considered. On the other hand, evaluation of the toxicity values for PCE and TCE is ongoing and may indicate higher risks from exposure than previously considered.

The greatest uncertainty with toxicological changes for the Site is associated with TCE. In August 2001, U.S. EPA's Office of Research and Development (ORD) released the draft *Trichloroethylene Health Risk Assessment: Synthesis and Characterization* (TCE Health Risk Assessment) for external peer review. The draft TCE Health Risk Assessment takes into account recent scientific studies of the health risks posed by TCE. According to the draft TCE Health Risk Assessment, for those who have increased susceptibility and/or higher background exposures, TCE could pose a higher risk through inhalation than previously considered. The draft TCE Health Risk Assessment is available on-line at: http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=23249.

The Science Advisory Board, a team of outside experts convened by U.S. EPA, reviewed the draft TCE Health Risk Assessment in 2002. The Science Advisory Board's review of the draft TCE Health Risk Assessment is available at: http://www.epa.gov/sab/pdf/ehc03002.pdf.

In July 2006, the National Academy of Sciences completed additional peer review of scientific issues that were the basis for the draft TCE Health Risk Assessment. In response to this review, U.S. EPA will revise the draft TCE Health Risk Assessment.

Consequently, review of the toxicity value for TCE may continue for a number of years. This issue will need to be updated in subsequent five-year reviews.

In addition, an HBGL and PRG have been established for 1,4-dioxane. This contaminant has been detected at the Site at elevated concentrations and should be addressed in the final remedy.

7.2.3 Changes in Risk Assessment Methods

The1992 risk assessment methodology was based on *EPA Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual: Part A* (EPA, 1989). Current methodology for risk assessment has not changed, however, the air model used to estimate indoor risks has changed and it would be prudent to model current risks based on this newer model (EPA *Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway From Groundwater and Soils, November 2002*) and updated toxicity values. ADEQ is currently evaluating the methodology for assessing the indoor air risks and will implement the methodology once the guidance is finalized, or other methodology can be agreed upon by ADEQ and EPA. In the meantime, ADEQ requested Freescale to conduct a study in 2005 using soil gas data collected during a 1995 soil gas investigation at OU1. The results of this study are discussed in Section 3.3.11.

7.2.4 Progress Towards Meeting RAOs

The RAOs provided in the LOD, ROD were selected to set goals for an interim groundwater remedy designed to contain and reduce groundwater contamination. No chemical-specific soil or groundwater clean-up levels were established in the ROD and LOD. Freescale is currently conducting a Groundwater Remedial Alternatives Analysis as an addendum to the 1987 feasibility study (FS) to support the selection of a final remedy. Therefore, the current set of RAOs is being re-evaluated to set cleanup standards for a final remedy.

7.3 Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

ADEQ is aware that there may be additional upgradient sources to groundwater contamination. ADEQ is currently conducting potentially responsible party (PRP) searches to identify these potential sources and will evaluate whether these sources impact the remedy.

As groundwater elevations decline at the Site due to both regional decline and OU1 pumping, the area of the alluvium/bedrock interface is increased, potentially aggravating the existing uncertainty of bedrock capture. The potential finite capacity of the system to capture bedrock contamination as the regional aquifer continues to decline represents a potential remedy problem.

7.4 Summary of Technical Assessment

According to the data reviewed, the site inspection, and the interviews, ADEQ has identified several concerns that questions the effectiveness of the remedy. Capture in bedrock and to the north of the Old Crosscut Canal (near EW-18) is questionable. In addition, concentrations in groundwater downgradient of the source area indicate that the onsite groundwater extraction system may not be reducing or eliminating contaminant migration from the source area. Continuing decline of groundwater elevations may call into question the future effectiveness of the groundwater treatment system.

Changes to toxicity factors of certain COCs have occurred and should be evaluated. In addition, new methodology to evaluate indoor air risks is being developed. While no chemical-specific soil or groundwater clean-up levels were established in the ROD and LOD, ADEQ is currently developing chemical-specific RAOs for the final remedy.

8.0 ISSUES

The following issues discovered during the five-year review are discussed below and are included in Table 7.

8.1 Groundwater Issues

Several groundwater issues were identified during the technical assessment of the OU1 interim remedy. These issues are primarily associated with groundwater capture and source removal. The following is a list of the issues.

8.1.1 Capture Issues

1) Capture and containment can only be confirmed with an adequate monitor well network that provides both groundwater level data to demonstrate hydraulic capture and groundwater quality data to demonstrate overall reduction of mass within and outside the capture zone(s). Additional groundwater elevation and quality data are needed to adequately evaluate the OU1 system. The monitoring network needs to be evaluated and updated based on current site conditions and issues.

2) Based on a conservative interpretation of the data, using converging lines of evidence, it appears that capture of the TCZ in bedrock is uncertain. Additional bedrock monitor wells are needed to address the uncertainty of capture in bedrock both downgradient of the on-site system (DM-125, DM-601, and DM-606 areas) and the OCC system (between OCC and DM-118, DM-119, DM-120, DM-122, DM-123, DM-502, and DM503 area). Freescale has installed one multiport bedrock well; however, an increased monitor well network is needed to support the assessment of capture in bedrock.

3) Based on a conservative interpretation of the data, using converging lines of evidence, it appears the TCZ in the vicinity of EW-18 is questionable. Additional alluvial and bedrock monitor wells are needed in the vicinity of EW-18 to address the extent of contamination and evaluate capture of the TCZ.

4) Extraction primarily from the alluvial aquifer is credited for hydraulic capture at substantial depth in the bedrock aquifer. ADEQ is concerned that declining groundwater elevations at the site due to both regional decline and OU1 pumping will reduce the effectiveness of bedrock capture. As yield from the alluvial aquifer decreases, resulting changes in the predicted vertical capture needs to be addressed. The potential finite capacity of the system to capture bedrock contamination as the regional aquifer continues to decline represents a potential remedy problem.

5) Concentrations in extraction well DM-313 are currently very close to the MCL for TCE. Concentrations in this well have been increasing slightly over the last

three years. If concentrations continue to increase and exceed the MCL, this well must be put back into operation.

8.1.2 Source Removal Issues

6) ADEQ is concerned that the source area interim remedy is not significantly effective in reducing the levels of contaminants due to the DNAPL in the fractured bedrock. ADEQ is concerned that high concentrations of TCE will continue in the source area wells for a long period of time.

7) Groundwater concentrations in the shallow bedrock ports of DM-125 and DM-601 appear to be increasing. These data indicate that the onsite groundwater extraction system may not be reducing or eliminating contaminant migration from the source area.

8.2 Soil Issues

The following issues regarding soils were discovered during the five-year review.

8) Confirmatory soil sampling should be conducted at the Courtyard to obtain closure. Soil sampling should be conducted once the Arizona Soil Rule and guidance has been finalized.

9) The CO required that an SVE system be installed at the ATP. No active soil remediation has been conducted in the ATP area to date. Soil sampling should be conducted at the ATP to obtain closure once the Arizona Soil Rule has been finalized.

8.3 Health Assessment Issues

The following issues were discovered during the five-year review.

10) Changes to the toxicity levels for certain contaminants have occurred since the last five-year review.

11) New methodology is being developed for indoor air risk evaluation. Once the methodology is finalized or EPA and ADEQ can agree to the process for evaluating the pathway, an indoor air risk evaluation should be performed for the OU1 Area.

12) The Baseline Risk Assessment and Health Assessments recommended to sample Mr. Morgan's well. Access may be an issue for sampling this well. A plan should be developed regarding this well.

13) There is a potential for unregistered, private wells to exist in the OU1 Area.

8.4 O&M Issues

The following O&M issues were identified during the five-year review.

14) The secondary containment system's protective coatings showed signs of weathering (e.g., cracked, peeling, lifting).

15) All PVC piping, valves, and other appurtenances showed signs of ultraviolet (UV) light weathering (e.g., brittle appearance).

16) The stainless steel steam pressure tanks were stress corroded and cracked (this is one of the reasons the steam regeneration is no longer used).

17) Most steel (non-stainless steel) appurtenances (e.g., vacuum release valves/breakers, manual ball valves, etc.) showed signs of rusting and/or corrosion.

8.5 General Issues

The following general issues were identified during the five-year review.

18) The COCs should be identified for the final remedy.

19) Air emissions and influent/effluent analytical data are an important tool for evaluating the effectiveness of the treatment system and should be reported in the annual Effectiveness Reports.

20) Additional upgradient sources to groundwater contamination may exist.

9.0 FOLLOW-UP ACTIONS AND RECOMMENDATIONS

Based on the issues identified during the five-year review process, the following corrective actions should be taken. Table 8 provides a summary of the follow-up actions and recommendations listed below along with the responsible party, oversight agency, and schedule for completion.

9.1 Follow-up Actions

9.1.1 Groundwater Follow-up Actions

The following follow-up actions regarding the groundwater issues at the OU1 area should addressed.

9.1.1.1 Groundwater Capture

1, 2, 3) A work plan should be prepared and submitted to ADEQ to address the OU1 data gaps identified in Section 8.1.1. The work plan should include a summary of the current conceptual site model, a review of the existing OU1 groundwater monitoring well network and other available data, identify the data gaps, and propose the work necessary to fill the data gaps.

4) A work plan should be prepared and submitted to ADEQ to address the bedrock hydraulic conductivity and extraction issues. The work plan should include the installation of a deep bedrock extraction and monitor wells such that a bedrock extraction pilot study may be completed to evaluate bedrock hydraulic conductivity. The results of the study should be incorporated into the feasibility study for the final remedy.

5) Freescale should prepare a plan to monitor the concentrations in DM-313. If these concentrations continue to increase and exceed the MCL, the well should be put back into operation.

9.1.1.2 Source Removal

6) Freescale submitted a *Groundwater Remedial Alternatives Analysis* report in September 2005 followed by an *Addendum to the Groundwater Remedial Alternatives Analysis* report in December 2005 evaluating treatment technologies for DNAPL. The report is currently under review by ADEQ.

7) Freescale should prepare a plan to evaluate the effectiveness of the source area treatment system.

9.1.2 Soil Follow-up Actions

The following follow-up actions regarding the soil issues at the OU1 area should addressed.

8) Freescale should develop a workplan to evaluate the vadose zone at the Courtyard area. The work plan should include evaluation criteria for clean-up. ADEQ will provide Freescale with the evaluation criteria once the Soil Rule is finalized.

9) A work plan should also be developed for obtaining closure at the ATP. The closure criteria will be established once the Soil Rule is finalized and should be included in the work plan.

9.1.3 Health Assessment Follow-up Actions

The following follow-up actions regarding the health assessment issues at the OU1 area should addressed.

10) A review of the toxicity values for COCs at the Site should be conducted before the final remedy is selected.

11) Freescale has previously prepared a work plan to address the vapor intrusion to indoor air pathway. New methodology is being developed for indoor air risk evaluation. Once the methodology is finalized or EPA and ADEQ can agree to the process for evaluating the pathway, an indoor air risk evaluation should be performed for the OU1 Area. The work plan should be updated to meet these requirements.

12) ADEQ and Freescale should develop a plan to collect groundwater samples from Mr. Morgan's well and take further actions if necessary.

13) ADEQ issues a fact sheet every other year to all the addresses listed within the Motorola 52nd Street Superfund Site. ADEQ will include a note in the next fact sheet requesting owners to notify ADEQ of any private well.

9.1.4 O&M Follow-up Actions

The following follow-up actions regarding the O&M issues at the OU1 area should addressed.

14) The secondary containment system's protective coatings should be repaired.

15) The PVC piping, valves, and other appurtenances that showed signs of weathering should be replaced.

16) The stainless steel steam pressure tanks should be replaced if they are brought back into use.

17) Steel appurtenances that showed signs of rusting and/or corrosion should be replaced.

9.1.5 General Follow-up Actions

The following follow-up actions regarding the general issues at the OU1 area should addressed.

18) ADEQ and Freescale should establish a list of COCs for the Site. Once the list has been established, Freescale should conduct a sampling round to evaluate the COC list for the RAOs for the final remedy.

19) Freescale needs to include the air emission and groundwater influent/effluent analytical data in the annual Effectiveness Reports.

20) ADEQ will conduct a PRP search for upgradient sources and will evaluate whether these sources will impact the remedy.

9.2 Parties Responsible for Implementation

Freescale, as identified in the supporting decision documents, is responsible for the recommended actions.

9.3 Agencies with Oversight Authority

Pursuant to the supporting decision documents, ADEQ is the current agency with oversight authority

9.4 Schedule for Completion

Because the OU1 interim remedy issues identified above are current and ongoing, the recommended actions under Section 9.1 should be conducted as soon as practical. Table 8 outlines the expected completion date.

10.0 PROTECTIVENESS STATEMENT

A protectiveness determination of the OU1 interim remedy cannot be made at this time until further information is obtained. The necessary follow-up actions and recommendations identified in this Report are needed to evaluate protectiveness. The actions will require the efforts of Freescale and ADEQ to be completed. It is expected that these actions will take approximately 1 year to complete at which time a protectiveness determination will be made.

11.0 NEXT REVIEW

The next review for the Site is required within five years of EPA's signature of this review. It is anticipated that the next review will be completed by the end of September 2011.

TABLES

Table 7 - Identified Issues and Noted Concerns for OU1
Motorola 52nd Street Superfund Site
Phoenix, Arizona

#	Type	Issues	Protectiveness Affected?	
			Current	Future
1	Groundwater Capture	Capture and containment can only be confirmed with an adequate monitor well network that provides both groundwater level data to demonstrate hydraulic capture and groundwater quality data to demonstrate overall reduction of mass within and outside the capture zone(s) Additional groundwater elevation and quality data are needed to adequately evaluate the OU1 system The monitoring network needs to be evaluated and updated based on current site conditions and issues	Unknown	Unknown
2		Based on a conservative interpretation of the data, using converging lines of evidence, it appears that capture of the TCZ in bedrock is uncertain Additional bedrock monitor wells are needed to address the uncertainty of capture in bedrock both downgradient of the on-site system (DM-125, DM-601, and DM-606 areas) and the OCC system (between OCC and DM-118, DM-119, DM-120, DM-122, DM-123, DM-502, and DM503 area) Freescale has installed one multiport bedrock well, however, an increased monitor well network is needed to support the assessment of capture in bedrock	Unknown	Unknown
3		Based on a conservative interpretation of the data, using converging lines of evidence, it appears the TCZ in the vicinity of EW-18 is questionable Additional alluvial and bedrock monitor wells are needed in the vicinity of EW-18 to address the extent of contamination and evaluate capture of the TCZ	Unknown	Unknown
4		Extraction primarily from the alluvial aquifer is credited for hydraulic capture at substantial depth in the bedrock aquifer ADEQ is concerned that declining groundwater elevations at the site due to both regional decline and OU1 pumping will reduce the effectiveness of bedrock capture As yield from the alluvial aquifer decreases, resulting changes in the predicted vertical capture needs to be addressed The potential finite capacity of the system to capture bedrock contamination as the regional aquifer continues to decline represents a potential remedy problem	Unknown	Unknown
5		Concentrations in extraction well DM-313 are currently very close to the MCL for TCE Concentrations in this well have been increasing slightly over the last three years If concentrations continue to increase and exceed the MCL, this well must be put back into operation	No	Unknown
6	Groundwater Source Removal	ADEQ is concerned that the source area interim remedy is not significantly effective in reducing the levels of contaminants due to the DNAPL in the fractured bedrock ADEQ is concerned that high concentrations of TCE will continue in the source area wells for a long period of time	Yes	Unknown
7		Groundwater concentrations in the shallow bedrock ports of DM-125 and DM-601 appear to be increasing These data indicate that the onsite groundwater extraction system may not be reducing or eliminating contaminant migration from the source area	Yes	Unknown
8	Soil	Confirmatory soil sampling should be conducted at the Courtyard to obtain closure Soil sampling should be conducted once the Arizona Soil Rule and guidance has been finalized	Yes	Unknown
9		The CO required that an SVE system be installed at the ATP No active soil remediation has been conducted in the ATP area to date Soil sampling should be conducted at the ATP to obtain closure once the Arizona Soil Rule and guidance has been finalized	Yes	Unknown

Table 7 - Identified Issues and Noted Concerns for OU1
Motorola 52nd Street Superfund Site
Phoenix, Arizona

#	Type	Issues	Protectiveness Affected?	
			Current	Future
10	Health Assessment	Changes to the toxicity levels for certain contaminants have occurred since the last five-year review	Unknown	Unknown
11		New methodology is being developed for indoor air risk evaluation Once the methodology is finalized or EPA and ADEQ can agree to the process for evaluating the pathway, an indoor air risk evaluation should be performed for the OU1 area	Unknown	Unknown
12		The Baseline Risk Assessment and Health Assessments recommended to sample Mr Morgan's well Access may be an issue for sampling this well A plan should be developed regarding this well	Unknown	Unknown
13		There is a potential for unregistered, private wells to exist in the OU1 Area	Unknown	Unknown
14	O&M	The secondary containment system's protective coating showed signs of weathering (e g , cracking, peeling, lifting)	No	Unknown
15		All PVC piping, valves, and other appurtenances showed signs of ultraviolet light weathering (e g , brittle appearance)	No	Unknown
16		The stainless steel steam pressure tanks were stress corroded and cracked	No	Unknown
17		Most steel appurtenances showed signs of rusting and/or corrosion.	No	Unknown
18	General	The COCs should be identified for the final remedy	No	Unknown
19		Air emissions and influent/effluent analytical data are an important tool for evaluating the effectiveness of the treatment system and should be reported in the annual Effectiveness Reports	No	Unknown
20		Additional upgradient sources to groundwater contamination may exist	No	Unknown

Notes

ADEQ - Arizona Department of Environmental Quality
ATP - Acid Treatment Plant
COP - City of Phoenix
EPA - Environmental Protection Agency
IGWTP - Integrated Groundwater Treatment Plant
MCL - Maximum Contaminant Level
PQGWWP - Poor Quality Groundwater Withdrawal Permit
SVE - Soil Vapor Extraction
SWPL - Southwest Parking Lot area
TCE - Trichloroethene
VOC - Volatile Organic Compounds

Table 8 - Follow-up Actions and Recommendations for OU1
Motorola 52nd Street Superfund Site
Phoenix, Arizona

Reference Number*	Follow-up Actions/Recommendations	Responsible Party	Oversight Agency	Completion Date
	Follow-up Actions			
1, 2, 3	A work plan should be prepared and submitted to ADEQ to address the OU1 data gaps identified in Section 8 1 1 The work plan should include a summary of the current conceptual site model, a review of the existing OU1 groundwater monitoring well network and other available data, identify the data gaps, and propose the work necessary to fill the data gaps	Freescale, ADEQ	ADEQ	9/28/2007
4	A work plan should be prepared and submitted to ADEQ to address the bedrock hydraulic conductivity and extraction issues. The work plan should include the installation of a deep bedrock extraction and monitor wells such that a bedrock extraction pilot study may be completed to evaluate bedrock hydraulic conductivity. The results of the study should be incorporated into the feasibility study for the final remedy	Freescale	ADEQ	9/28/2007
5	Freescale should prepare a plan to monitor the concentrations in DM-313 If these concentrations continue to increase and exceed the MCL, the well should be put back into operation	Freescale	ADEQ	9/28/2007
6	Freescale submitted a Groundwater Remedial Alternatives Analysis report in September 2005 followed by an Addendum to the Groundwater Remedial Alternatives Analysis report in December 2005 evaluating treatment technologies for DNAPL The report is currently under review by ADEQ	Freescale, ADEQ	ADEQ	12/29/2006
7	Freescale should prepare a plan to evaluate the effectiveness of the source area treatment system	Freescale	ADEQ	9/28/2007
8	Freescale should develop a work plan to evaluate the vadose zone at the Courtyard area The work plan should include evaluation criteria for clean-up ADEQ will provide Freescale with the evaluation criteria once the Soil Rule and guidance is finalized	Freescale, ADEQ	ADEQ	1 year following promulgation of Soil Rule and Guidance
9	A work plan should also be developed for obtaining closure at the ATP The closure criteria will be established once the Soil Rule and guidance is finalized and should be included in the work plan	Freescale, ADEQ	ADEQ	1 year following promulgation of Soil Rule and Guidance
10	A review of the toxicity values for COCs at the Site should be conducted before the final remedy is selected.	ADEQ, EPA	ADEQ, EPA	ongoing
11	Freescale has previously prepared a work plan to address the vapor intrusion to indoor air pathway. Once the guidance for evaluating the vapor intrusion to indoor air pathway is finalized or EPA and ADEQ can agree to the process for evaluating the pathway, an indoor air risk evaluation should be conducted at the Site The work plan should be updated to meet the final guidance requirements	Freescale, ADEQ	ADEQ	1 year following ADEQ and EPA agreement on process

Table 8 - Follow-up Actions and Recommendations for OU1
Motorola 52nd Street Superfund Site
Phoenix, Arizona

Reference Number*	Follow-up Actions/Recommendations	Responsible Party	Oversight Agency	Completion Date
12	ADEQ and Freescale should develop a plan to collect groundwater samples from Mr Morgan's well and take further actions if necessary	Freescale, ADEQ	ADEQ	9/28/2007
13	ADEQ issues a fact sheet every other year to all the addresses listed within the Motorola 52nd Street Superfund Site ADEQ will include a note in the next fact sheet requesting owners to notify ADEQ of any private well.	ADEQ	ADEQ	9/28/2007
14	The secondary containment system's protective coating should be repaired	Freescale	ADEQ	9/28/2007
15	The PVC piping, valves, and other appurtenances that show signs of weathering should be replaced	Freescale	ADEQ	9/28/2007
16	The stainless steel steam pressure tanks should be replaced if they are brought back into use	Freescale	ADEQ	9/28/2007
17	Steel appurtenances that show signs of rusting and/or corrosion should be replaced	Freescale	ADEQ	9/28/2007
18	ADEQ and Freescale should establish a list of COCs for the Site. Once the list has been established, Freescale should conduct a sampling round to evaluate the COC list for the RAOs for the final remedy.	Freescale	ADEQ	9/28/2007
19	Freescale should include the air emission and groundwater influent/effluent analytical data in the annual Effectiveness Reports	Freescale	ADEQ	9/28/2007
20	ADEQ will conduct a PRP search for upgradient sources and will evaluate whether these sources will impact the remedy	ADEQ	ADEQ	9/28/2007

Notes

* Refer to Table 7 for reference number
ADEQ - Arizona Department of Environmental Quality
ADHS - Arizona Department of Health Services
ATP - Acid Treatment Plant
COC - Contaminant of Concern
COP - City of Phoenix
DNAPL - Dense Non-Aqueous Phase Liquid
EPA - Environmental Protection Agency
IGWTP - Integrated Groundwater Treatment Plant
MCL - Maximum Contaminant Level
O&M - Operation and Maintenance
OU1 - Operable Unit 1
PRP - Potentially Responsible Party
PQGWWP - Poor Quality Groundwater Withdrawal Permit
RAO - Remedial Action Objective
SVE - Soil Vapor Extraction
SWPL - Southwest Parking Lot area
TCE - Trichloroethene
VOC - Volatile Organic Compounds

Table 1 - Chronology of Events at the OU1 Area
Motorola 52nd Street Superfund Site
Phoenix, Arizona

Date	Event
1956	Manufacturing Operations commenced at the Motorola 52nd Street facility
1963 to 1974	A dry well located in the Courtyard area was used for solvent disposal
1974 to 1976	Southwest Parking Lot (SWPL) area was used for waste chemical storage
November 1982	Freescale discovered a discrepancy in the inventory for 1,1,1-Trichloroethane (TCA) in a 5,000 gallon underground storage tank (UST)
January 1983	Freescale notified Arizona Department of Health Services (ADHS) of leaking TCA underground tank
February 1983	Remedial Investigation (RI) initiated
February through September 1983	Installed 23 on-site, 6 off site, and 2 piezometers Also identifies provate wells for sampling
December 1983	Preliminary Investigation Report for 52nd Street facility was submitted to ADEQ by Freescale
October 1984	A workplan and a quality assurance program plan (QAPP) for the implementation of the RI/FS were issued
November 1984	Initial soil gas investigation was conducted at the Site
December 1984 through August 1986	Installation of wells for the RI/FS to supplement wells installed as part of the Preliminary Investigation
February/March 1985	Soil gas investigation indicated tetrachloroethene (PCE) existed at elevated concentrations between Buildings A-D and A-A, and in the southwest corner of SWPL
July/August 1985	Monitor wells DM-201 and others installed and aquifer test conducted
October 1985 through February 1986	Source verification investigations (Stage 1) were conducted
August 8, 1986	The results of preliminary screening of remedial action technologies and/or alternatives were submitted to ADEQ as a draft report
September 1986 through October 1986	A well survey was conducted to identify existing monitor wells, public wells, and private wells in an area downgradient from the Site
September 4, 1986	A work plan to implement the groundwater Pilot Treatment plant (PTP) was issued
September 15, 1986	The PTP operations were initiated
June 1987	Draft results of the remedial investigation/feasibility study (RI/FS) study were submitted to ADEQ
June 1988	Draft Remedial Action Plan (RAP) for OU1 was submitted to ADEQ
September 1988	EPA issued a Record of Decision (ROD) for OU1 and ADEQ issued a Letter of Determination (LOD) for OU1
January 1989	Additional soil gas samples were collected within the SWPL area
January 17-18, 1989	A supplementary soil gas investigation was performed in the Courtyard area to further assess the potential sources identified during previous investigations
June 20, 1989	Freescale entered into a Consent Order (CO) with ADEQ to implement a groundwater and soil remedy for OU1
July 26, 1989	Motorola 52nd Street Consent Order was lodged with the Arizona Superior Court
October 1989	The site was placed on the USEPA CERCLA National Priorities List (NPL)
1990	A sump in the southwest corner of Building A-D was identified as another potential source of contamination in the SWPL area
August 1990	Additional wells were added to the Pilot Treatment System
January 4, 1991	A hydrologic report supporting the application for a poor quality groundwater withdrawal permit (PQGWWP) for the OU1 extraction wells was submitted to Arizona Department of Water Resources (ADWR)
February 1991	SWPL investigation was initiated
March 1991	A soil gas investigation was conducted within the SWPL area
March 1991	100% completed design drawings for the Integrated Groundwater Treatment Plant (IGWTP) was submitted to ADEQ
May 8, 1991	ADWR issued a Poor Quality Groundwater Withdrawal Permit (PQGWWP) #590530577 for the OU1 groundwater extraction program
June 28, 1991	Pumping activities were initiated in SWPL area
October 1991 through November 1991	Additional soil gas investigation was conducted within the SWPL area

Table 1 - Chronology of Events at the OU1 Area
Motorola 52nd Street Superfund Site
Phoenix, Arizona

Date	Event
Januray through February 1992	Drilling of SWPL monitor and extraction wells and soil gas investigation at the SWPL area
February 19, 1992	Final Remedy RI report for OU1 was completed and submitted by Freescale to ADEQ
May 1992	A baseline report prior to the startup of the IGWTP was submitted to ADEQ This baseline report would be used to compare the effectiveness of OU1
May 1992	The SWPL remedy was expanded
May 7, 1992	The installation of the Courtyard Soil Vapor Extraction System (Courtyard SVE) system was completed
May 8-13, 1992	Baseline data for the Courtyard SVE system was collected
June 3, 1992	The Courtyard SVE system was initially started up and subsequently shut down for process modifications
July 1992	Permanent treatment system (IGWTP) for OU1 became operational
September 11, 1992	A final draft SWPL RI Work Plan was submitted to ADEQ
September 21, 1992	Courtyard SVE pilot program began operation
September 23, 1992	A draft In-Situ Air Sparging/SVE System Field Test (Pilot Test) Plan was submitted to ADEQ
February 11, 1993	Air sparging/soil vapor extraction (AS/SVE) pilot program began operation in two locations within the SWPL area, the parking lot and Building A-D .Phase I SVE within the parking lot area was performed
February 15, 1993	The Phase 2 SVE test within the Building A-D area was performed in the SWPL area
February 17, 1993	Sensitivity testing was performed on portions of the CYSVE system operation
February 19, 1993	The Phase 3 AS test was performed on well AS002 in Building A-D in the SWPL area
February 20, 1993	The combined AS/SVE Phase 4 test was initiated in SWPL area
February 25, 1993	SWPL AS/SVE pilot program ended
March 31, 1993	Courtyard SVE pilot program ended
April 1993	Progress reporting activities for OU1 operations were implemented
May 1993	The results of the investigation activities performed at the SWPL area was presented in a draft report
May 1993	The first effectiveness report for OU1 1992 operations was submitted to ADEQ
June 9, 1993	Draft SWPL RI report submitted to ADEQ
October 1993	Interim Remedy Feasibility Study Report submitted to ADEQ
June to December 1993	OU1 permanent system was suspended due to a vinyl chloride air emission problem
December 10, 1993	Supplement Interim Remedy FS Report submitted to ADEQ
December 28, 1993	OU1 was put back into continuous operation
1994	Freescale initiated a program of periodic recovery of dense non-aqueous phase liquid (DNAPL)
February 18, 1994	A report evaluating the bedrock investigation was submitted to ADEQ
September 1994	Freescale submitted the 1993 OU1 Effectiveness Report to ADEQ
October 14, 1994	Addendum to SWPL RI report was submitted to ADEQ
December 1994	A report summarizing the results of the Courtyard SVE pilot program was submitted to ADEQ
December 1, 1994	A groundwater monitoring plan for OU1 was submitted to ADEQ
April 21, 1995	AS/SVE Pilot Program for SWPL was submitted to ADEQ
April 21, 1995	SWPL Remediation Design Report was submitted to ADEQ
April 25, 1995	Design report, plans, and specifications detailing SVE/AS for SWPL were submitted to ADEQ

Table 1 - Chronology of Events at the OU1 Area
Motorola 52nd Street Superfund Site
Phoenix, Arizona

Date	Event
April 28, 1995	Freescale submitted the 1994 OU1 Effectiveness Report to ADEQ
June 1, 1995	ADEQ approved the SVE/AS design plans for SWPL
September 1995	Five-Year Review report prepared by ADEQ was finalized
November 16, 1995	EPA accepted and approved the five year review report
December 4, 1995	Multi-depth soil gas investigation was performed within the Courtyard area
February 1996	Final construction specification of the installation of the AS/SVE system at the SWPL Building A-D was submitted to ADEQ
March 1, 1996	Freescale submitted the 1995 OU1 Effectiveness Report to ADEQ
March 15, 1996	Freescale submits Soil Gas Survey report to ADEQ
March 29, 1996	SWPL Remediation Operation Plan was submitted to ADEQ
March 31, 1996	Freescale confirmed that air emission controls that were changed in 1993 are final
November 1996	SWPL AS/SVE operations began
March 1, 1997	Freescale submitted the 1996 OU1 Effectiveness Report to ADEQ
April 1997	The AS/SVE system at SWPL ended
April 28, 1997	A report on the evaluation of the Courtyard SVE system was submitted to ADEQ
December 1997	Freescale submitted an updated monitoring plan to ADEQ for review and comments
December 17, 1997	ADEQ approved the updated monitoring plan subject to minor modifications
January 1998	Final updated monitoring plan was submitted by Freescale to ADEQ
January 5, 1998	Freescale submitted a Request for Modification on the PQGWWP to eliminate chloroform, 1,2-DCE, and carbon tetrachloride from the key parameters list, reduce the sampling for VOCs in extraction wells on an annual basis, include the 12 extraction wells in the SWPL area to the modified monitoring program, and reduce the reporting activity on a semi-annual basis Request was approved by ADWR
March 31, 1998	Freescale submitted the 1997 OU1 Effectiveness Report to ADEQ
April 30, 1998	Freescale submitted a no further action request for the Courtyard SVE system
December 22, 1998	A report on the evaluation of the SWPL SVE system was submitted to ADEQ
1999	Motorola's Communications, Power, and Signal Group was split off to become ON Semiconductor Motorola remains responsible for the remediation effort related to its former operations at the 52nd Street facility
March 31, 1999	Freescale submitted the 1998 OU1 Effectiveness Report to ADEQ
March 1, 2000	Freescale submitted the 1999 OU1 Effectiveness Report to ADEQ
August 2000	An updated O&M Manual for the IGWTP was submitted to ADEQ
January 31, 2001	Freescale submitted Semi-Annual Progress Report 2001-2 PQGWWP Report July through December 2001 to ADWR
March 2001	Freescale submitted the 2000 OU1 Effectiveness Report to ADEQ
March 21, 2001	Freescale submitted a no further action request for the SWPL SVE system
September 2001	Second Five-Year Review report was completed by ADEQ
2002	In response to the Second Five-Year Review, Freescale conducted studies and evaluated the OU1 groundwater treatment remedy
January 31, 2002	Freescale submitted Semi-Annual Progress Report 2001-2 PQGWWP Report July through December 2001 to ADWR
March 2002	Freescale submitted the 2001 OU1 Effectiveness Report to ADEQ
July 31, 2002	Freescale submitted Semi-Annual Progress Report 2002-1 PQGWWP Report January through June 2002 to ADWR
November 15, 2002	ADEQ determined that the soil cleanup in the SWPL area was complete

Table 1 - Chronology of Events at the OU1 Area
Motorola 52nd Street Superfund Site
Phoenix, Arizona

Date	Event
January 31, 2003	Freescale submitted Semi-Annual Progress Report 2002-2 PQGWWP Report July through December 2002 to ADWR
March 2003	Freescale submitted the 2002 OU1 Effectiveness Report to ADEQ
April 1, 2003	Freescale shut down the OU1 Treatment System after discovering cracks in the carbon vessels that serve as air emission controls
July 31, 2003	Freescale submitted an OU1 Evaluation – Shutdown and Monitoring report evaluating the impact on groundwater flow and contaminant migration as a result of the recent shutdown of the OU1 Treatment System
July 31, 2003	Freescale submitted Semi-Annual Progress Report 2003-1 PQGWWP Report January through June 2003 to ADWR
August 4, 2003	OU1 Treatment System was restarted after Freescale replaced the carbon vessels
September 17, 2003	Freescale submitted a Work Plan for a Soil Vapor Intrusion Risk Assessment
October 20, 2003	Freescale submitted a Letter of Intent to conduct a Feasibility Study for the OU1 area
January 31, 2004	Freescale submitted Semi-Annual Progress Report 2003-2 PQGWWP Report July through December 2003 to ADWR
March 2004	Freescale submitted the 2003 OU1 Effectiveness Report to ADEQ
April 2004	Motorola spun off its semiconductor sector into a new company, Freescale Semiconductor, which is a wholly owned subsidiary of Motorola Inc
April 12, 2004	Freescale submitted a revised QAPP for the OU1 area to ADEQ
July 31, 2004	Freescale submitted Semi-Annual Progress Report 2004-1 PQGWWP Report January through June 2004 to ADWR
September 2004	Freescale submitted a revised Work Plan for a Soil Vapor Intrusion Risk Assessment
September 7, 2004	Freescale submitted a capture analysis as part of a request to turn off extraction well DM-311
January 27, 2005	Freescale submitted a Work Plan to Install Additional Monitor Wells in the OU1 area
January 31, 2005	Freescale submitted Semi-Annual Progress Report 2004-2 PQGWWP Report July through December 2004 to ADWR
March 2005	Freescale submitted the 2004 OU1 Effectiveness Report to ADEQ
July 31, 2005	Freescale submitted Semi-Annual Progress Report 2005-1 PQGWWP Report January through June 2005 to ADWR
September 30, 2005	Freescale submitted a Groundwater Remedial Alternatives Analysis report
December 2005	Freescale submitted an Addendum to the Groundwater Remedial Alternatives Analysis, Evaluation of Technical Impracticability of Groundwater Restoration at the Motorola 52nd Street OU1 report
March 2006	Freescale submitted the 2005 OU1 Effectiveness Report to ADEQ

Table 2 - Annual O&M Costs for the OU1 Treatment System
Motorola 52nd Street Superfund Site
Phoenix, Arizona

Year	Total O&M Costs
2001	$577,703
2002	$1,206,523
2003	$1,119,242
2004	$1,160,467
2005	$1,083,958

Notes

1 The cost increase starting in 2001 is related to the ON Semiconductor separation and represents the accrual of land and utility costs not previously captured since the remedy was integrated into the manufacturing operations at the 52nd Street facility

Table 3 - Actions Taken Since the Last Five-Year Review for OU1
Motorola 52nd Street Superfund Site
Phoenix, Arizona

Issues from Previous Review	Recommendations/Follow-up Actions	Party Responsible	Milestone Date	Action Taken and Outcome	Date of Action
It is ADEQ's opinion that the pump and treat system is not significantly effective in reducing the levels of contaminants due to the DNAPL in fractured bedrock ADEQ is concerned that high concentrations of TCE will continue in the source area wells for a long time	ADEQ anticipates that the source area extraction system will approach the limits of effective mass reduction in the source area in the near future ADEQ believes it would be prudent to begin evaluation of alternative treatment technologies for DNAPL in fractured bedrock If the source area were effectively reduced, it may greatly reduce the long term operation and monitoring of the current pump and treat system	Freescale	on-going	Freescale prepared a *Groundwater Remedial Alternative Analysis, Motorola 52nd Street OU1, Phoenix, Arizona* (GRAA) and *Addendum to Groundwater Remedial Alternatives Analysis, Evaluation of Technical Impracticability of Groundwater Restoration at the Motorola 52nd Street OU1, Phoenix, Arizona* (GRAA Addendum) reports	September and December 2005
Source area well MP-03 has not been sampled since December 9, 1997	Source area well MP-03 should be added to the monitoring plan and sampled annually	Freescale	on-going	MP-03 contains DNAPL and will be added to the monitor list once free product is no longer present	on-going
ADEQ is concerned that the strong downward vertical gradient at DM606 may indicate that deep bedrock capture in that area is inadequate A slight increasing TCE concentration trend in the 330 feet bgs port of this well increases this concern	An analysis and explanation of the DM606 hydraulic and water quality data should be provided	Freescale	on-going	Freescale conducted an evaluation of this area during shutdown of the treatment system from December 2001 to February 2002 A discussion of the results was provided in the 2001 Effectiveness Report However, this area is still problematic and issues regarding the vertical gradient remain	on-going
Increasing TCE trends are observed in wells DM306, DM305, DM307, DM312, and DM 313 ADEQ will continue to monitor the TCE trends in these wells	TCE trends in wells DM306, DM305, DM307, DM312, and DM 313 should be closely monitored and discussed in future Effectiveness Reports	Freescale	on-going	Freescale has included a trend discussion in subsequent Effectiveness reports	on-going
Extraction well DM313 currently exceeds the MCL for TCE This well must be put back into operation In addition, should future increasing trends be observed in extraction well DM312 that exceeds the MCL, this well must also be put back into operation	Extraction well DM313 should be put back into operation If increasing TCE trends are observed in extraction well DM312 (exceeding the MCL), this well should also be put back into operation	Freescale	when required	DM-312 and DM-313 continue to be monitored during annual sampling events Concentrations in DM-312 remain relatively low Concentrations in DM-313 remain close to the MCL	on-going
DM306 was set to run in cyclic mode, 30-minutes on and 1-hour off Operation of this well in cyclic mode indicates that the extraction system may need to be modified to address capture of contaminants within the bedrock	Operation of extraction wells (e g - DM306) in cyclic mode indicates that the system may be entering a new phase of operation A plan that addresses current and future extraction well rate changes and their effect on the OU1 system and bedrock capture should be developed and submitted	Freescale	3/29/2002	Freescale evaluated DM-306 in the 2001 Effectiveness Report	3/29/2002
TCE concentrations are increasing in the shallow bedrock ports (170 feet) of DM603 and DM605 This may be the result of TCE contaminant migration from deeper bedrock fractures	An analysis and explanation of the increasing TCE concentrations in the shallow bedrock ports of DM603 and DM605 should be provided	Freescale	3/29/2002	Freescale evaluated DM-603 and DM-605 in the 2001 Effectiveness Report	3/29/2002
There are no wells immediately downgradient and outside the capture zone that can be used to confirm that the plume is contained ADEQ is concerned, particularly since the alluvium is becoming dewatered, that downgradient monitoring in the bedrock is limited	A plan should be provided that includes an analysis and evaluation of the current downgradient monitoring well network	Freescale	3/29/2002	Freescale evaluated this in the 2001 Effectiveness Report However, the downgradient monitor well network remains a concern	3/29/2002
	A plan to ensure adequate future downgradient monitoring with the addition of new groundwater monitoring wells, if determined necessary, should be submitted The plan should also address the potential changes in bedrock extraction as water levels continue to decline	Freescale	3/29/2002	Freescale evaluated this in the 2001 Effectiveness Report. However, this issue remains a concern	3/29/2002

Table 3 - Actions Taken Since the Last Five-Year Review for OU1
Motorola 52nd Street Superfund Site
Phoenix, Arizona

Issues from Previous Review	Recommendations/Follow-up Actions	Party Responsible	Milestone Date	Action Taken and Outcome	Date of Action
The increasing TCE trend found in wells EW18 (alluvium/bedrock) and DM125 (125 foot bedrock port) indicated that the migration of TCE may not be contained in the northern boundary of the plume The concentrations of TCE found in these northern wells also indicated that TCE is not completely defined to the north	An analysis and explanation of the TCE concentrations in wells EW18 and DM125 should be provided	Freescale	3/29/2002	Freescale evaluated this in the 2001 Effectiveness Report However, this issue remains a concern	3/29/2002
	Groundwater monitor well DM26 should be added to the current OU1 network and monitored annually	Freescale		This monitor well is monitored as part of the Motorola 56th Street Site	
Groundwater data indicated that vinyl chloride is detected more frequently and at higher concentrations exceeding MCLs in some of the wells associated with OU1	Vinyl chloride should be closely monitored and discussed in future Effectiveness Reports Vinyl chloride should be added to the OU1 COCs	Freescale		Vinyl chloride is evaluated in the Effectiveness Reports	
While dewatering of the alluvium indicates the success of the alluvial extraction system and alluvial capture, it changes the dynamics of the OU1 extraction and treatment system 1) As water levels decline and the alluvium is dewatered, the total extraction rate will be reduced Both extraction and treatment system design changes will be necessary to handle the reduced flow 2) ADEQ is concerned that as alluvial aquifer is dewatered, the effectiveness of bedrock capture may be reduced Freescale submitted an analysis of capture in bedrock in the 1994 Effectiveness Report According to the model, "pressure changes associated with a significant draw down in the alluvium are transmitted to great depth in the bedrock " This concept depends on pressure changes in the alluvium to induce capture in bedrock This concept was demonstrated by the results of a three-dimensional numeric model discussed in the Appendix If the alluvium is dewatered how can pressure changes be transmitted to bedrock fractures not connected to the extraction wells?	A plan should be provided that addresses the following 1) An updated conceptual site model (CSM) that incorporates dewatering of the alluvium The CSM should address effectiveness of bedrock capture as the alluvium is dewatered It may be useful to update the 1994 numeric model to aid in the analysis of the system 2) Any OU1 design changes necessary to maintain capture, especially in bedrock 3) Any OU1 monitoring well network changes necessary to assess the performance of the system as conditions change	Freescale	3/29/2002	A discussion of these issues was provided in the 2001 Effectiveness Report Additional discussion was provided in the GRAA However, these issues remain problematic	3/29/2002
The CO required that an SVE system be installed at the ATP The site inspection and document review confirmed that no SVE system was installed in the ATP	Freescale should provide documentation as to why an SVE system was not installed or required at the ATP	Freescale	3/29/2002	Freescale has indicated that soil data in the ATP area suggests that SVE remediation may not be applicable Freescale has provided ADEQ with a plan to evaluate the soil at the Courtyard and SWPL areas first and then the ATP area ADEQ has agreed to this plan	3/29/2002
The SVE system within the Courtyard area was not operated in a cyclic mode prior to shut down In addition, no confirmatory soil sampling was performed	The SVE system within the Courtyard should be operated in a cyclic mode Cyclic operation entails turning the system on and off for short periods of time to allow equilibration of the subsurface vapors and flow pathways in an effort to remove the remaining low concentrations of VOCs Cyclic operation will entail two weeks of system operation, followed by two weeks off for flow pathway equilibrium Each time the SVE system is restarted, a vapor sample should be collected and analyzed Once two consecutive vapor samples are near or below the laboratory reporting limits, after surging has begun, Freescale should collect confirmatory soil boring samples Prior to conducting any work, Freescale should submit a work plan to ADEQ	Freescale	3/29/2002	Freescale has submitted a work plan to ADEQ for obtaining closure for the Courtyard soils ADEQ is currently waiting for the Arizona Soil Rule to be finalized before determining evaluation criteria	on-going
No confirmatory soil sampling was performed after the shut down of the SVE system within the SWPL area	Confirmatory soil samples should be collected in the areas impacted by the SVE system at the SWPL area Prior to conducting any work, Freescale should submit a work plan to ADEQ	Freescale	3/29/2002	A No Further Action was issued by ADEQ on November 15, 2002	11/15/2002
A Site Review and Update for the Motorola 52nd Street Superfund Site has not been conducted by ADHS since 1996	ATSDR has plans to conduct a Site Review and Update for the Motorola 52nd Street Superfund Site	ATSDR	NA	ADHS prepared a *Status Verification of Private Drinking Water Wells, Motorola 52nd Street Superfund Site* report	4/17/2002
The Baseline Risk Assessment and the Health Assessments recommend to increase the frequency of monitoring Mr Morgan's well The well has not been sampled in years, however, this may be due to access issues	Freescale should develop a plan to notice Mr Morgan (or current owner), gain access to the well, sample on a periodic basis, provide analytical results to Mr Morgan (or current owner), and take other actions, if necessary	Freescale	on-going	Access issues remain	on-going
Property owners have the right to install an "exempt" well for any type of use which cannot be restricted by ADWR The potential future use of "exempt" wells by individual property owners has never been evaluated for OU1 An institutional control may need to be considered	ATSDR is currently assessing the well surveys that have been conducted at the Motorola 52nd Street Superfund Site A well use survey should also be conducted within the Site If the results of the survey confirms future use of "exempt" wells by property owners, institutional controls should be considered	Freescale & ATSDR	NA	ADHS prepared a *Status Verification of Private Drinking Water Wells, Motorola 52nd Street Superfund Site* report	4/17/2002

Table 3 - Actions Taken Since the Last Five-Year Review for OU1
Motorola 52nd Street Superfund Site
Phoenix, Arizona

Issues from Previous Review	Recommendations/Follow-up Actions	Party Responsible	Milestone Date	Action Taken and Outcome	Date of Action
ADHS identified a private well (Willis) in the 1992 Baseline Risk Assessment that is located within OU1 However, no information regarding the well is provided except that it is "closed"	ATSDR should investigate the status of the Willis well during the next Site Review and Update	ATSDR	NA	The Willis well was abandoned in June 1990	June 1990
The Tumage well that was locked in 1986 to prevent its use and access is controlled by Freescale This well is not monitored to ensure the integrity of the lock and the well Additionally, it is unclear as to the status of ownership of the well	Freescale should conduct semiannual inspections of the Tumage well to ensure that the well has not been tampered with Additionally, the owner of the well must be identified and Freescale should consider transferring ownership since they are responsible for ensuring no one has access to the well If the Tumage well has no use to the Motorola 52nd Street Superfund Site, Freescale should consider abandoning the well	Freescale	3/29/2002	The Tumage well was abandoned in January 2005	1/25/2005
The ADHS Soil Gas Sampling Risk Assessment (March 1992) concluded that concentrations of 1,1-DCE are high enough to suggest that further study of potential indoor exposures may be warranted, including collecting air samples from residences This issue is not addressed in the ADHS Baseline Risk Assessment (November 1992) or in subsequent ATSDR Health Assessments	ADHS should determine if 1,1-DCE and any other VOCs are still a concern for indoor air exposure	ADHS	NA	Toxicity levels for certain VOCs including 1,1-DCE have been revised recently Revisions to the toxicity value for 1,1-DCE indicates a lower risk from exposure than previously thought	on-going
Inspection of the IGWTP revealed that the secondary containment system's protective coating was cracking, peeling, and/or lifting up	The IGWTP secondary containment system's protective coating should be repaired to fix all areas that were cracking, peeling, and/or lifting	Freescale	3/29/2002	Due to exposure to sun and the elements, repairs to treatment system parts is an on-going process Repairs will be completed as needed	on-going
The PVC valve at the Liquid Chlorine Feed system looked brittle	The PVC valve at the Liquid Chlorine Feed system should be replaced	Freescale	3/29/2002	The valve was replaced following ADEQ's Second Five-Year Review site inspection	March 2001
The pressure gauge on Air Stripper AS-201 was not functioning	The non-functioning pressure gauge on Air Stripper AS-201 should be replaced	Freescale	3/29/2002	The pressure gauge was replaced following ADEQ's Second Five-Year Review site inspection	March 2001
Well vault MP-11 was full of water	Water that has accumulated in well vault MP-11 should be removed Freescale should *ensure that O&M of the well vaults are maintained to prevent any potential problems* due to rainfall/runoff	Freescale	on-going	Well vaults in low-lying areas are inspected after every significant rainfall and pumped out as necessary The vault for MP-11 was flooded due to ON Semiconductor's testing of a nearby fire hydrant The vault was pumped put immediately after ADEQ's Second Five-Year Review site inspection	March 2001
The treated effluent monitoring plan was not available on site	The treated effluent monitoring plan should be made available on site for future inspections	Freescale	NA	The effluent monitoring plan is contained in the IGWTP O&M manual at the IGWTP	3/1/2001
the PQGWWP was not available on site	The PQGWWP should be available on site for future inspections	Freescale		The PQGWWP was previously kept in the main part of the 52nd Street facility when it was owned by Motorola The PQGWWP will be kept at the IGWTP in the future	3/1/2001
The IGWTP effluent data and air emissions data *were not available on site*	The IGWTP effluent data and air emissions data should be available on site for future inspections	Freescale	NA	Results of effluent data and air emissions data will be kept at the IGWTP	3/1/2001
The perimeter fencing around the IGWTP did not completely surround the system, and locks were not provided on the access gates	Because Freescale does not own the entire facility, it is highly recommended that the perimeter fencing be fully extended around the IGWTP In addition, all access gates to the system should be kept locked when unattended by authorized OU1 Maintenance personnel	Freescale	NA	Due to space limitations and the need for ON Semiconductor personnel to access adjacent buildings, it is not feasible to extend fencing around the entire IGWTP However, ON Semiconductor does recognize the area as restricted space and allows access by authorized personnel only	NA
Perimeter signs that warns of unauthorized entry were of insufficient number to cover the entire perimeter of the IGWTP	Perimeter signs that warns of unauthorized entry should be placed around all sides of the perimeter fence around the IGWTP	Freescale	NA	Signs were added to the existing fencing	NA
Review of the SWPL RI report indicates that a typo was made in Tables F 4 *and F 5 regarding the unit*, "ug/mg" should actually be "mg/kg"	The SWPL RI report should be amended to correct the "unit" typos in Tables F 4 and F 5, and the revised sections resubmitted to ADEQ	Freescale	NA	Freescale provided an errata sheet correcting the typographical error	3/1/2001

Table 3 - Actions Taken Since the Last Five-Year Review for OU1
Motorola 52nd Street Superfund Site
Phoenix, Arizona

Issues from Previous Review	Recommendations/Follow-up Actions	Party Responsible	Milestone Date	Action Taken and Outcome	Date of Action
The 1992 Baseline Risk Assessment may be outdated based on current site conditions for consideration in the final remedy	Because decrease in contaminant concentrations may have occurred, which ultimately reduces risk, it is recommended that the 1992 baseline risk assessment be updated to reassess these new site conditions, prior to the selection of the final remedy Reduction in risk would play an important role in the nature and type of the final remedy that is selected	Freescale, ADEQ, & ADHS	NA	A final remedy for OU1 has not been selected yet.	NA

Table 4 - Summary of Current Chemical-Specific Standards
Motorola 52nd Street Superfund Site
Phoenix, Arizona

Authority	Medium	Requirements	Requirement Synopsis	Remedy Compliance with Current Standards
Federal Regulatory Requirements	Groundwater	Federal safe Drinking Water Maximum Contaminant Levels (MCLs) for organic and inorganic chemicals (40 CFR 141 Subparts B and G)	MCLs have been promulgated for a number of common organic and inorganic contaminants These levels regulate the concentrations of contaminants in public drinking water supplies, and are considered relevant and appropriate for groundwater aquifers potentially used for drinking water	Current groundwater conditions in OU1 indicate that many of the contaminants of concern are above their specific MCLs in on-site and off-site wells However, the ROD/LOD does not establish a level of cleanup for the aquifer This may be an ARAR for the final remedy
		EPA Region IX Preliminary Remediation goals (PRGs)	EPA Region IX guidelines establishing concentrations of compounds in tap water considered to be protective of human health	Current groundwater conditions in OU1 indicate that many of the contaminants of concern are above their specific PRG in on-site and off-site wells However, the ROD/LOD does not establish a level of cleanup for the aquifer This may be an ARAR for the final remedy
	Wastewater	Federal Pretreatment Standard for total toxic organics (TTO) (40 CFR 469 16)	Specifies that the maximum daily limitation for TTO is 1,370 ppb	Yes
	Soil	EPA Region IX Preliminary Remediation goals (PRGs)	EPA Region IX guidelines establishing concentrations of compounds in soil considered to be protective of human health	No post remediation confirmatory soil sampling has been conducted in the ATP and Courtyard However, the ROD/LOD does not establish a level of cleanup for the soil This may be an ARAR for the final remedy
	Air	EPA Region IX Preliminary Remediation goals (PRGs)	EPA Region IX guidelines establishing concentrations of compounds in air considered to be protective of human health	This may be an ARAR for the final remedy
State and Local Regulatory Requirements	Groundwater	Arizona Aquifer Water Quality Standards (AWQS), (AAC R18-11-109, AAC R18-11-406)	Statewide aquifer protection standards for organic and inorganic compounds, established for drinking water protective usage Many of the compound concentrations are comparable to the Federal MCLs If the AWQSs are more stringent than the MCLs, than the AWQSs should be used	Current groundwater conditions within the Site have shown that many of the contaminants of concern are above their specific AWQSs in OU1 wells This may be an ARAR for the final remedy
		ADEQ's (Office of Environmental Health) Human Health-Based Guidance Levels (HBGLs) for the Ingestion of Contaminants in Drinking Water, December 1997	This guidance document lists a variety of compounds that provides different concentration/limits based upon calculated risk-based ingestion concentrations, MCLs; proposed MCLs, and state laboratory levels of quantitation values	Current groundwater conditions in OU1 indicate that many of the contaminants of concern are above their specific HBGLs in on-site and off-site wells However, the ROD/LOD does not establish a level of cleanup for the aquifer This may be an ARAR for the final remedy

Table 4 - Summary of Current Chemical-Specific Standards
Motorola 52nd Street Superfund Site
Phoenix, Arizona

Authority	Medium	Requirements	Requirement Synopsis	Remedy Compliance with Current Standards
State and Local Regulatory Requirements	Soil	Arizona Soil Remediation Levels (SRLs) and Groundwater Protection Levels (GPLs) (AAC R18-7-205)	SRLs are statewide predetermined remediation standards for residential or non-residential areas depending on the site usage GPLs are alternate standards which must be used if they are more stringent than the SRLs	Although the SWPL area has received a NFA, confirmatory samples have not been collected at the ATP and Courtyard areas While the SRLs and GPLs were promulgated after the ROD/LOD was executed, these standards may be an ARAR for the final soil remedy for the Site
		ADEQ's (Office of Environmental Health) Human Health-Based Guidance Levels (HBGLs) for the Ingestion of Contaminants in Soil, December 1997	This guidance document lists a variety of compounds that provides different concentration/limits based upon calculated risk-based ingestion concentrations	No confirmatory soil sampling has been conducted in the ATP and Courtyard areas However, the ROD/LOD does not establish a level of cleanup for the soil This may be an ARAR for the final remedy
	Wastewater	Appendix C1 3 4(3) of the CO	Design requirements established in the CO require that treated groundwater effluent does not exceed 100 ppb of the total VOC concentration, if the TTO concentration is less than 186 ppb If the TTO limit is exceeded for three consecutive months, the VOC limit of the effluent may not exceed 50 ppb of which the TCE concentration must be less than 5 ppb	Yes
	Air	Arizona Ambient Air Quality Guidelines	ADEQ issues permits to industries and facilities that emit regulated pollutants to ensure that these emissions do not harm public health or cause significant deterioration in areas that presently have clean air	This may be an ARAR for the final remedy
		Maricopa County Environmental Services Department (MCESD) Rule 200, Section 303	An Air Emissions Permit was issued by MCESD The permit was subsequently withdrawn after Freescale demonstrated that air emissions were so low that a permit was no longer required	Yes
		Maricopa County VOC Limitation	This standard limits VOC emissions from any source within Maricopa County to less than 3 pounds per day	Yes

Table 5 - Summary of Action-Specific Standards
Motorola 52nd Street Superfund Site
Phoenix, Arizona

Authority	Requirements	Requirement Synopsis	Remedy Compliance with ARARs
Federal Regulatory Requirements	"Standards Applicable to Generator of Hazardous Waste" (40 CFR 262) Established as an ARAR in Section 6 3 of the CO	Provides the management guidelines of the recovered solvents and spent carbon applicable to OU1	Yes
State and Local Regulatory Requirements	Arizona Administrative Code (AAC) Title 45, Chapter 2 Article 10 Established as an ARAR in Section 6 3 of the CO	Provides the requirements for the drilling, construction, operation, and abandonment for any type of well which is directly applicable to the extraction and monitoring wells installed for OU1	Yes
	City of Phoenix construction permits and right of way acquisitions Established as an ARAR in Section 6 3 of the CO	Provides requirements to obtain construction permits and right of way acquisitions for the construction of the OU1 systems and off-site extraction wells	Yes
	Arizona Revised Statues (ARS) 45-516 Established as an ARAR in Section 6 3 of the CO	Requires that the operation of the OU1 conform with area groundwater management plans	Yes
	Appendix C1 3 2 of the CO (established ARAR)	This established ARAR requires that OU1 maintain a "zone of capture" by ensuring that the hydraulic gradient is maintained from the edges of the "zone of capture" to the extractions wells to reduce/eliminate the contaminant migration	Unknown - Additional data must be provided by the Companies
	Appendix C1 3 2 of the CO (established ARAR)	Requires that treated groundwaterfrom OU1 be beneficially used at the ON Semiconductor facility	Yes
	Appendix C1 3 2 of the CO (established ARAR)	Requires that the OU1 air stripping tower be equipped with air emission controls as needed to meet Maricopa County requirements Rule 320, Section 302, Rule 330, Section 306, and Rule 200	Yes

Table 6 - Confirmation of Chemical-Specific Toxicity Values for OU1 Area
Motorola 52nd Street Superfund Site
Phoenix, Arizona

Chemical of Concern	Toxicity Value Name	Toxicity Value		Source (oral/inhal)	Impact on Risk Assessment
COCs with Carcinogenic Endpoint					
Vinyl Chloride	Cancer Slope Factor [SF] $(mg/kg\text{-}day)^{-1}$	Previous (oral/inhalation)	1 9 / 0 3	EPA, 1997	Impact on the risk assessment needs to be evaluated
	Cancer Slope Factor [SF] $(mg/kg\text{-}day)^{-1}$	Current (oral/inhalation)	1 5 / 0 031	EPA, 2004	
1,1-Dichloroethene	Cancer Slope Factor [SF] $(mg/kg\text{-}day)^{-1}$	Previous (oral/inhalation)	0 6 / 0 18	EPA, 1999	Impact on the risk assessment de minimis
	Cancer Slope Factor [SF] $(mg/kg\text{-}day)^{-1}$	Current (oral/inhalation)	0 6 / 0 18	EPA, 1999	
Chloroform	Cancer Slope Factor [SF] $(mg/kg\text{-}day)^{-1}$	Previous (oral/inhalation)	0 0061 / 0 081	EPA, 1999	Impact on the risk assessment de minimis.
	Cancer Slope Factor [SF] $(mg/kg\text{-}day)^{-1}$	Current (oral/inhalation)	0 031 / 0 019	EPA, 2004	
Trichloroethene	Cancer Slope Factor [SF] $(mg/kg\text{-}day)^{-1}$	Previous (oral/inhalation)	0 011 / 0 006	EPA, 1999	Impact on the risk assessment needs to be evaluated
	Cancer Slope Factor [SF] $(mg/kg\text{-}day)^{-1}$	Current (oral/inhalation)	0 013 / 0 007	EPA, 2004	
Benzene	Cancer Slope Factor [SF] $(mg/kg\text{-}day)^{-1}$	Previous (oral/inhalation)	0 029 / 0 027	EPA, 1999	Impact on the risk assessment de minimis.
	Cancer Slope Factor [SF] $(mg/kg\text{-}day)^{-1}$	Current (oral/inhalation)	0 055 / 0 027	EPA, 2004	
Tetrachlorethene	Cancer Slope Factor [SF] $(mg/kg\text{-}day)^{-1}$	Previous (oral/inhalation)	0 052 / 0.002	EPA, 1999	Impact on the risk assessment needs to be evaluated
	Cancer Slope Factor [SF] $(mg/kg\text{-}day)^{-1}$	Current (oral/inhalation)	0.54 / 0.021	EPA, 2004	
1,4-Dioxane	Cancer Slope Factor [SF] $(mg/kg\text{-}day)^{-1}$	Previous (oral/inhalation)	Not Previously Evaluated		Impact on the risk assessment needs to be evaluated
	Cancer Slope Factor [SF] $(mg/kg\text{-}day)^{-1}$	Current (oral/inhalation)	0.011 / 0 011	EPA, 2004	

Table 6 - Confirmation of Chemical-Specific Toxicity Values for OU1 Area
Motorola 52nd Street Superfund Site
Phoenix, Arizona

Chemical of Concern	Toxicity Value Name	Toxicity Value		Source (oral/inhal.)	Impact on Risk Assessment
1,1,2-Trichloroethane	Cancer Slope Factor [SF] $(mg/kg\text{-}day)^{-1}$	Previous (oral/inhalation)	Not Previously Evaluated		Impact on the risk assessment needs to be evaluated
	Cancer Slope Factor [SF] $(mg/kg\text{-}day)^{-1}$	Current (oral/inhalation)	0 057 / 0 056	EPA, 2004	
1,1,2,2-Tetrachloroethane	Cancer Slope Factor [SF] $(mg/kg\text{-}day)^{-1}$	Previous (oral/inhalation)	Not Previously Evaluated		Impact on the risk assessment needs to be evaluated
	Cancer Slope Factor [SF] $(mg/kg\text{-}day)^{-1}$	Current (oral/inhalation)	0 2 / 0 2	EPA, 2004	
Methylene Chloride	Cancer Slope Factor [SF] $(mg/kg\text{-}day)^{-1}$	Previous (oral/inhalation)	Not Previously Evaluated		Impact on the risk assessment needs to be evaluated
	Cancer Slope Factor [SF] $(mg/kg\text{-}day)^{-1}$	Current (oral/inhalation)	0 0075 / 0 0016	EPA, 2004	
Bromodichloromethane	Cancer Slope Factor [SF] $(mg/kg\text{-}day)^{-1}$	Previous (oral/inhalation)	Not Previously Evaluated		Impact on the risk assessment needs to be evaluated
	Cancer Slope Factor [SF] $(mg/kg\text{-}day)^{-1}$	Current (oral/inhalation)	0 062/0 062	EPA, 2004	
Carbon Tetrachloride	Cancer Slope Factor [SF] $(mg/kg\text{-}day)^{-1}$	Previous (oral/inhalation)	Not Previously Evaluated		Impact on the risk assessment needs to be evaluated
	Cancer Slope Factor [SF] $(mg/kg\text{-}day)^{-1}$	Current (oral/inhalation)	0 13 / 0 053	EPA, 2004	
Arsenic	Cancer Slope Factor [SF] $(mg/kg\text{-}day)^{-1}$	Previous (oral/inhalation)	Not Previously Evaluated		Impact on the risk assessment needs to be evaluated
	Cancer Slope Factor [SF] $(mg/kg\text{-}day)^{-1}$	Current (oral/inhalation)	1 5 / 15	EPA, 2004	
Total Chromium	Cancer Slope Factor [SF] $(mg/kg\text{-}day)^{-1}$	Previous (oral/inhalation)	Not Previously Evaluated		Impact on the risk assessment needs to be evaluated
	Cancer Slope Factor [SF] $(mg/kg\text{-}day)^{-1}$	Current (oral/inhalation)	NL / 420	EPA, 2004	

Table 6 - Confirmation of Chemical-Specific Toxicity Values for OU1 Area
Motorola 52nd Street Superfund Site
Phoenix, Arizona

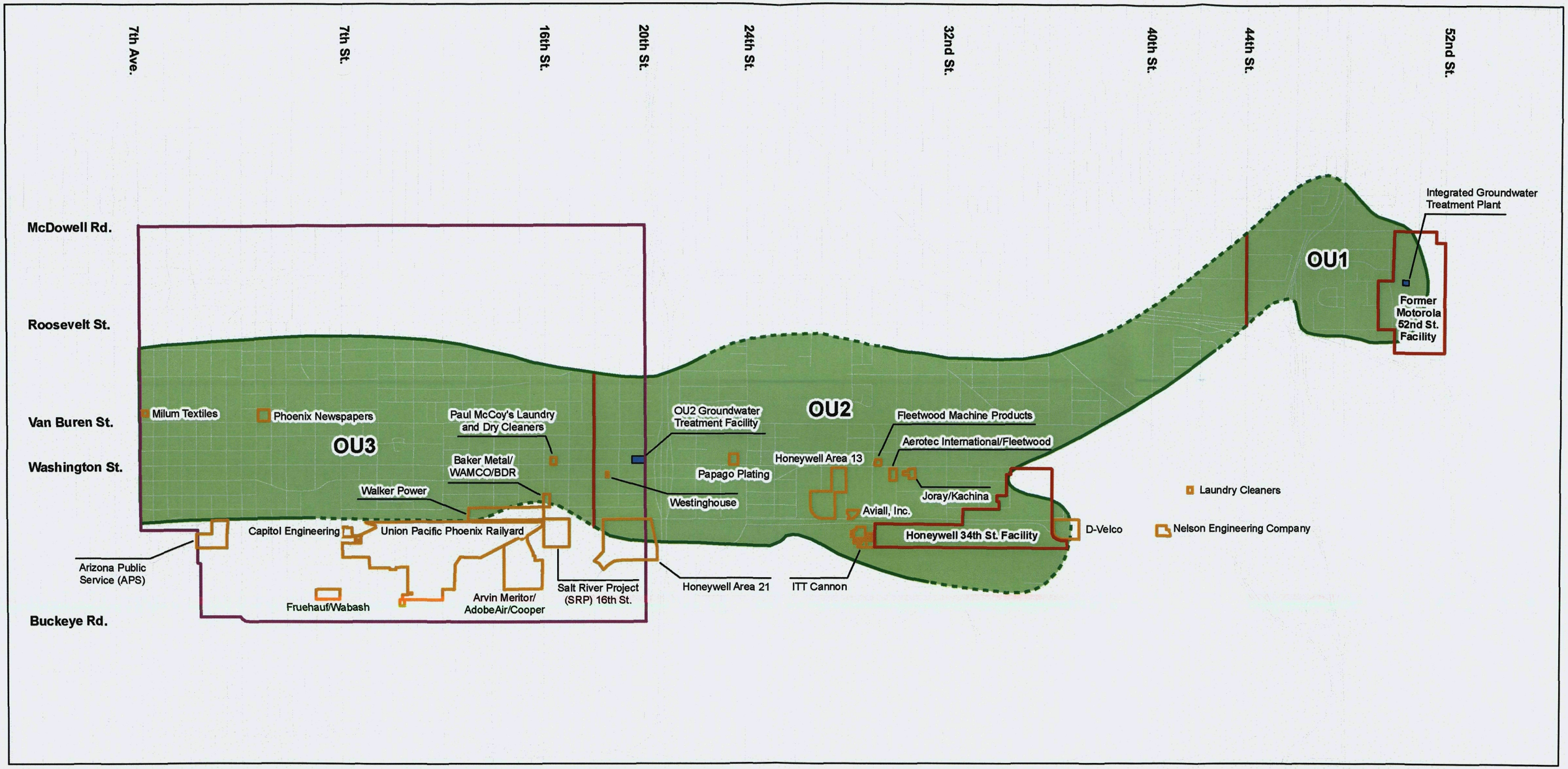
Chemical of Concern	Toxicity Value Name	Toxicity Value		Source (oral/inhal)	Impact on Risk Assessment
COCs with Noncarcinogenic Effects					
1,1-Dichloroethane	Reference Doses (mg/kg-day)	Previous (oral/inhalation)	0 1 / 0 14	EPA, 1997	Impact on the risk assessment de minimis
	Reference Doses (mg/kg-day)	Current (oral/inhalation)	0 1 / 0 14	EPA, 2004	
1,1,1-Trichlorethane	Reference Doses (mg/kg-day)	Previous (oral/inhalation)	0 09 / 0 3	EPA, 1991	Impact on the risk assessment de minimis
	Reference Doses (mg/kg-day)	Current (oral/inhalation)	0 28 / 0 63	EPA,2004	
trans-1,2-Dichloroethene	Reference Doses (mg/kg-day)	Previous (oral/inhalation)	0 02 / 0 02	EPA, 1999	Impact on the risk assessment de minimis
	Reference Doses (mg/kg-day)	Current (oral/inhalation)	0.02 / 0 02	EPA, 2004	
cis-1,2-Dichloroethene	Reference Doses (mg/kg-day)	Previous (oral/inhalation)	Not Previously Evaluated		Impact on the risk assessment de minimis
	Reference Doses (mg/kg-day)	Current (oral/inhalation)	0 01 / 0 01	EPA,2004	
Trichlorotrifluoroethane (F-113)	Reference Doses (mg/kg-day)	Previous (oral/inhalation)	Not Previously Evaluated		Impact on the risk assessment de minimis.
	Reference Doses (mg/kg-day)	Current (oral/inhalation)	30 / 8 6	EPA,2004	
Chlorobenzene	Reference Doses (mg/kg-day)	Previous (oral/inhalation)	0 02 / 0 017	EPA, 1999	Impact on the risk assessment de minimis
	Reference Doses (mg/kg-day)	Current (oral/inhalation)	0.02 / 0 017	EPA, 2004	
Toluene	Reference Doses (mg/kg-day)	Previous (oral/inhalation)	Not Previously Evaluated		Impact on the risk assessment de minimis.
	Reference Doses (mg/kg-day)	Current (oral/inhalation)	0 2 / 0 11	EPA,2004	
Ethylbenzene	Reference Doses (mg/kg-day)	Previous (oral/inhalation)	Not Previously Evaluated		Impact on the risk assessment de minimis.
	Reference Doses (mg/kg-day)	Current (oral/inhalation)	0.1 / 0 29	EPA,2004	

Table 6 - Confirmation of Chemical-Specific Toxicity Values for OU1 Area
Motorola 52nd Street Superfund Site
Phoenix, Arizona

Chemical of Concern	Toxicity Value Name	Toxicity Value		Source (oral/inhal)	Impact on Risk Assessment
Boron	Reference Doses (mg/kg-day)	Previous (oral/inhalation)	Not Previously Evaluated		Impact on the risk assessment de minimis
	Reference Doses (mg/kg-day)	Current (oral/inhalation)	0 2 / 0 0057	EPA,2004	
Cadmium	Reference Doses (mg/kg-day)	Previous (oral/inhalation)	Not Previously Evaluated		Impact on the risk assessment de minimis
	Reference Doses (mg/kg-day)	Current (oral/inhalation)	0 0005 / NL	EPA,2004	
Thallium	Reference Doses (mg/kg-day)	Previous (oral/inhalation)	Not Previously Evaluated		Impact on the risk assessment de minimis
	Reference Doses (mg/kg-day)	Current (oral/inhalation)	0 000066 / NL	EPA,2004	
Fluroide	Reference Doses (mg/kg-day)	Previous (oral/inhalation)	Not Previously Evaluated		Impact on the risk assessment de minimis
	Reference Doses (mg/kg-day)	Current (oral/inhalation)	0 006 / NL	EPA,2004	

Notes:
NL - Not Listed

FIGURES



N

0 2,500 5,000 feet

1" = 2,500'

LEGEND

- Responsible Parties
- Potentially Responsible Parties
- OU3 Study Area
- M52 Site Boundary
- Treatment Systems
- OU Boundaries
- Streets

NOTES

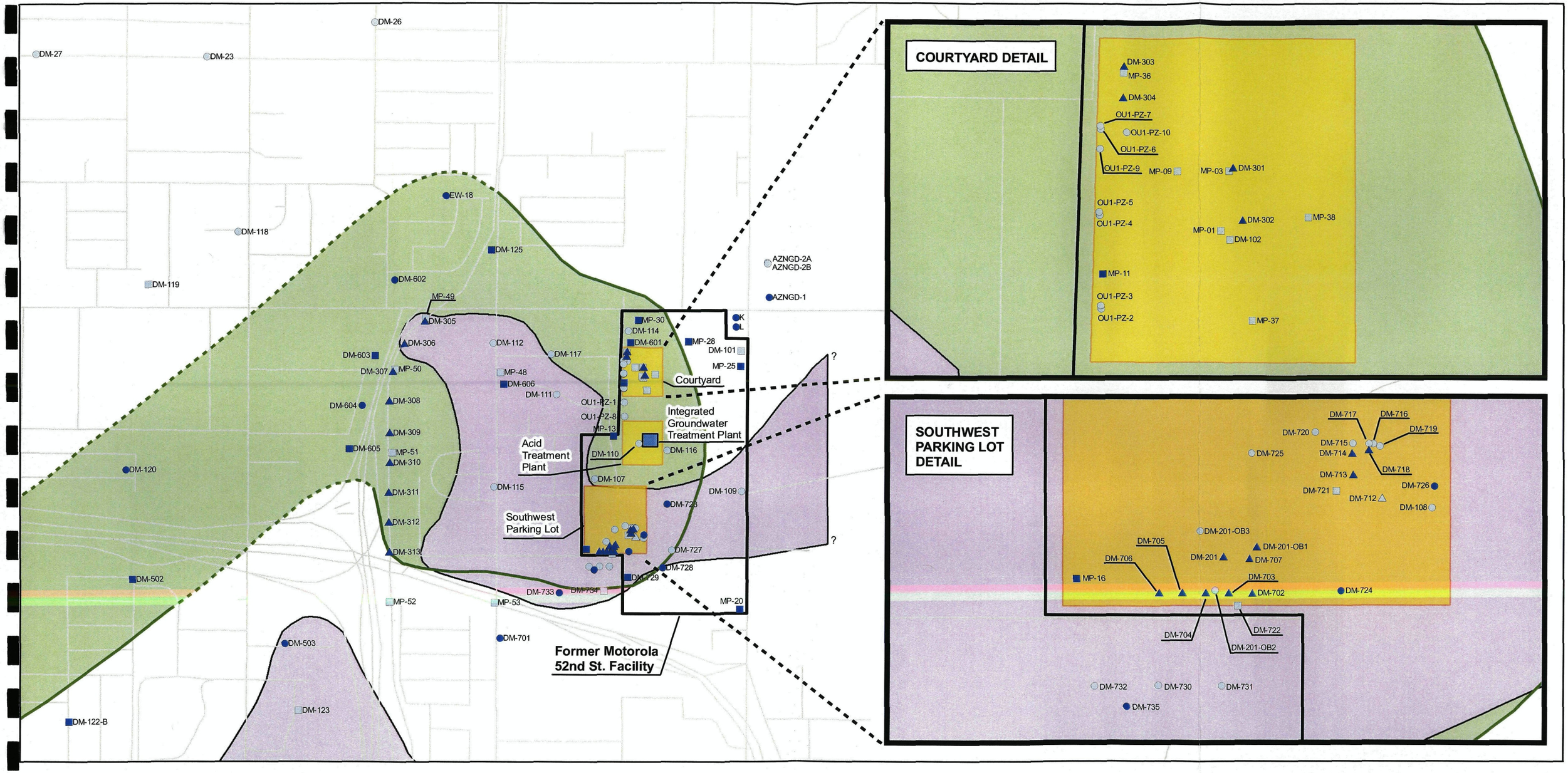
- M52 Site Boundary represents the estimated area of volatile organic compounds in alluvial and bedrock groundwater that exceed the Arizona Aquifer Water Quality Standards (AWQS) based on samples taken in September 2005. (dashed line = inferred)

MOTOROLA 52ND STREET SUPERFUND SITE PHOENIX, ARIZONA

Figure 1

Site Vicinity Map

LFR



N

0 1,000 2,000 feet

1" = 1000'

LEGEND

- M52 Site Boundary
- Unsaturated Basin Fill
- Integrated Groundwater Treatment Plant
- Streets
- Conventional Monitor Well, OU1 Network
- Westbay or Multi-port Well, OU1 Network
- Groundwater Extraction Well, OU1 Network
- Conventional Monitor Well, Non-network
- Westbay or Multi-port Well, Non-network
- Groundwater Extraction Well, Non-network

NOTES

- M52 Site Boundary represents the estimated area of volatile organic compounds in alluvial and bedrock groundwater that exceed the Arizona Aquifer Water Quality Standards (AWQS) based on samples taken in September 2005 (dashed line = inferred).

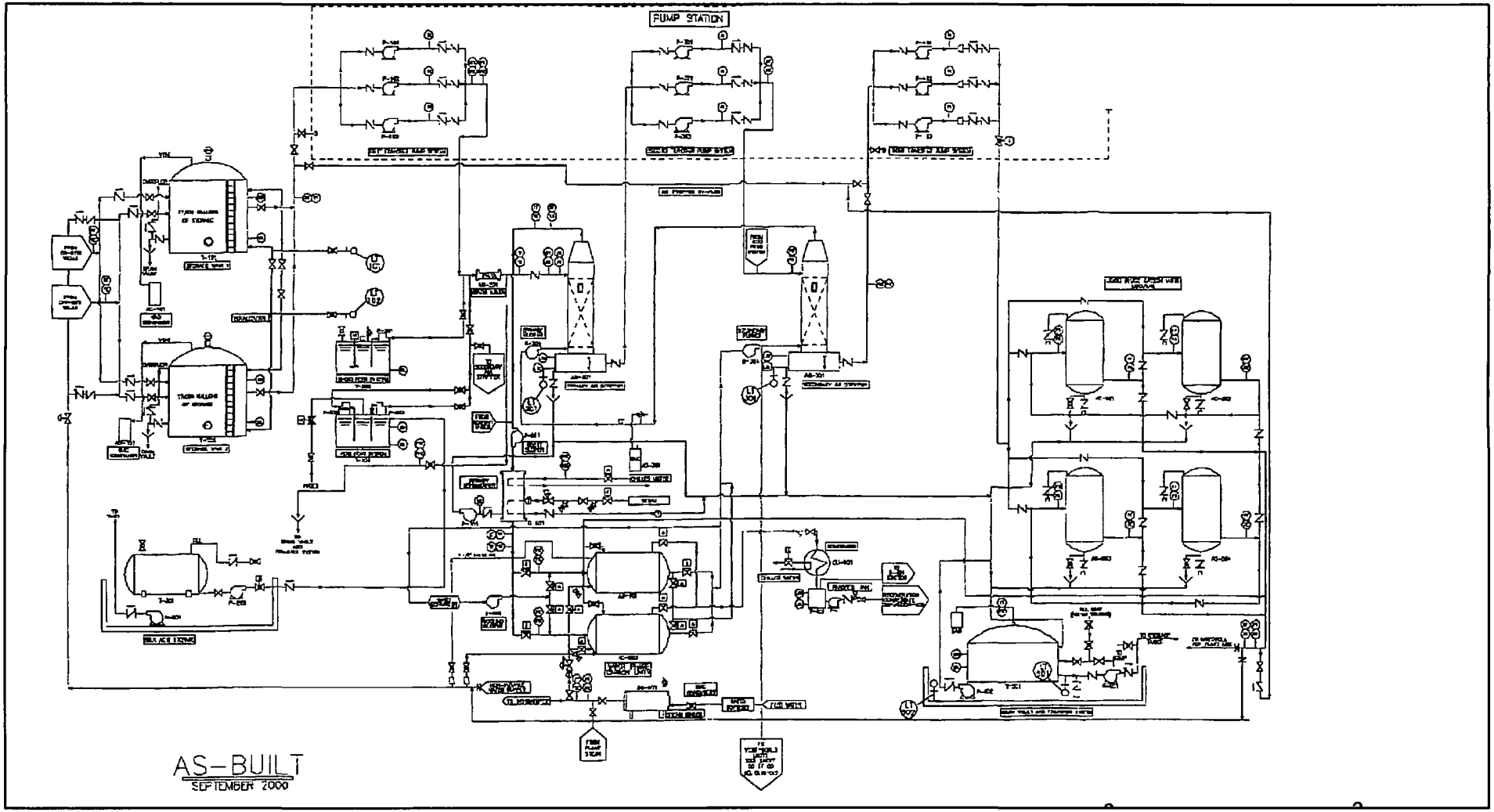
- Unsaturated Basin Fill represents the area of intersection of the "B" HSU and bedrock.

MOTOROLA 52ND STREET SUPERFUND SITE PHOENIX, ARIZONA

Figure 2

Site Plan

LFR



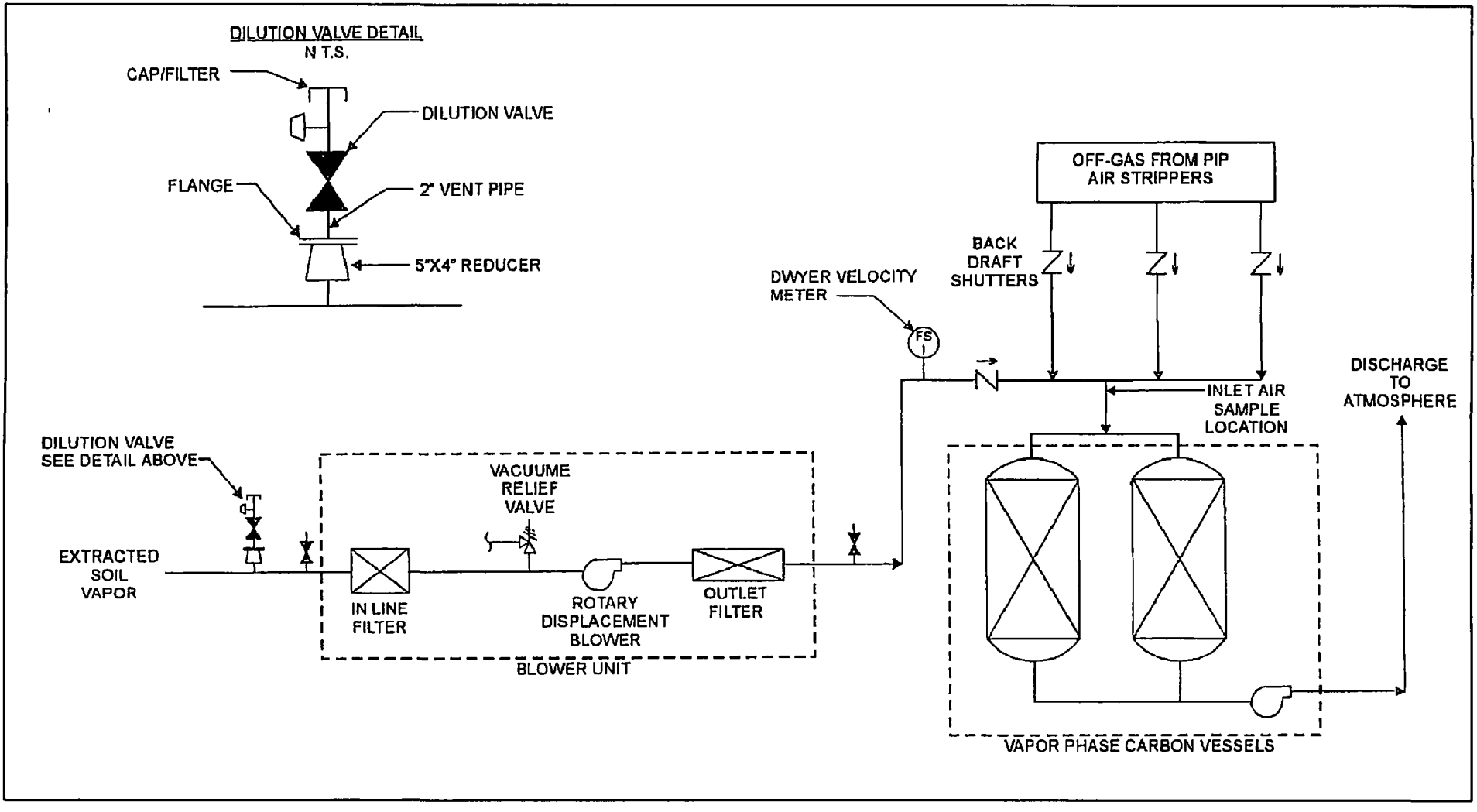
MOTOROLA 52ND STREET SUPERFUND SITE
PHOENIX, ARIZONA

Original drafting and design electronically transferred from Dames & Moore, Design Service Group
Job No 09448-083-022, Drawing No 5164-001, Rev No 8, Date 1/4/90
Frank Stephenson, Arizona Professional Registration No 23580

Figure 3

OU1 Process and Instrumentation Diagram

LFR

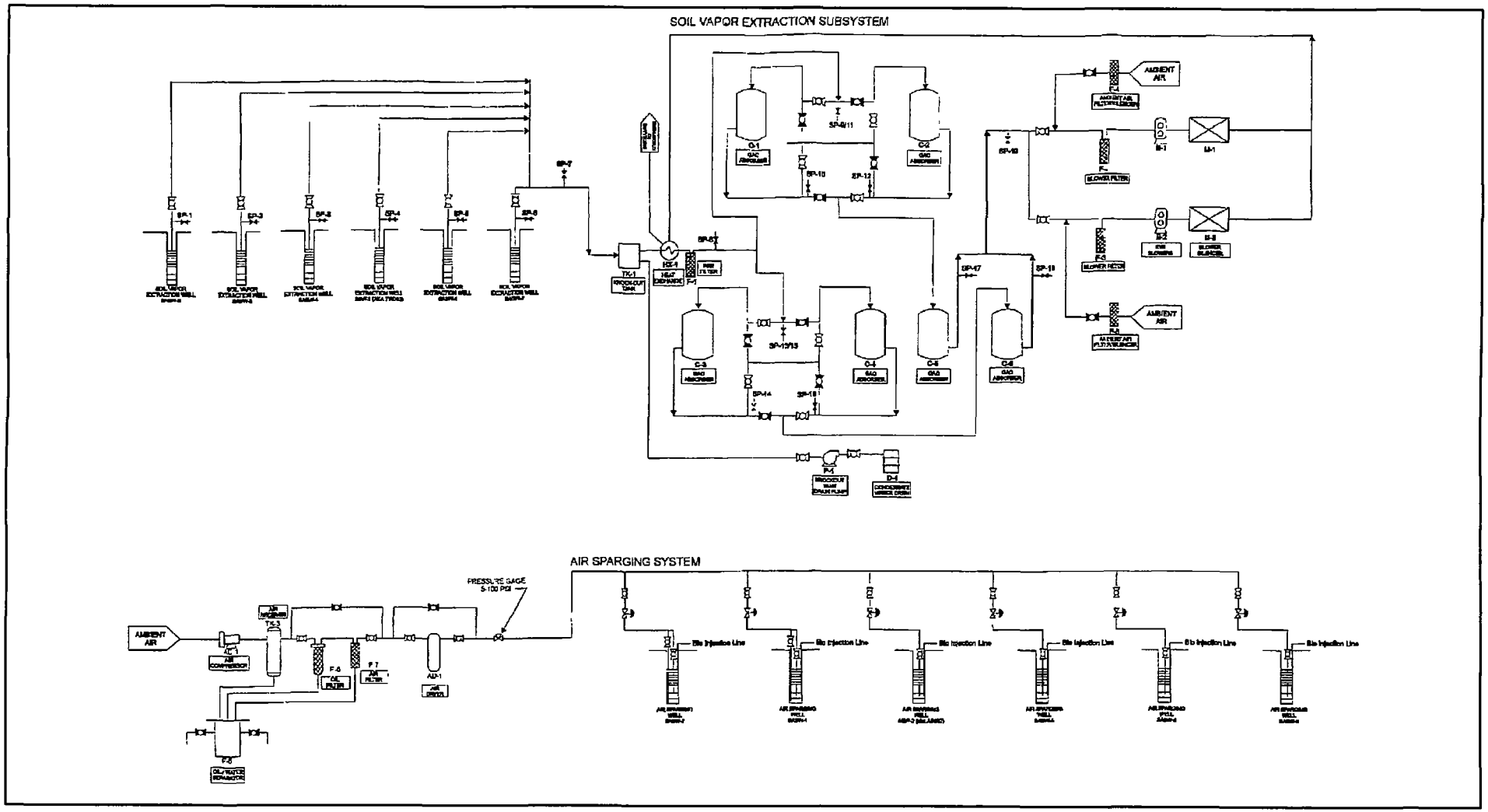


MOTOROLA 52ND STREET SUPERFUND SITE
PHOENIX, ARIZONA

Figure 4

OU1 Courtyard SVE Process Flow Diagram

LFR



MOTOROLA 52ND STREET SUPERFUND SITE
PHOENIX, ARIZONA

Figure 5

OU1 SWPL SVE Process Flow Diagram

LFR

APPENDICES

APPENDIX A

LIST OF DOCUMENTS REVIEWED

Arizona Department of Environmental Quality (ADEQ), 2002. Letter amending Groundwater Monitoring Plan for 52nd Street Superfund Site, Operable Unit No. 1 Area. July 30, 2002.

Arizona Department of Water Resources (ADWR), 1991. Letter from Mr. Richard A. Gessner, ADWR to Mr. John Seeger, Motorola Inc. dated May 8, 1991 transmitting the Poor Quality Ground-water Permit No. 59-530577 written April 22, 1991, and witnessed May 13, 1991.

Arizona Department of Environmental Quality and Harding ESE, "Second Five-Year Review Report, Operable Unit No. 1", September 27, 2001.

ADWR, 2005 Poor Quality Groundwater Withdrawal Permit (PQGWWP) No. 59-530577.0001, an amended-conveyed permit from Arizona Department of Water Resources effective on August 3, 2005 for the 52nd Street Superfund Site.

Attorney General's Office, 1989. 52nd Street/Complaint, Consent Order and Settlement Agreement, Civil Action No. 89-16807. June 20, 1989.

Clear Creek Associates, 2001a. Operable Unit No. 1 Effectiveness Report 2000 Operations, 52nd Street Superfund Site for Motorola Inc., March 2001.

Clear Creek Associates, 2001b. Semi-Annual Progress Report 2001-1 Annual PQGWWP Report, January through June 2001, 52nd Street Superfund Site, Consent Order CV 89-16807, PQGWWP No. 59-530577, July 31, 2001.

Clear Creek Associates, 2002a. Semi-Annual Progress Report 2001-2 Annual PQGWWP Report, July through December 2001, 52nd Street Superfund Site, Consent Order CV 89-16807, PQGWWP No. 59-530577, January 31, 2002.

Clear Creek Associates, 2002b. Operable Unit No. 1 Effectiveness Report 2001 Operations, 52nd Street Superfund Site, and OU1 System Evaluation for Motorola Inc., March 2002.

Clear Creek Associates, 2002c. Semi-Annual Progress Report 2002-1 Annual PQGWWP Report, January through June 2002, 52nd Street Superfund Site, Consent Order CV 89-16807, PQGWWP No. 59-530577, July 31, 2002.

Clear Creek Associates, 2003a. Semi-Annual Progress Report 2002-2 Annual PQGWWP Report, July through December 2002, 52nd Street Superfund Site, Consent Order CV 89-16807, PQGWWP No. 59-530577, January 31, 2003.

Clear Creek Associates, 2003b. Operable Unit No. 1 Effectiveness Report 2002 Operations, 52nd Street Superfund Site, and OU1 System Evaluation for Motorola Inc., March 2003.

Dames & Moore, 1991b. Clarification of Requirements for Poor Quality Groundwater Withdrawal Permit No. 59-530577, Motorola 52nd St. Operable Unit. November 22, 1991.

Dames & Moore, 1992a. Final Remedy Remedial Investigation Report Motorola 52nd St. February, 1992.

Dames & Moore, 1992b. Motorola 52nd St. Operable Unit Baseline Report. April 1992.

Dames & Moore, 1992c. Draft Operations Guidance Document for the OU1. November 13, 1992.

Dames & Moore, 1993a. MI52 Quarterly Report April 1993. April 28, 1993.

Dames & Moore, 1993c. Draft Southwest Parking Lot Remedial Investigation Report, Motorola 52nd St. Facility. May 1993.

Dames & Moore, 1994e. Addendum to the Draft Southwest Parking Lot Remedial Investigation Report, Motorola 52nd St. Facility. October 14, 1994.

Dames & Moore, 1998a Groundwater Monitoring Plan, 52nd Street Superfund Site, Operable Unit No. 1 Area, for Motorola Inc. January 26, 1998.

Dames & Moore, 2000. Semi-Annual Progress Report 99-2 Annual PQGWWP Report, July through December 1999, 52nd Street Superfund Site, Consent Order CV 89-16807, PQGWWP No. 59-530577 January 31, 2000.

EPA, 1994 Methods for Monitoring Pump and Treat Performance. EPA/600/R-94/123. June 1994.

GeoTrans, Inc., 2005a. Groundwater Remedial Alternatives Analysis, Motorola 52nd Street OU1, Phoenix, Arizona. September 30, 2005.

GeoTrans, Inc., 2005b. Addendum to Groundwater Remedial Alternatives Analysis, Evaluation of Technical Impracticability of Groundwater Restoration at the Motorola 52nd Street OU1, Phoenix, Arizona. December 2005.

Motorola, 2002. Southwest Parking Lot (SWPL) Request for Closure. September 18, 2002.

Motorola, 2003. OU1 Evaluation - Shutdown and Monitoring. July 31, 2003.

Reynolds, Stephen J. and R. Douglas Bartlett. 2002. Subsurface geology of the easternmost Phoenix basin, Arizona: Implications for groundwater flow. Arizona Geological Survey Contributed Report CR-02-A. August 2002.

APPENDIX B

AMENDED PQGWWP DOCUMENTS

AMENDED-CONVEYED PERMIT

ARIZONA DEPARTMENT OF WATER RESOURCES

PERMIT TO WITHDRAW

POOR QUALITY GROUNDWATER

PURSUANT TO A.R.S. § 45-516

PERMIT NO. 59-530577.0001

STATE OF ARIZONA)
) ss.
COUNTY OF MARICOPA)

This is to certify that Application No. 59-530577.0001 meets the requirements of Title 45, Chapter 2, Article 7, Arizona Revised Statutes for a permit to withdraw poor quality groundwater. The Director hereby grants a permit to withdraw poor quality groundwater pursuant to A.R.S. § 45-516, subject to the following limitations and conditions:

Permit Limitations

Permittee:	Freescale Semiconductor Inc. Attn: Tom Suriano 2100 E. Elliot Road Mail Drop EL-614 Tempe, AZ 85284
Active Management Area:	Phoenix
Sub-basin:	West Salt River Valley

PERMIT NO. 59-530577.0001

Maximum annual withdrawals:	1314 acre-feet per annum
Authorized Points of Withdrawal:	As referenced in Table 2
Authorized Use of Groundwater:	Groundwater contaminated with volatile organic compounds will be remediated by the Integrated Groundwater Treatment Plant (IGWTP) and utilized for industrial processing at the ON Semiconductor, Inc. facility
Authorized Place of Use for Groundwater Withdrawn:	Section 5, Township 1 North, Range 4 East
Effective Date of Permit:	August 3, 2005
Expiration Date of Permit:	May 6, 2011

Permit Conditions

1. The poor quality groundwater to be withdrawn by the Permittee will be treated to remove volatile organic compounds as part of the remedial action involving the Operable Unit by the Permittee. The treated water will then be used for industrial processes including reverse osmosis, deionized water systems, and cooling towers by ON Semiconductor at 52nd Street and McDowell Road pursuant to the Freescale Semiconductor, Inc. poor quality groundwater withdrawal permit #59-530577.0001

2. For the purpose of this permit, poor quality groundwater is defined as groundwater containing the following water quality parameters at concentrations meeting or exceeding the indicated United States Environmental Protection Agency (US EPA) Maximum Contaminant Level (MCL) or proposed MCL (MCLp) for that parameter:

TABLE 1: Water Quality Parameters

Parameter:	Poor Quality Indicator Level (ug/l):	Agency & MCL or MCLp:
1,2-Dichloroethane (1,2-DCA)	5 (ug/l)	EPA/MCL
1,1-Dichloroethylene (1,1-DCE)	7 (ug/l)	EPA/MCL
Cis-1,2- Dichloroethylene (c-1,2-DCE)	70 (ug/l)	EPA/MCL
trans-1,2-Dichloroethylene(t-1,2-DCE)	100 (ug/l)	EPA/MCL
Perchloroethylene or Tetrachloroethylene (PCE)	5 (ug/l)	EPA/MCL
1,1,1-Trichloroethane (1,1,1-TCA)	200 (ug/l)	EPA/MCL
Trichloroethene (TCE)	5 (ug/l)	EPA/MCL
Vinyl Chloride (VC)	2 (ug/l)	EPA/MCL

The contaminant levels listed above are to be used by the Arizona Department of Water Resources (ADWR) and the Permittee as an indicator that the groundwater is of poor quality. These levels do not constitute an ADWR "clean-up" standard. If groundwater contaminant levels drop below the indicator level, the ADWR may terminate this permit.

The contaminant levels will be reviewed annually by the ADWR to identify any changes that may have been promulgated during the previous year. The ADWR will notify the Permittee of any changes to the permit in writing.

3. The issuance of this permit does not constitute endorsement of the assertions or findings of investigations and studies submitted by the permit holder as part of its applications, nor as part of its other efforts to date to delineate the area and extent of contamination or to delineate contamination source or responsibility. Issuance of this permit does not waive application of any federal, state, county or local laws, rules or permits.

4 The Permittee shall take groundwater samples at the sample port at each wellhead or prior to a point of confluence with another source of groundwater.

5. The Permittee shall sample and analyze groundwater samples taken from all wells listed on Table 2. In addition, the Permittee shall measure groundwater levels in all wells listed in Table 2. The frequency of sampling and monitoring is indicated on Table 2. All groundwater levels shall be measured to within an accuracy of at least 0 1 foot, and each groundwater level measurement shall be related to an established survey point at each well. Survey points shall be described with reference to the following

- All metadata associated with each survey point (horizontal and vertical geodetic datum, projection, units, etc);
- Description of surveyed measuring point (MP) i.e. top of casing north side; center of well plate, etc; and
- A reference measurement between the MP and land surface with accuracy estimate.

All data is to be provided in both hard copy **and** electronic format in either a MS Excel spreadsheet or a MS Access database. The Permittee shall also submit a listing correlating all well numbers to ADWR well registration numbers within each semi-annual and annual report. A location map shall be submitted with all extraction wells, injections, and existing monitor wells to be used for sampling and monitoring illustrating the sampling distributions relative to the known extent of contamination. Contour maps of known extent of contamination shall also be drafted to document baseline conditions of this permit.

Table 2: Water Quality Sampling and Water Level Monitoring

Permittee Well ID:	ADWR Well Registration Number (55#):	Water Level Monitoring Frequency:	Sampling Frequency:
DM201	55-511601	Quarterly	Annual
DM201-OB1	55-511598	Quarterly	Annual
DM301	55-514169	Quarterly	Annual
DM302	55-514170	Quarterly	Annual
DM303	55-527636	Quarterly	Annual
DM304	55-527637	Quarterly	Annual
DM305	55-531585	Quarterly	Annual
DM306	55-531586	Quarterly	Annual
DM307	55-531587	Quarterly	Annual
DM308	55-531588	Quarterly	Annual
DM309	55-531589	Quarterly	Annual
DM310	55-531590	Quarterly	Annual
DM311	55-531591	Quarterly	Annual
DM312	55-531592	Quarterly	Annual
DM313	55-531593	Quarterly	Annual
DM702	55-534091	Quarterly	Annual
DM703	55-534092	Quarterly	Annual
DM704	55-534093	Quarterly	Annual
DM705	55-534094	Quarterly	Annual
DM706	55-534095	Quarterly	Annual
DM707	55-534096	Quarterly	Annual
DM713	55-534137	Quarterly	Annual

DM714	55-534136	Quarterly	Annual
DM718	55-534141	Quarterly	Annual
DM724	55-536569	Quarterly	Annual

6. The Permittee shall follow sampling and preservation techniques accepted by the US EPA and the ADEQ. All samples shall be analyzed using approved US EPA methodologies by a laboratory certified by the State of Arizona or a laboratory approved by the US EPA.

7. In the event of a restart of the wells after non-use of the wells for thirty (30) days or more, the Permittee shall measure groundwater levels in **all** wells.

8. The Permittee shall use an approved water-measuring device and method as required by A.R.S. § 45-604 and A.A.C. R12-15-902 and R12-15-903 and monitor extracted groundwater pumpage rates and volumes continuously at the wellheads.

9. The Permittee shall provide to the ADWR, on a semi-annual basis, groundwater data reports during each year of the permit. Any groundwater quality analyses that indicate the groundwater sampled cannot be defined as poor quality groundwater as outlined under permit condition No. 2 shall be **clearly** identified in the semi-annual groundwater data reports.

10. The semi-annual groundwater data reports shall contain a comprehensive summary and analysis of all water quality, water level, and water volume data collected during the prior 3 month or 6 month data reporting period that describes the efficiency of the remedial action. All data is to be provided in both hard copy **and** electronic format in either a MS Excel spreadsheet or a MS Access database. ARCMap (ESRI) shape files or AutoCAD or .pdf files produced to illustrate the extent of contamination and water level contours shall be submitted in electronic format.

11. The semi-annual groundwater data reports shall contain any proposed amendments to the permit by the Permittee including proposed changes to the monitoring and reporting schedules. All proposed amendments are subject to approval by the Director and may be either approved, amended, or rejected in writing within ninety (90) days after receipt of the semi-annual groundwater data report.

12. The Permittee shall submit its semi-annual groundwater data report no later than forty-five (45) days following the end of the completed semi-annual data-reporting period.

13. The Permittee shall file an "Annual Water Withdrawal and Use Report" as required under A.R.S. § 45-632 in addition to the semi-annual groundwater data reports as required by the conditions of this permit. The first annual reporting period shall commence on the date of issuance of the permit and end on December 31 of this calendar year. The Annual Water Withdrawal and Use Report shall be filed no later than March 31 for the prior calendar year. Subsequent annual report periods shall be for each year that the permit is in effect.

14. The Permittee shall send all semi-annual groundwater data reports to the ADWR, Hydrology-Water Quality Section, 500 North Third Street, Phoenix, Arizona 85004. The Permittee shall send the Annual Water Withdrawal and Use Report to the ADWR, Information Management Unit, 500 North Third Street, Phoenix, Arizona 85004.

15. Any semi-annual groundwater data reports found to be deficient shall be returned to the Permittee for revision, and shall be resubmitted to the Department within thirty (30) days.

16. The Permittee shall notify the Director in writing no later than ten (10) days after becoming aware of any permit noncompliance. The Permittee shall submit a written report within thirty (30) days documenting the noncompliance in detail.

WITNESS my hand and seal of office this 3rd day of August 2005.

Sandra Fabritz-Whitney

Sandra Fabritz-Whitney, Assistant Director

freescale semiconductor

Arizona Site Services
2100 East Elliot Road
M/D EL-614
Tempe, AZ 85284
FAX (480) 413-3100

Date: ~~June 30~~ 7/28, 2005

From: Tom Suriano (480) 413-5182

To: Sharon Ward - ADWR

cc:

FAX No. (602) 417-2467

Pages: 2 (including cover)

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Privileged and Confidential

Comments: Appeal waiver form for July 19, 2005 Draft Poor Quality Groundwater Withdrawal Permit 59-530577.0001

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PS Form 3800, June 2002 See Reverse for Instructions

7004 2510 0002 2283 0801

Appealable Agency Action Waiver

I, Thomas Surface, duly authorized by the Applicant for Poor Quality Groundwater Withdrawal Permit No. 59-530577.0001, assert that the Applicant has reviewed the Final Appealable Draft Permit of Application No. 59-530577.0001 and hereby waives all rights that the Applicant may have pursuant to Arizona Revised Statutes, Title 41, Chapter 6, Article 10, and Title 45, Chapter 2, Article 7, to administrative and judicial appeal, review or hearing concerning the issuance of the above listed Permit, including all limitations and conditions contained therein.

Signature

7/28/2005
Date

Remediation Program Manager
Title

ARIZONA DEPARTMENT OF WATER RESOURCES
WATER MANAGEMENT DIVISION
500 North Third Street, Phoenix, Arizona 85004
Telephone 602 417-2470
Fax 602 417-2423

July 19, 2005

JANET NAPOLITANO
Governor

HERB GUENTHER
Director

VIA CERTIFIED MAIL 7004 2510 0007 2283 0801

Mr. Tom Suriano
Freescale Semiconductor, Inc.
2100 E. Elliot Road
Mail Drop EL-614
Tempe, Arizona 85284

Re: Amended-Conveyed Poor Quality Use Permit No. 59-530577.0001

RE: Decision of the Director to Grant the Conveyance of Poor Quality Groundwater Withdrawal Permit No. 59-530577.0001 to Freescale Semiconductor, Inc.

Dear Mr Suriano:

This letter is the Decision of the Director of the Arizona Department of Water Resources to convey Poor Quality Groundwater Withdrawal Permit No 59-530577.0001 to Freescale Semiconductor, Inc.

The Department's review of the relevant information establishes that all of the requirements for the conveyance of a Poor Quality Groundwater Withdrawal Permit set forth in A.R.S. § 45-516 have been met.

This Decision of the Director to grant Permit No. 59-530577.0001 for a Poor Quality Groundwater Withdrawal is an appealable agency action. I have enclosed a copy of the Final Appealable Draft Permit. The Final Appealable Draft Permit will be the final form of your permit upon issuance.

You are entitled to appeal this decision. If you wish to appeal this decision, you must file a written appeal within **thirty (30) days** from receipt of this letter. I am providing you with a summary of the appeal process and an appeal form, should you elect to pursue this option.

You may elect to complete and file the enclosed Appealable Agency Action Waiver Form, waiving your right to appeal the Director's Decision, so that your permit can be signed without delay. If the Appealable Agency Action Waiver is not filed, the permit shall be signed and issued at the end of the 30-day appeal period.

Please direct any questions concerning the permit or the appeal process to Ken Slowinski in the Department's Legal Division at 602-417-2420.

Sincerely,

Sandra Fabritz-Whitney
Assistant Director

Enclosures
cc: Ken Slowinski, Legal Division
Sharon Ward, Phoenix AMA
Mark Holmes, Hydro/WQARF

APPENDIX C

TCE CONCENTRATIONS OF ALLUVIAL AND BEDROCK AQUIFER AND GROUNDWATER ELEVATIONS PRESENTED IN EFFECTIVENESS REPORTS FOR 1992 (BASELINE), 2001, 2002, 2003, 2004, AND 2005 OPERATIONS

LEGEND:

- DM 602 — NAME OF WELL
- 1100 — GROUNDWATER ELEV CONTOUR (FEET AMSL)
- SUPPLEMENTAL 1 FT CONTOURS (DASHED) SHOWN FOR MORE DETAIL
- APPROX AREA OF CAPTURE

NOTES:

1. FOR MORE DETAILED INFORMATION ON WELLS, REFER TO MI52 QUARTERLY 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 OCCURRING IN THE COURTYARD AND SWPL AREAS .
3. CONTOUR INTERVAL IS 5 FEET EXCEPT AS NOTED

MORGAN (4626G)
EW-18 1167 71
DM 118 1141 42
DM 125
AZNGD-2A 1205 39
AZNGD-1 1217 86
DM 119 1128 01
DM 602 1147 89
DM 305 1148 69
DM 306 1142 30
McDOWELL ROAD
DM 114 1183 08
MP 30 1184 45
DM 303 1178 64
DM 117 1179 03
DM 601 1180 20
DM 304 1174 47
MP 28 1186 78
BRILL STREET
DM 603 1137 69
DM 307 1136 94
DM 606 1160 79
MP 09 1183 03
MP 11 1183 68
DM 301 1182 69
DM 302 1177 9
MP 25 1187 09
DM 308 1135 90
DM 111 1181 66
MP 03 1181 62
COURTYARD AREA
DM 604 1133 70
DM 309 1132 81
DM 605 1130 14
DM 310 1132 51
OLD CROSSCUT CANAL
48th STREET
MP 13 1184 6
DM 115 1144 30
DM 311 1132 07
DM 107 1181 08
52nd STREET FACILITY
DM 312 1131 59
DM 201 1153 63
DM 718 1176 15
52nd STREET
DM 313 1131 40
MP 16 1164 07
SWPL AREA
DM 120 1112 00
RED MOUNTAIN FREEWAY
ROOSEVELT STREET
DM 733 1158 68
50th STREET
DM 502 1103 10
DM 503 1108 42
MP 20 1186 34
DM 701 1146 44
40th STREET
44th STREET
HOHOKAM FREEWAY
DM 122 1092 33
DM 123 1108 25
GRAND CANAL
1100
1125
1150
1175
1200

APPROXIMATE SCALE
0 600 1200
IN FEET

N

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

Figure 2.1

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2003 OPERATIONS
MARCH 2004

OU1-2003-2-1.DWG 1-21-04

A
ELEVATION
FEET AMSL

A'
ELEVATION
FEET AMSL

1250
1200
1150
1100
1050
1000
950
900
850
800

GROUND SURFACE
WATER TABLE
BEDROCK
OLD CROSSCUT CANAL
52ND STREET FACILITY
PROJECTED DM 117
PROJECTED DM 111 DRY
APPROXIMATE AREA OF CAPTURE

DM 502
1103 10
1103 60
1103 96
1104 60
1104 53

DM 603
1137 69
1137 51
1137 53
1137 41
1137 57

DM 307
1136 94

DM 606
1179 03
1160 79
1160 91
1159 00
1158 57
1156 13
1155 20

DM 601
DM 304
1180 20
1181 05
1181 26
1181 13

MP 09
MP 03
DM 301
1174 47
1182 69
1182 03
1181 62
1183 40
1181 80
1181 66

MP 25
1187 09
1189 31

1125
1150
1175
1200

LEGEND:

DM 606 — NAME OF WELL
GROUND SURFACE
BEDROCK CONTACT
MONITOR ZONE
MEASUREMENT PORT
PUMPING PORT
1160 91 — WATER LEVEL ELEVATION (FEET AMSL)

1125 — WATER LEVEL ELEVATION CONTOUR (FEET AMSL)
WATER TABLE
CAPTURE ZONE

NOTES:

1 LOCATION OF SECTION A–A' IS SHOWN ON FIGURE 1 1
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 OFFSITE PORTION OF THE OU1 WAS NOT IN OPERATION AT THIS TIME (3/92)

HORIZONTAL SCALE
0 600 1200
IN FEET

VERTICAL EXAGGERATION
10X

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

Figure 2.6

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2003 OPERATIONS
MARCH 2004

OU1-2003-2-6.DWG 2-26-04

LEGEND:

- • — WELL LOCATION
- DM 119 — WELL NAME
- −72 — DEPTH OF WESTBAY SAMPLE PORT (IN FEET) OR COMPLETION INTERVAL DESIGNATION, TCE CONCENTRATION (ppb)
- —— — TCE CONCENTRATION CONTOUR (ppb)
- ▬▬ — APPROXIMATE AREA OF CAPTURE

NOTES:

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

EW−18
DM 118
DM 125
AZNGD−2A&2B
AZNGD−1
DM 119
−72
−98
−137
DM 602
McDOWELL ROAD
DM 305
DM 306
DM 307
DM 603
−68
−115
DM 308
DM 604
DM 309
DM 606
−45
BRILL STREET
MP 30−B
DM 601
−40
DM 303
DM 304
DM 301
DM 302
MP 25
−A
MP 11
−B
MP 13
−A
−B
48th STREET
DM 120
AZSLD
DM 605
−66
−105
DM 310
DM 311
OLD CROSSCUT CANAL
DM 312
DM 313
52nd STREET FACILITY
52nd STREET
DM 718
MP 16
−A
−B
DM 201
APPROXIMATE AREA OF CAPTURE
ROOSEVELT STREET
DM 730
DM 733
50th STREET
MP 20
−A
RED MOUNTAIN FREEWAY
DM 502
−79
−119
40th STREET
DM 503
44th STREET
HOHOKAM FREEWAY
DM 701
DM 123
−56
DM 122
−A
−B
GRAND CANAL
APPROXIMATE SCALE
0 600 1200
IN FEET
N

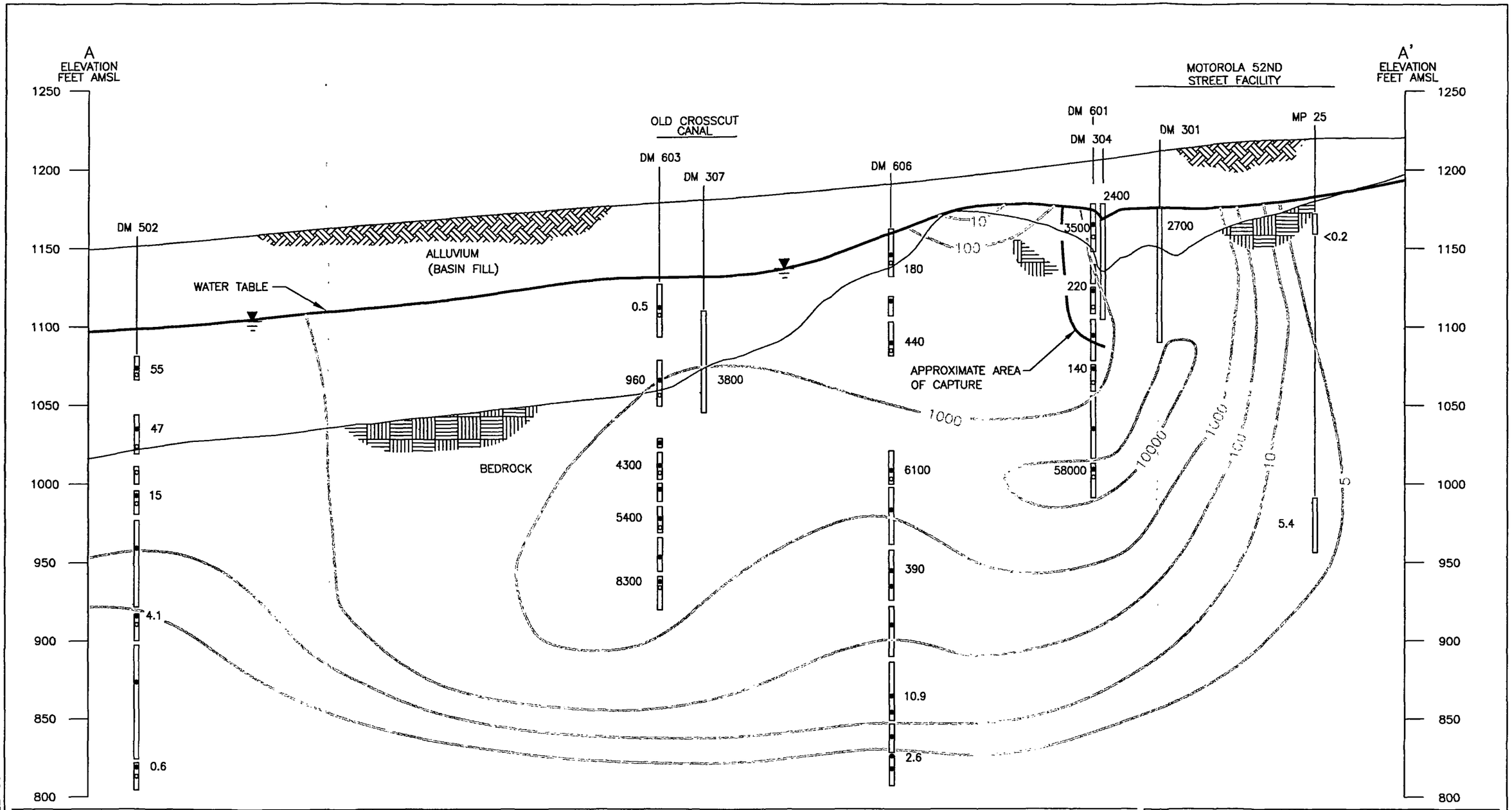
OU1−2003−3−1 DWG 1−21−04

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

Figure 3.1

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2003 OPERATIONS
MARCH 2004



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)

TCE CONCENTRATION CONTOUR (ppb)

CAPTURE ZONE

NOTES:

1. LOCATION OF SECTION A–A' IS SHOWN ON FIGURE 1.1.
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

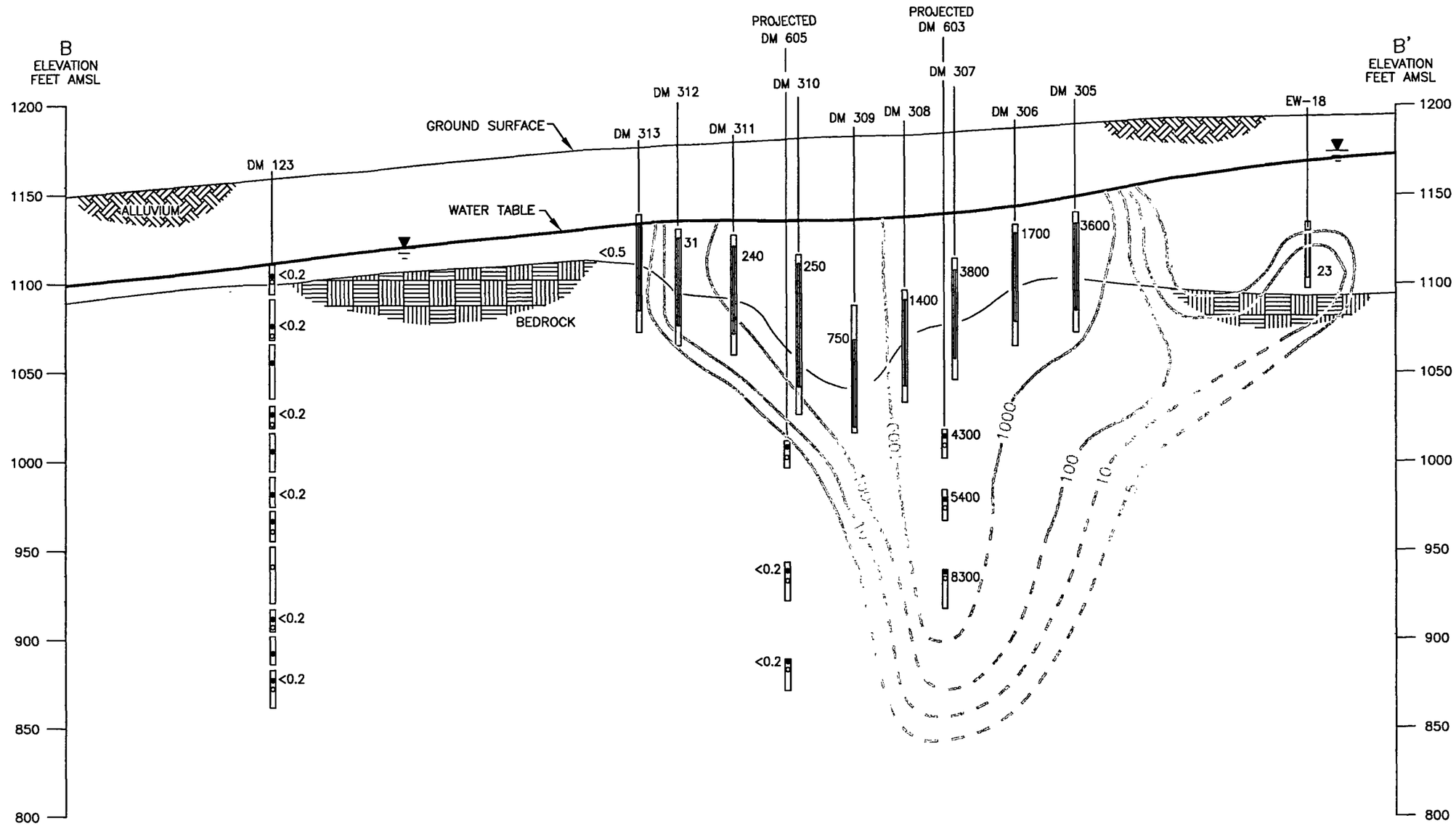
BASELINE (MARCH - MAY 1992) TCE CONCENTRATIONS SECTION A-A'

Figure 3.7

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2005 OPERATIONS
MARCH 2006

OU1-2005-3-7.DWG 2-22-06



LEGEND:

DM 123 — NAME OF WELL
— GROUND SURFACE
— BEDROCK CONTACT
— 1992 WATER TABLE
— MONITOR ZONE
— MEASUREMENT PORT
— PUMPING 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 1.1.
2. THE WATER TABLE WAS PLOTTED USING MARCH–MAY 1992 DATA.
3. DM 313 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

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

Figure 3.8

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2005 OPERATIONS
MARCH 2006

OU1-2005-3-8.DWG 3-11-06

LEGEND

- •DM 602 NAME OF WELL
- 1100 GROUNDWATER ELEVATION CONTOUR (FEET AMSL)
- APPROXIMATE AREA OF CAPTURE
- APPROXIMATE AREA OF BEDROCK ABOVE WATER TABLE

NOTES:

1. FOR MORE DETAILED INFORMATION ON WELLS, REFER TO MI52 QUARTERLY REPORTS AND THE 1992 MI52 FR RI REPORT.
2. DM123 WATER LEVEL POSTED IS FROM THE UPPERMOST BEDROCK PORT; ALLUVIAL PORT WAS DRY.
3. CONTOUR INTERVAL 10 FEET.
4. WATER LEVELS FOR WELLS DM 305 TO 311 ADJUSTED FOR WELL EFFICIENCY. SEE DISCUSSION IN SECTION 2 OF THIS REPORT
5. WELLS WITH ( ) WERE PUMPING WHEN WATER MEASUREMENTS WERE RECORDED.

EW-18 1156.15
DM 125 1161.89
AZNGD-2A 1217.92
AZNGD-1 1211.51
DM 602 1124.91
McDOWELL ROAD
DM 305 (1118.6)
DM 306 (1101.2)
DM 112 DRY
DM 114 1168.26
MP 30 1169.50
1208.86
1204.69
1167.04
DM 304
DM 303 1162.40
1168.93
DM 117
1168.87
DM 601
1166.93
MP 09
MP 28 1177.11
BRILL STREET
DM 606 1145.89
MP 03 1168.68
DM 301 1161.45
MP 25 1185.14
MP 11 1173.12
DM 302 1161.43
DM 111 DRY
1173.42
MP 13
DM 603 1108.90
DM 307 (1096.6)
DM 308 (1088.8)
DM 309 (1094.0)
DM 604 1104.22
DM 605 1104.22
DM 310 (1092.5)
DM 311 (1086.0)
DM 312 1104.61
DM 313 1108.49
OLD CROSSCUT CANAL
DM 115 DRY
DM 107 1177.72
1176.74
DM 723
52nd STREET FACILITY
1171.16
DM 725
DM 718 1162.22
DM 201 (1100.90)
1158.23
MP 16
DM 724 1157.34
DM 727 1182.03
DM 728
DM 729 1173.57
1157.98
DM 733 1150.25
ROOSEVELT STREET
48th STREET
52nd STREET
MP 20 1181.95
DM 701 1137.05
APPROXIMATE AREA OF CAPTURE FALL 2001
APPROXIMATE AREA OF CAPTURE FALL 2001
DM 120 1098.08
RED MOUNTAIN FREEWAY
DM 502 1093.21
DM 503 1095.62
DM 123 1095.20
DM 122-B 1084.22
40th STREET
44th STREET
GRAND CANAL
APPROXIMATE SCALE
0 600 1200
IN FEET
N

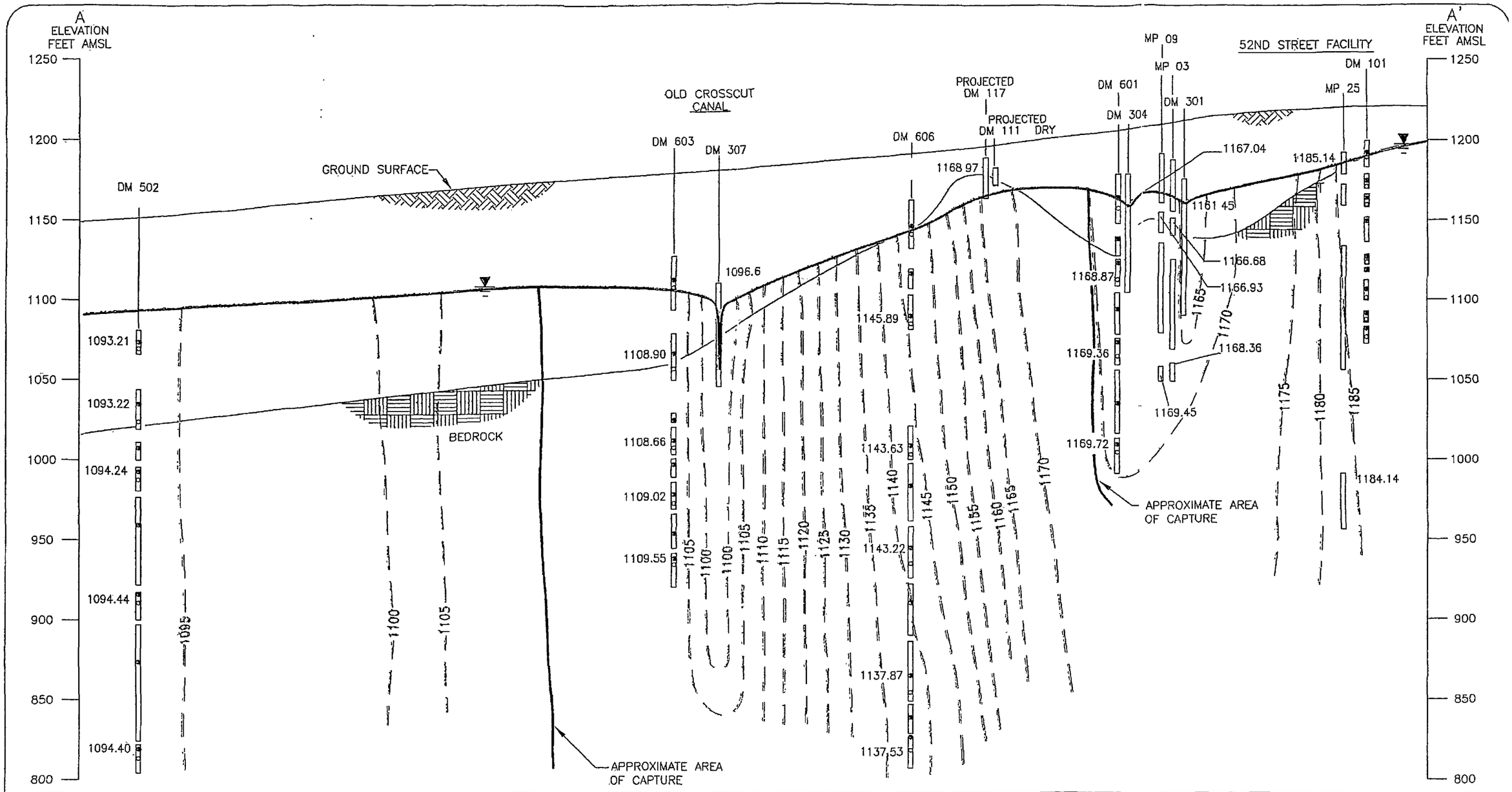
FALL 2001 WATER LEVEL ELEVATIONS ALLUVIAL AQUIFER PLAN VIEW

Figure 2.2

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2001 OPERATIONS
MARCH 2002

OU1-2001-2-2.dwg 3-28-02



LEGEND

DM 606 — NAME OF WELL
GROUND SURFACE
BEDROCK CONTACT
MONITOR ZONE
MEASUREMENT PORT
PUMPING PORT
1148.89 WATER LEVEL ELEVATION (IN FEET AMSL)

APPROXIMATE AREA OF CAPTURE

1000 WATER LEVEL ELEVATION CONTOUR (IN FEET AMSL)

WATER TABLE

NOTES:

1. LOCATION OF SECTION A–A' IS SHOWN ON FIGURE 1.1.
2. THE WATER TABLE WAS PLOTTED USING FALL 2001 DATA
3. FIGURE 2.2 SHOWS WHERE THE CROSS SECTION CROSSES THE CAPTURE ZONE NEAR THE OCC. GROUNDWATER FLOW IS SOUTH–EAST TOWARD THE EXTRACTION WELLS. IN FIGURE 2.7 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. *THEREFORE, THE STAGNATION POINT DOES NOT APPEAR AS THE HIGH POINT IN THE WATER ELEVATION PROFILE.*
4. WATER LEVEL FOR DM 307 ADJUSTED FOR WELL EFFICIENCY SEE DISCUSSION IN SECTION 2 OF THIS REPORT

HORIZONTAL SCALE
0 600 1200
IN FEET

VERTICAL EXAGGERATION 10X

FALL 2001 WATER LEVEL ELEVATIONS SECTION A-A'

Figure 2.7

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2001 OPERATIONS
MARCH 2002

OU1-2001-2-7.DWG 3-26-02

LEGEND:

- • WELL LOCATION
- DM 125 WELL NAME
- −76 0.77 DEPTH, TCE CONCENTRATION (ppb)
- —100— TCE CONCENTRATION CONTOUR (ppb)
- ——— APPROXIMATE AREA OF CAPTURE
- NS NOT SAMPLED

NOTES:

1. THE TCE CONCENTRATION CONTOURS DRAWN ON THIS FIGURE ARE APPROXIMATE AND ARE SHOWN TO ILLUSTRATE THE GENERAL CONCENTRATIONS OF TCE IN THE AREA.

* TCE CONCENTRATION WAS 5.4 pbb WHEN SAMPLED IN FIRST QUARTER 2002. REFER TO CHAPTER 4.

•EW-18 25 10

DM 125 −076 0.77

AZNGD−2A <0.5

AZNGD−1 • <0.5

DM 602 • 3.0

10

McDOWELL ROAD

MP 30 −B 65

100 1000

•DM 305 1300

DM 306 3200

DM 303 2000

•MP 28 <0.5

DM 601 −40 NS

DM 301 640

DM 603 • −115 5.4

DM 307 280

BRILL STREET

DM 304 750

MP 25 NS

DM 302 2800

DM 606 −45 NS

DM 308 150

MP 11 −B 260

1000

100

APPROXIMATE AREA OF CAPTURE FALL 2001

DM 604 • 4.6

DM 309 56.0

MP 13 −B 370

APPROXIMATE AREA OF CAPTURE FALL 2001

•DM 120 3.7

DM 310 35.0

•DM 605 −105 2.4

48th STREET

DM 311 3.1

52nd STREET FACILITY

100

DM 723 120

DM 312 0.61

10

DM 313* 26.0

OLD CROSSCUT CANAL

DM 201 34.0

DM 718 20.0

DM 724 180

MP 16 −B 9.9

100

RED MOUNTAIN FREEWAY

ROOSEVELT STREET

•DM 728 4.0

DM 729 −50 58.0

0.62 •DM 733

50th STREET

52nd STREET

MP 20 −A <0.50

•DM 502 −79 6.8 −119 6.5

•DM 503 <0.50

•DM 701 <0.50

40th STREET

44th STREET

HOHOKAM FREEWAY

•DM 123 NS

•DM 122 −B <0.5

GRAND CANAL

APPROXIMATE SCALE

0 600 1200

IN FEET

N

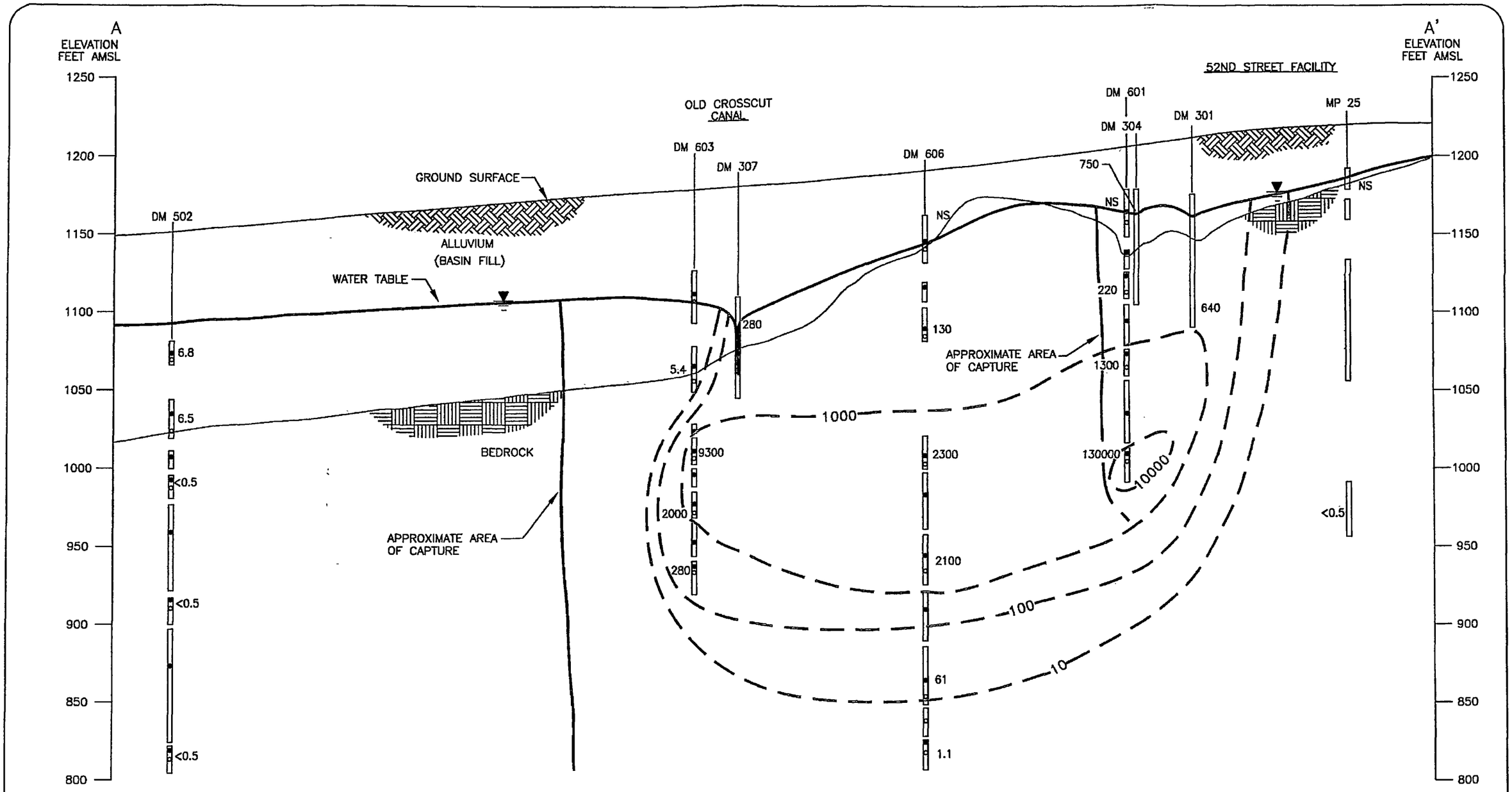
OU1-2002-3-2.DWG 3-12-03

FALL 2001 TCE CONCENTRATIONS ALLUVIAL AQUIFER PLAN VIEW

Figure 3.2

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2002 OPERATIONS
MARCH 2003



LEGEND:

DM 606 — NAME OF WELL
GROUND SURFACE
BEDROCK CONTACT
MONITOR ZONE
MEASUREMENT PORT
PUMPING PORT

130 TCE CONCENTRATION (ppb)

10 TCE CONCENTRATION CONTOUR (ppb)

WATER TABLE

NOTES:

1. LOCATION OF SECTION A–A' IS SHOWN ON FIGURE 1.1
2. THE TCE CONTOURS DRAWN ON THIS FIGURE ARE APPROXIMATE AND ARE PRESENTED TO ILLUSTRATE THE RELATIVE TCE CONCENTRATIONS.
3. THE WATER TABLE WAS PLOTTED USING FALL 2001 DATA.

HORIZONTAL SCALE
0 600 1200
IN FEET

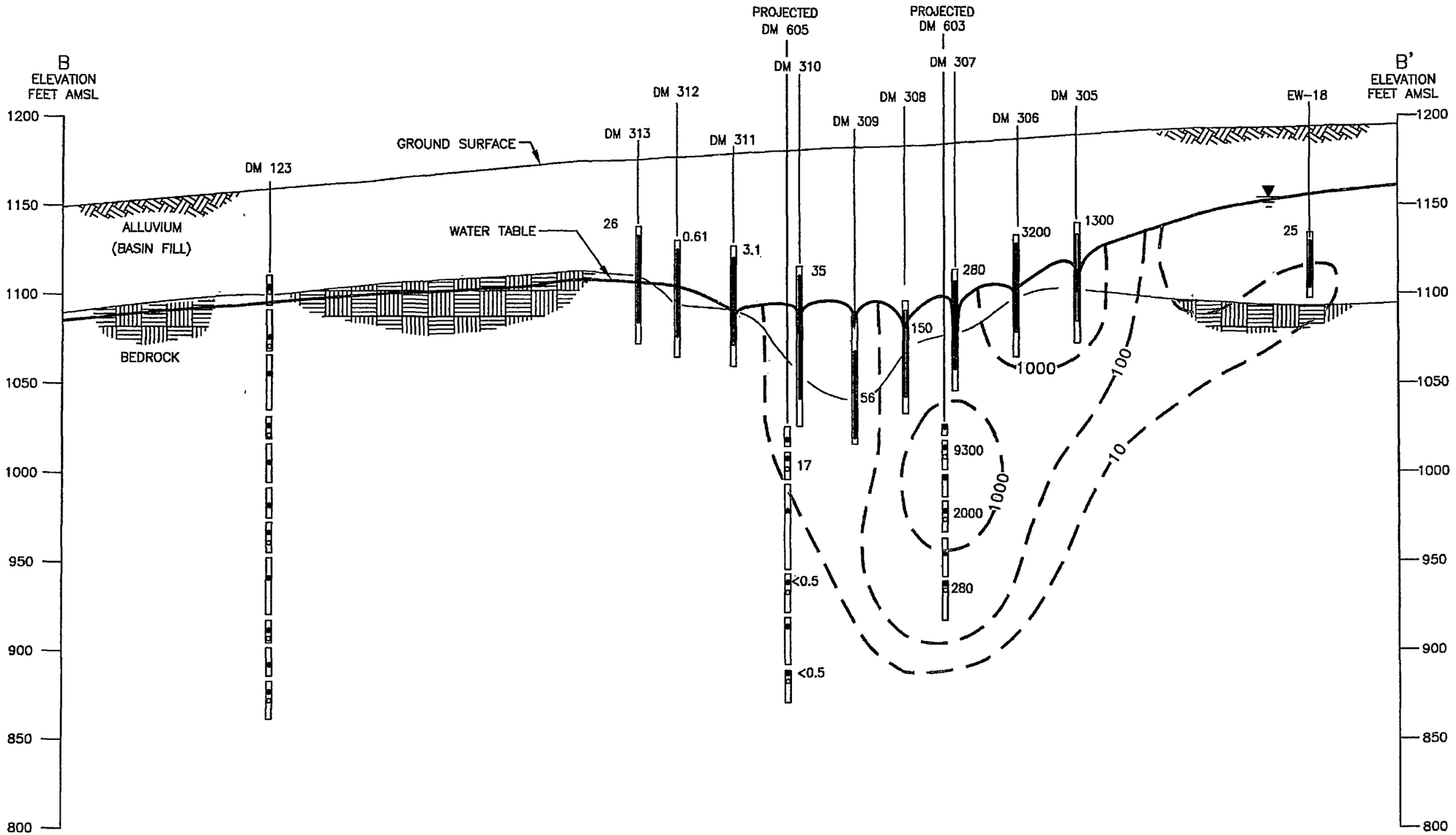
VERTICAL EXAGGERATION
10X

FALL 2001
TCE CONCENTRATIONS
SECTION A-A'
Figure 3.9

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2002 OPERATIONS
MARCH 2003

OU1-2002-3-9.DWG 3-12-03



LEGEND:

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

NOTES:

1. LOCATION OF SECTION B–B' IS SHOWN ON FIGURE 1.1.
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 TCE CONTOURS DRAWN ON THIS FIGURE ARE APPROXIMATE AND ARE PRESENTED TO ILLUSTRATE THE RELATIVE IN TCE CONCENTRATIONS
4. THE WATER TABLE WAS PLOTTED USING FALL 2001 DATA.

HORIZONTAL SCALE
0 600 1200
IN FEET

VERTICAL EXAGGERATION
10X

FALL 2001
TCE CONCENTRATIONS
SECTION B-B'
Figure 3.11

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2002 OPERATIONS
MARCH 2003

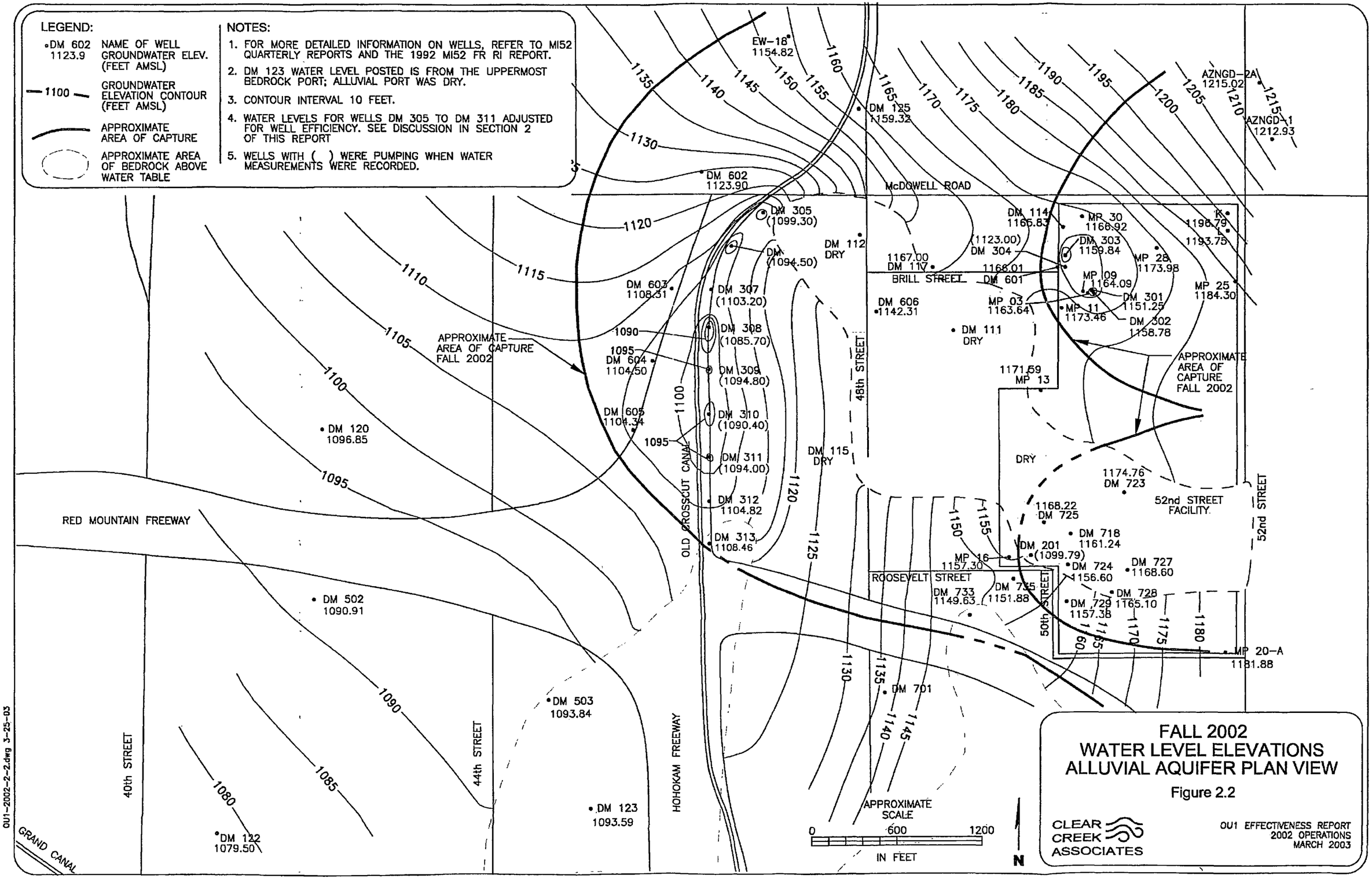
OU1-2002-3-11.DWG 3-7-03

LEGEND:

- •DM 602 1123.9 — NAME OF WELL GROUNDWATER ELEV. (FEET AMSL)
- —1100— GROUNDWATER ELEVATION CONTOUR (FEET AMSL)
- APPROXIMATE AREA OF CAPTURE
- APPROXIMATE AREA OF BEDROCK ABOVE WATER TABLE

NOTES:

1. FOR MORE DETAILED INFORMATION ON WELLS, REFER TO MI52 QUARTERLY REPORTS AND THE 1992 MI52 FR RI REPORT.
2. DM 123 WATER LEVEL POSTED IS FROM THE UPPERMOST BEDROCK PORT; ALLUVIAL PORT WAS DRY.
3. CONTOUR INTERVAL 10 FEET.
4. WATER LEVELS FOR WELLS DM 305 TO DM 311 ADJUSTED FOR WELL EFFICIENCY. SEE DISCUSSION IN SECTION 2 OF THIS REPORT
5. WELLS WITH ( ) WERE PUMPING WHEN WATER MEASUREMENTS WERE RECORDED.



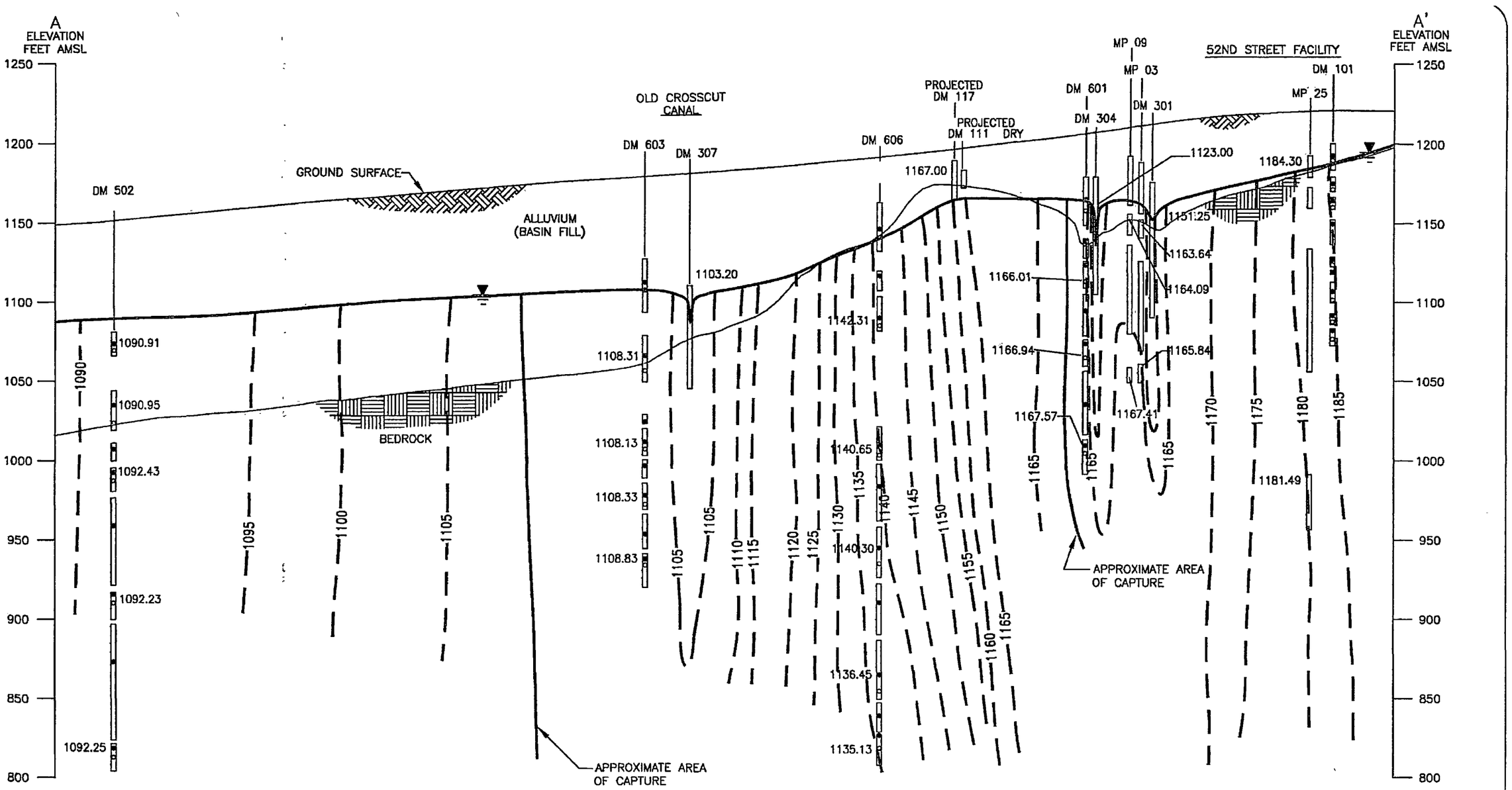
FALL 2002 WATER LEVEL ELEVATIONS ALLUVIAL AQUIFER PLAN VIEW

Figure 2.2

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2002 OPERATIONS
MARCH 2003

OU1-2002-2-2.dwg 3-25-03



LEGEND:

- DM 606 — NAME OF WELL
- GROUND SURFACE
- BEDROCK CONTACT
- MONITOR ZONE
- MEASUREMENT PORT
- PUMPING PORT
- 1142.31 — WATER LEVEL ELEVATION (IN FEET AMSL)
- APPROXIMATE AREA OF CAPTURE
- 1000 — WATER LEVEL ELEVATION CONTOUR (IN FEET AMSL)
- WATER TABLE

NOTES:

1. LOCATION OF SECTION A–A' IS SHOWN ON FIGURE 1.1.
2. THE WATER TABLE WAS PLOTTED USING FALL 2002 DATA.
3. FIGURE 2.2 SHOWS WHERE THE CROSS SECTION CROSSES THE CAPTURE ZONE NEAR THE OCC. GROUNDWATER FLOW IS SOUTH–EAST TOWARD THE EXTRACTION WELLS. IN FIGURE 2.7 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. THEREFORE, THE STAGNATION POINT DOES NOT APPEAR AS THE HIGH POINT IN THE WATER LEVEL ELEVATION PROFILE.
4. WATER LEVEL FOR DM 307 ADJUSTED FOR WELL EFFICIENCY. SEE DISCUSSION IN SECTION 2 OF THIS REPORT.

HORIZONTAL SCALE
0 600 1200
IN FEET

VERTICAL EXAGGERATION 10X

FALL 2002 WATER LEVEL ELEVATIONS SECTION A-A'

Figure 2.7

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2002 OPERATIONS
MARCH 2003

OU1-2001-2-7.DWG 3-18-03

LEGEND:

- • WELL LOCATION
- DM 125 WELL NAME
- −76 0.77 DEPTH, TCE CONCENTRATION (ppb)
- —100— TCE CONCENTRATION CONTOUR (ppb)
- APPROXIMATE AREA OF CAPTURE
- NS NOT SAMPLED

NOTES:

1. THE TCE CONCENTRATION CONTOURS DRAWN ON THIS FIGURE ARE APPROXIMATE AND ARE SHOWN TO ILLUSTRATE THE GENERAL CONCENTRATIONS OF TCE IN THE AREA.

EW−18 26
DM 125 −076 0.54
AZNGD−2A NS
AZNGD−1 <0.5
DM 602 6.7
MP 30 −B 59
McDOWELL ROAD
DM 305 970
DM 306 2200
DM 303 1800
K <0.5
L <0.5
MP 28 −A <0.5
DM 601 −40 NS
DM 301 580
DM 603 −115 4.5
DM 307 470
BRILL STREET
DM 304 1200
MP 25 −A NS
DM 302 2300
DM 606 −45 NS
DM 308 160
MP 11 −B 250
DM 604 6.5
APPROXIMATE AREA OF CAPTURE FALL 2002
DM 309 52
MP 13 −B 2000
APPROXIMATE AREA OF CAPTURE FALL 2002
DM 120 4.2
DM 605 −105 2.8
DM 310 33
48th STREET
DM 311 2.8
52nd STREET FACILITY
DM 723 180
DM 312 <0.5
DM 201 71
DM 718 5.5
DM 724 280
DM 313 1
MP 16 −B 11
OLD CROSSCUT CANAL
52nd STREET
RED MOUNTAIN FREEWAY
ROOSEVELT STREET
DM 735 <0.5
DM 728 1.2
DM 729 −50 44
DM 733 <0.5
50th STREET
MP 20 −A <0.50
DM 502 −79 5.9 −119 14
DM 701 <0.50
DM 503 <0.50
40th STREET
44th STREET
HOHOKAM FREEWAY
DM 123 NS
DM 122 −B <0.5
GRAND CANAL
APPROXIMATE SCALE
0 600 1200
IN FEET
N

OU1-2002-3-3.DWG 3-28-03

FALL 2002 TCE CONCENTRATIONS ALLUVIAL AQUIFER PLAN VIEW

Figure 3.3

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2001 OPERATIONS
MARCH 2002

LEGEND:

- ◦ DM 602 NAME OF WELL
- 1122 53 GROUNDWATER ELEVATION (FEET AMSL)
- 1100 GROUNDWATER ELEVATION CONTOUR (FEET AMSL)
- APPROXIMATE AREA OF CAPTURE
- APPROXIMATE AREA OF BEDROCK ABOVE WATER TABLE

NOTES:

1. FOR MORE DETAILED INFORMATION ON WELLS, REFER TO MI52 QUARTERLY AND SEMI ANNUAL REPORTS AND THE 1992 MI52 FR RI REPORT
2. DM 123 AND DM 606 WATER LEVEL POSTED IS FROM THE UPPERMOST BEDROCK PORT, ALLUVIAL PORT WAS DRY
3. WATER LEVELS FOR WELLS DM 305 TO DM 311 ADJUSTED FOR WELL EFFICIENCY SEE DISCUSSION IN SECTION 2 OF THIS REPORT
4. WELLS WITH ( ) WERE PUMPING WHEN WATER MEASUREMENTS WERE RECORDED

EW-18 1154 82
DM 118 1122 62
DM 119 1108 75
DM 602 1122 53
DM 125 1158 70
AZNGD-2A 1218 45
AZNGD-1 1213 09
McDOWELL ROAD
DM 305 (1097 94)
DM 306 (1091 70)
DM 112 DRY
DM 114 1165 05
MP 30 1166 35
DM 304 (1120 51)
DM 303 (1155 96)
MP 28 1173 79
1165 85
DM 117
BRILL STREET
DM 601 1165 38
MP 109 1163 82
MP 25 1184 83
DM 603 1106 54
DM 307 (1104 90)
DM 606 1143 73
MP 03 1165 51
MP 11 1172 49
DM 301 (1140 61)
DM 302 (1157 68)
DM 308 (1097 78)
DM 111 DRY
48th STREET
APPROXIMATE AREA OF CAPTURE FALL 2003
1095
DM 604 1102 35
DM 309 (1092 91)
MP 13 1171 60
APPROXIMATE AREA OF CAPTURE FALL 2003
DM 605 1102 44
DM 310 (1089 87)
DM 107 1170 43
DM 115 DRY
DM 311 (1094 30)
DM 723 1176 51
DM 312 1104 06
52nd STREET FACILITY
DM 725 1170 55
DM 718 1162 42
DM 313 1107 96
DM 201 (1102 65)
MP 16 1158 79
DM 724 1156 52
DM 727 1172 06
ROOSEVELT STREET
DM 733 1149 91
DM 735 1152 80
DM 728 1166 74
DM 729 1157 83
50th STREET
MP 20-A 1180 22
DM 701 1135 77
DM 120 1092 80
DM 502 1085 71
DM 503 1092 00
DM 123 1092 45
DM 122 1075 53
RED MOUNTAIN FREEWAY
40th STREET
44th STREET
HOHOKAM FREEWAY
OLD CROSSCUT CANAL
GRAND CANAL
52nd STREET
APPROXIMATE SCALE
0 600 1200
IN FEET
N

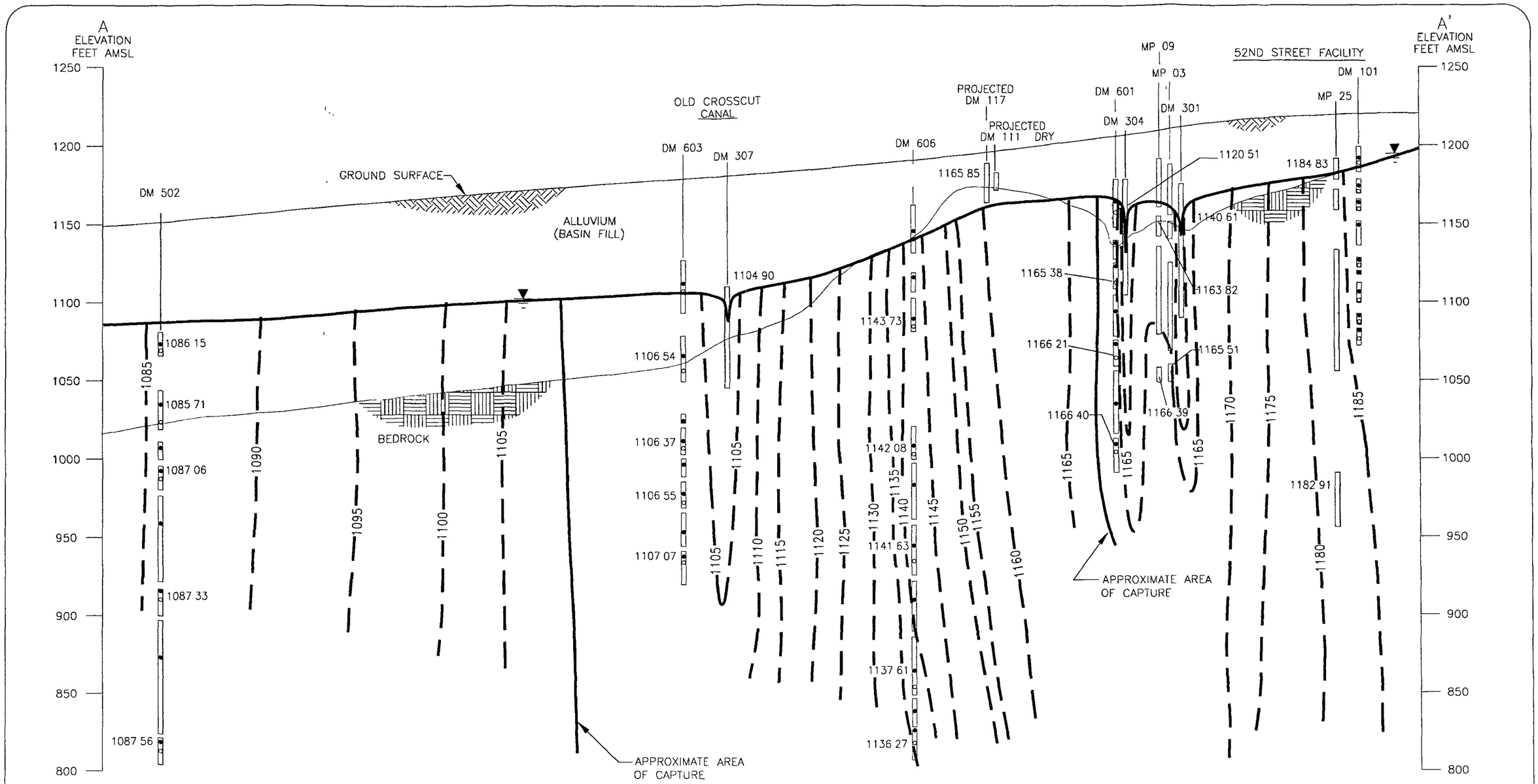
FALL 2003 WATER LEVEL ELEVATIONS ALLUVIAL AQUIFER PLAN VIEW

Figure 2.2

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2003 OPERATIONS
MARCH 2004

OU1-2003-2-2.dwg 3-1-04



LEGEND:

DM 606 — NAME OF WELL
GROUND SURFACE
BEDROCK CONTACT
MONITOR ZONE
MEASUREMENT PORT
PUMPING PORT
1142 08 WATER LEVEL ELEVATION (IN FEET AMSL)

APPROXIMATE AREA OF CAPTURE

1000 WATER LEVEL ELEVATION CONTOUR (IN FEET AMSL)

WATER TABLE

NOTES:

1 LOCATION OF SECTION A–A' IS SHOWN ON FIGURE 1 1

2 THE WATER TABLE WAS PLOTTED USING FALL 2003 DATA

3 FIGURE 2 2 SHOWS WHERE THE CROSS SECTION CROSSES THE CAPTURE ZONE NEAR THE OCC GROUNDWATER FLOW IS SOUTH–EAST TOWARD THE EXTRACTION WELLS IN FIGURE 2 7 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 THEREFORE, THE STAGNATION POINT DOES NOT APPEAR AS THE HIGH POINT IN THE WATER LEVEL ELEVATION PROFILE

4 WATER LEVEL FOR DM 307 ADJUSTED FOR WELL EFFICIENCY SEE DISCUSSION IN SECTION 2 OF THIS REPORT

HORIZONTAL SCALE
0 600 1200
IN FEET

VERTICAL EXAGGERATION 10X

FALL 2003 WATER LEVEL ELEVATIONS SECTION A-A'

Figure 2.7

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2003 OPERATIONS
MARCH 2004

OU1-2003-2-7.DWG 3-6-04

LEGEND.

- • WELL LOCATION
- DM 125 / −76 — WELL NAME; DEPTH OF WESTBAY SAMPLE PORT (IN FEET) OR COMPLETION INTERVAL DESIGNATION, TCE CONCENTRATION (ppb)
- —— TCE CONCENTRATION CONTOUR (ppb)
- ——— APPROXIMATE AREA OF CAPTURE
- NS NOT SAMPLED

NOTES:

1 THE TCE CONTOURS DRAWN ON THIS FIGURE ARE APPROXIMATE AND ARE PRESENTED TO ILLUSTRATE GENERAL CONCENTRATIONS OF TCE IN THE AREA

DM 118
DM 119 −137
DM 120
EW-18
DM 125 −076
AZNGD-2A
AZNGD-1
DM 602
DM 305
DM 306
DM 603 −115
DM 307
DM 308
DM 604
DM 309
DM 310
DM 605 −105
DM 311
DM 312
DM 313
DM 502 −79 −119
DM 503
DM 123
DM 122 −B
DM 701
McDOWELL ROAD
BRILL STREET
ROOSEVELT STREET
DM 601 −40
DM 303
DM 304
DM 606 −45
MP 30 −B
MP 28 −A
DM 301
DM 302
MP 25 −A
MP 11 −B
MP 13 −B
K
L
52nd STREET FACILITY
DM 723
DM 201
DM 718
DM 724
MP 16 −B
DM 728
DM 729 −50
DM 735
DM 733
MP 20 −A
APPROXIMATE AREA OF CAPTURE FALL 2003
APPROXIMATE AREA OF CAPTURE FALL 2003
RED MOUNTAIN FREEWAY
GRAND CANAL
40th STREET
44th STREET
48th STREET
50th STREET
52nd STREET
OLD CROSSCUT CANAL
HOHOKAM FREEWAY
APPROXIMATE SCALE
0 600 1200
IN FEET
N

OU1-2003-3-2.DWG 2-26-04

FALL 2003 TCE CONCENTRATIONS ALLUVIAL AQUIFER PLAN VIEW

Figure 3.3

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2003 OPERATIONS
MARCH 2004

LEGEND:

- ✤ ● ▲ ■ ✦ WELL LOCATION SYMBOLS
- DM 602 WELL NAME
- 1120.62 GROUNDWATER ELEVATION (FEET AMSL)
- —1100— GROUNDWATER ELEVATION CONTOUR (FEET AMSL)
- APPROXIMATE AREA OF CAPTURE
- APPROXIMATE AREA OF BEDROCK ABOVE WATER TABLE
- DIRECTION OF GROUNDWATER FLOW

NOTES:

1. FOR MORE DETAILED INFORMATION ON WELLS, REFER TO MI52 QUARTERLY AND SEMI ANNUAL REPORTS AND THE 1992 MI52 FR RI REPORT.
2. DM123 AND DM 606 WATER LEVEL POSTED IS FROM THE UPPERMOST BEDROCK PORT; ALLUVIAL PORT WAS DRY.
3. WATER LEVELS FOR WELLS DM305, DM307, DM308 AND DM309 ADJUSTED FOR WELL EFFICIENCY, SEE DISCUSSION IN SECTION 2 OF THIS REPORT.
4. WELLS WITH ( ) WERE PUMPING WHEN WATER MEASUREMENTS WERE RECORDED.

N

APPROXIMATE SCALE

0 600 1200

IN FEET

APPROXIMATE AREA OF CAPTURE FALL 2004

APPROXIMATE AREA OF CAPTURE FALL 2004

52nd STREET FACILITY

RED MOUNTAIN FREEWAY

HOHOKAM EXPWY

OLD CROSSCUT CANAL

FALL 2004 WATER LEVEL ELEVATIONS ALLUVIAL AQUIFER PLAN VIEW

Figure 2.2a

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2004 OPERATIONS
MARCH 2005

OU1-2004-2-2.DWG 3-13-05

LEGEND:

WELL LOCATION SYMBOLS

DM 119 WELL NAME
1109.69 GROUNDWATER ELEVATION (FEET AMSL)

—1100— GROUNDWATER ELEVATION CONTOUR (FEET AMSL)

N

APPROXIMATE SCALE

0 600 1200

IN FEET

E PALM LN
E ALMERIA RD
E ALMERIA DR
E GRANADA RD
E CORONADO RD
E McDOWELL RD
E WILLETTA ST
E BELLEVIEW ST
E MORELAND ST
E PORTLAND ST
E BRILL ST
E CULVER ST
E ROOSEVELT ST
E BEATRICE ST
E GARFIELD ST
E McKINLEY ST
E PIERCE ST
E FILLMORE ST
E TAYLOR ST
E GATEWAY BLVD
N 41ST PL
N 41ST ST
N 42ND ST
N 43RD PL
N 44TH PL
N 44TH ST
N 45TH ST
N 46TH PL
N 46TH ST
N 47TH PL
N 47TH ST
N 48TH PL
N 48TH ST
N 50TH ST
N 51ST ST
N 52ND ST
N 30TH ST
N COFCO CENTER CT
E COFCO CENTER BLVD
OLD CROSSCUT CANAL
HOHOKAM EXPWY
RED MOUNTAIN FREEWAY

DM 118
DM 119 1109.69
DM 602
EW-18
DM 125 1156.94
DM 305
DM 306
DM 307
DM 308
DM 309
DM 310
DM 311
DM 312
DM 313 1101.10
DM 603 1107.68
DM 605 1103.04
DM 606 1144.02
DM 601 1163.44
DM 303
DM 304
DM 301
DM 302
MP 30 1167.15
MP 28
MP 09 1165.01
MP 25 1181.92
MP 03 1163.26
MP 11 1167.90
MP 13 1172.85
MP 16 1154.70
DM 201
DM 718
DM 721 1163.17
DM 724
DM 722 1157.50
DM 729 1157.41
MP 20 1179.71
AZNGD-2B
AZNGD-2 1218.78
DM 502 1087.67
DM 123 1093.92

1080 1090 1100 1110 1120 1130 1140 1150 1160 1170 1180 1190 1200 1210

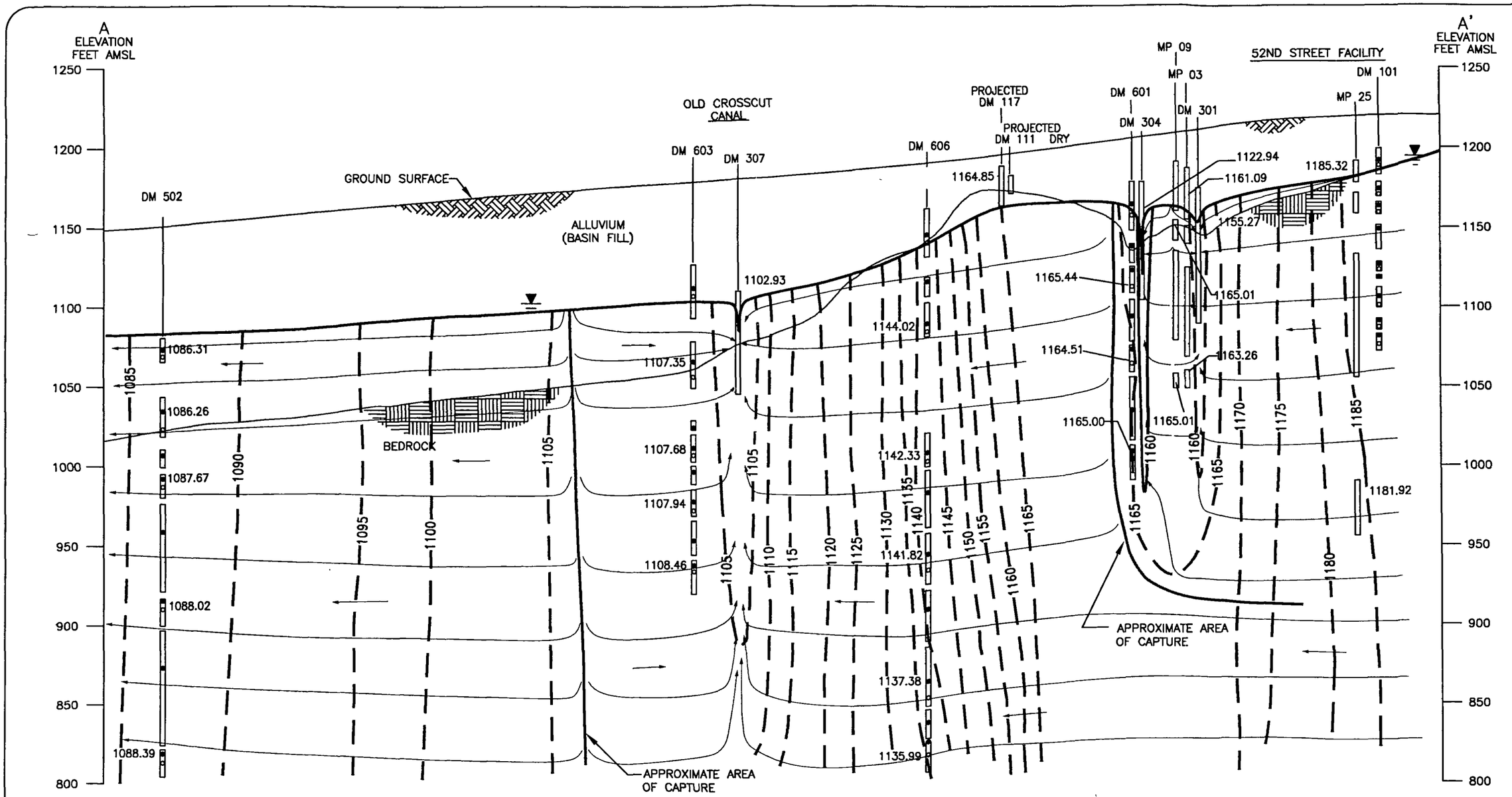
FALL 2004
WATER LEVEL ELEVATIONS IN BEDROCK

Figure 2.2b

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2004 OPERATIONS
MARCH 2005

OU1-2004-2.2b.DWG 3-24-05



LEGEND:

- DM 502 — NAME OF WELL
- GROUND SURFACE
- BEDROCK CONTACT
- MONITOR ZONE
- MEASUREMENT PORT
- PUMPING PORT
- 1086.31 — WATER LEVEL ELEVATION (IN FEET AMSL)
- APPROXIMATE AREA OF CAPTURE
- 1000 — WATER LEVEL ELEVATION CONTOUR (IN FEET AMSL)
- WATER TABLE
- DIRECTION OF GROUNDWATER FLOW

NOTES:

1. LOCATION OF SECTION A–A' IS SHOWN ON FIGURE 1.1.
2. THE WATER TABLE WAS PLOTTED USING FALL 2004 DATA.
3. FIGURE 2.2 SHOWS WHERE THE CROSS SECTION CROSSES THE CAPTURE ZONE NEAR THE OCC. GROUNDWATER FLOW IS SOUTH–EAST TOWARD THE EXTRACTION WELLS. IN FIGURE 2.7 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. THEREFORE, THE STAGNATION POINT DOES NOT APPEAR AS THE HIGH POINT IN THE WATER LEVEL ELEVATION PROFILE.
4. WATER LEVEL FOR DM 307 ADJUSTED FOR WELL EFFICIENCY. SEE DISCUSSION IN SECTION 2 OF THIS REPORT.

HORIZONTAL SCALE
0 600 1200
IN FEET

VERTICAL EXAGGERATION 10X

FALL 2004 WATER LEVEL ELEVATIONS SECTION A-A'

Figure 2.7

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2004 OPERATIONS
MARCH 2005

OU1-2004-2-7.DWG 3-13-05

LEGEND:

- ✱ ● ▲ ■ ✦ — WELL LOCATION SYMBOLS
- DM 125 / −76 1.0 — WELL NAME; DEPTH OF WESTBAY SAMPLE PORT (IN FEET) OR COMPLETION INTERVAL DESIGNATION, TCE CONCENTRATION (ppb)
- —100— TCE CONCENTRATION CONTOUR (ppb)
- ——— APPROXIMATE AREA OF CAPTURE
- NS — NOT SAMPLED

NOTES:

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

N

APPROXIMATE SCALE

0 600 1200

IN FEET

APPROXIMATE AREA OF CAPTURE FALL 2004

APPROXIMATE AREA OF CAPTURE FALL 2004

52nd STREET FACILITY

RED MOUNTAIN FREEWAY

HOHOKAM EXPWY

OLD CROSSCUT CANAL

E PALM LN
E GRANADA RD
E CORONADO RD
E ALMERIA RD
E ALMERIA DR
E McDOWELL RD
E WILLETTA ST
E BELLEVIEW ST
E MORELAND ST
E PORTLAND ST
E BRILL ST
E CULVER ST
E ROOSEVELT ST
E BEATRICE ST
E GARFIELD ST
E McKINLEY ST
E PIERCE ST
E FILLMORE ST
E TAYLOR ST
E GATEWAY BLVD
N COFCO CENTER BLVD
N 41ST PL
N 41ST ST
N 42ND ST
N 43RD PL
N 44TH PL
N 44TH ST
N 45TH PL
N 45TH ST
N 46TH PL
N 46TH ST
N 47TH PL
N 47TH ST
N 48TH ST
N 49TH PL
N 49TH ST
N 50TH ST
N 51ST ST
N 52ND ST
ADO RD
7TH ST

DM 118 NS
DM 119 NS
DM 120 13
DM 122 −B 0.52
DM 123 NS
DM 125 −76 1.0
DM 502 −79 11 −119 16
DM 503 <0.50
DM 602 41
DM 603 −68 NS −115 4.9
DM 604 5.3
DM 605 −66 NS −105 3.1
DM 606 −45 NS
DM 701 <0.30
EW-18 10
DM 601 −40 NS
DM 305 960
DM 306 2400
DM 307 1100
DM 308 210
DM 309 49
DM 310 30
DM 311 1.1
DM 312 0.51
DM 313 2.8
MP 30 −B 54
MP 28 −A <0.5
MP 25 −A NS
MP 11 −B 67.5
MP 13 −B 2100
MP 16 −B 8.3
MP 20 −A <0.50
DM 303 2200
DM 304 1500
DM 301 3900
DM 302 3800
DM201-OB1 75
DM 707 20
DM 201 52
DM 704 12
DM 723 92
DM 703 40
DM 718 76
DM 726 20
DM 724 150
DM 702 10
DM 706 4
DM 705 25
DM 735 0.92
DM 733 <0.50
DM 728 2.8
DM 729 −50 NS
AZNGD-2B
AZNGD-2A NS
AZNGD-1 <0.50
K <0.5
L

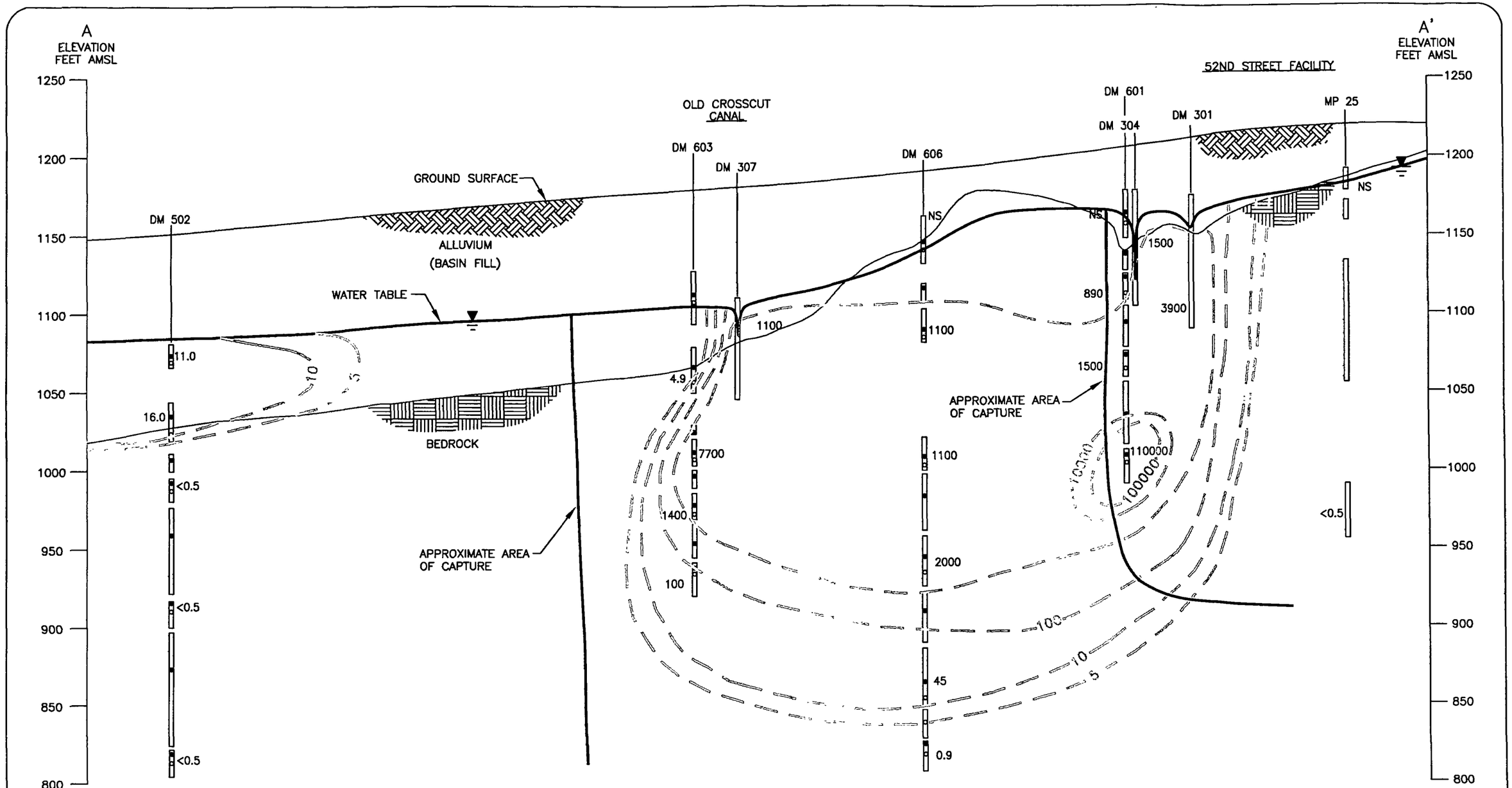
OU1-2004-3-3.DWG 3-18-05

FALL 2004 TCE CONCENTRATIONS ALLUVIAL AQUIFER PLAN VIEW

Figure 3.3

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2004 OPERATIONS
MARCH 2005



LEGEND:

- DM 606 — NAME OF WELL
- GROUND SURFACE
- BEDROCK CONTACT
- MONITOR ZONE
- MEASUREMENT PORT
- PUMPING PORT
- 45 — TCE CONCENTRATION (ppb)
- 10 — TCE CONCENTRATION CONTOUR (ppb)
- WATER TABLE

NOTES:

1. LOCATION OF SECTION A–A' IS SHOWN ON FIGURE 1.1.
2. THE TCE CONTOURS DRAWN ON THIS FIGURE ARE APPROXIMATE AND ARE PRESENTED TO ILLUSTRATE THE RELATIVE CHANGE IN TCE CONCENTRATIONS BETWEEN DIFFERENT PERIODS.
3. THE WATER TABLE WAS PLOTTED USING FALL 2004 DATA.

HORIZONTAL SCALE
0 600 1200
IN FEET

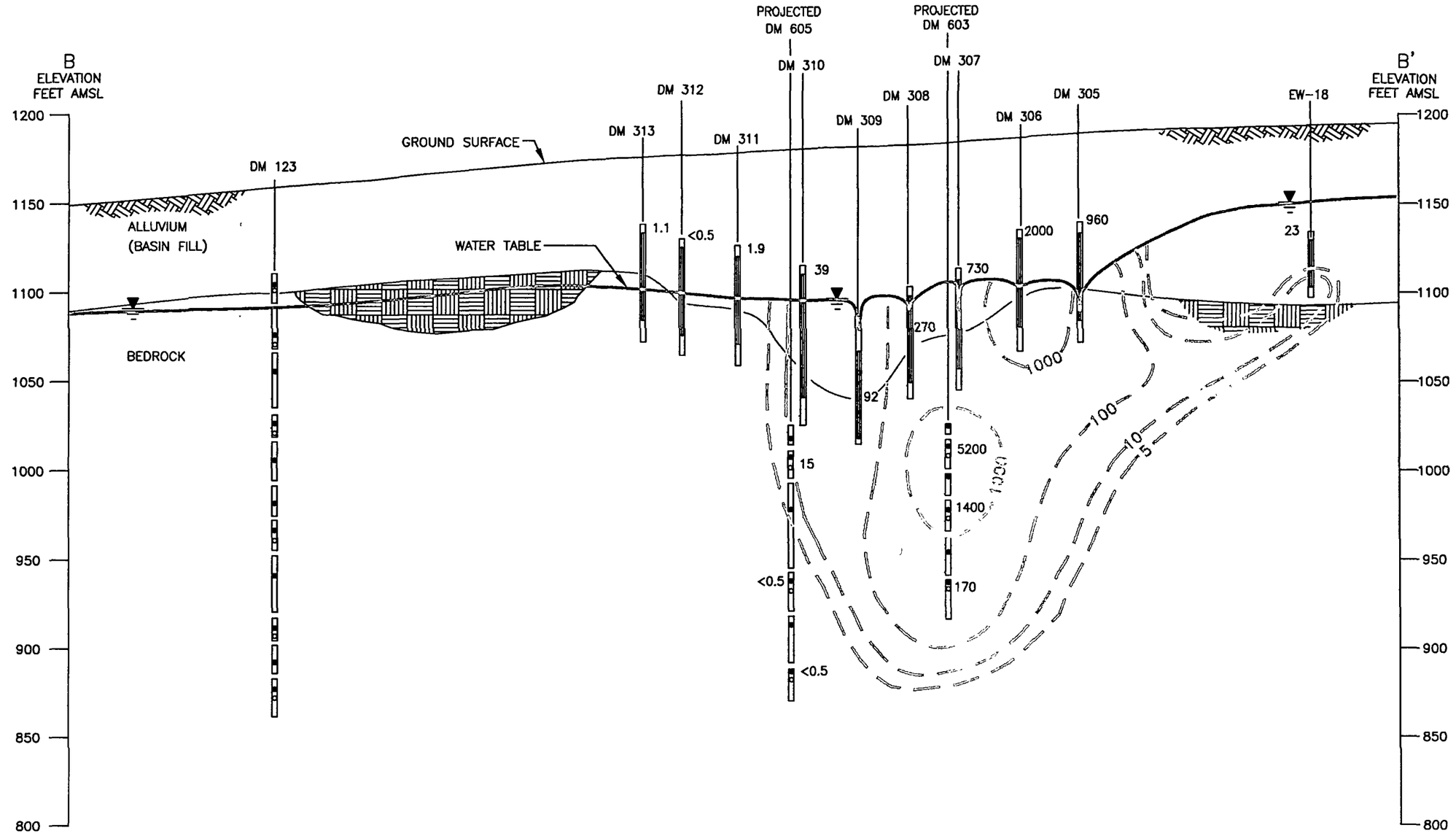
VERTICAL EXAGGERATION
10X

FALL 2004
TCE CONCENTRATIONS
SECTION A-A'
Figure 3.10

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2004 OPERATIONS
MARCH 2005

OU1-2004-3-9.DWG 3-17-05



LEGEND:

DM 123 — NAME OF WELL
GROUND SURFACE
BEDROCK CONTACT
MONITOR ZONE
MEASUREMENT PORT
PUMPING PORT
MONITOR ZONE
WELL SCREEN

<0.5 — TCE CONCENTRATION (ppb)

10 — TCE CONCENTRATION CONTOUR (ppb)

WATER TABLE

NOTES:

1. LOCATION OF SECTION B–B' IS SHOWN ON FIGURE 1.1.
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 TCE CONTOURS DRAW ON THIS FIGURE ARE APPROXIMATE AND ARE PRESENTED TO ILLUSTRATE THE RELATIVE CHANGE IN TCE CONCENTRATIONS BETWEEN DIFFERENT PERIODS.
4. THE WATER TABLE WAS PLOTTED USING FALL 2003 DATA.

HORIZONTAL SCALE
0 600 1200
IN FEET

VERTICAL EXAGGERATION
10X

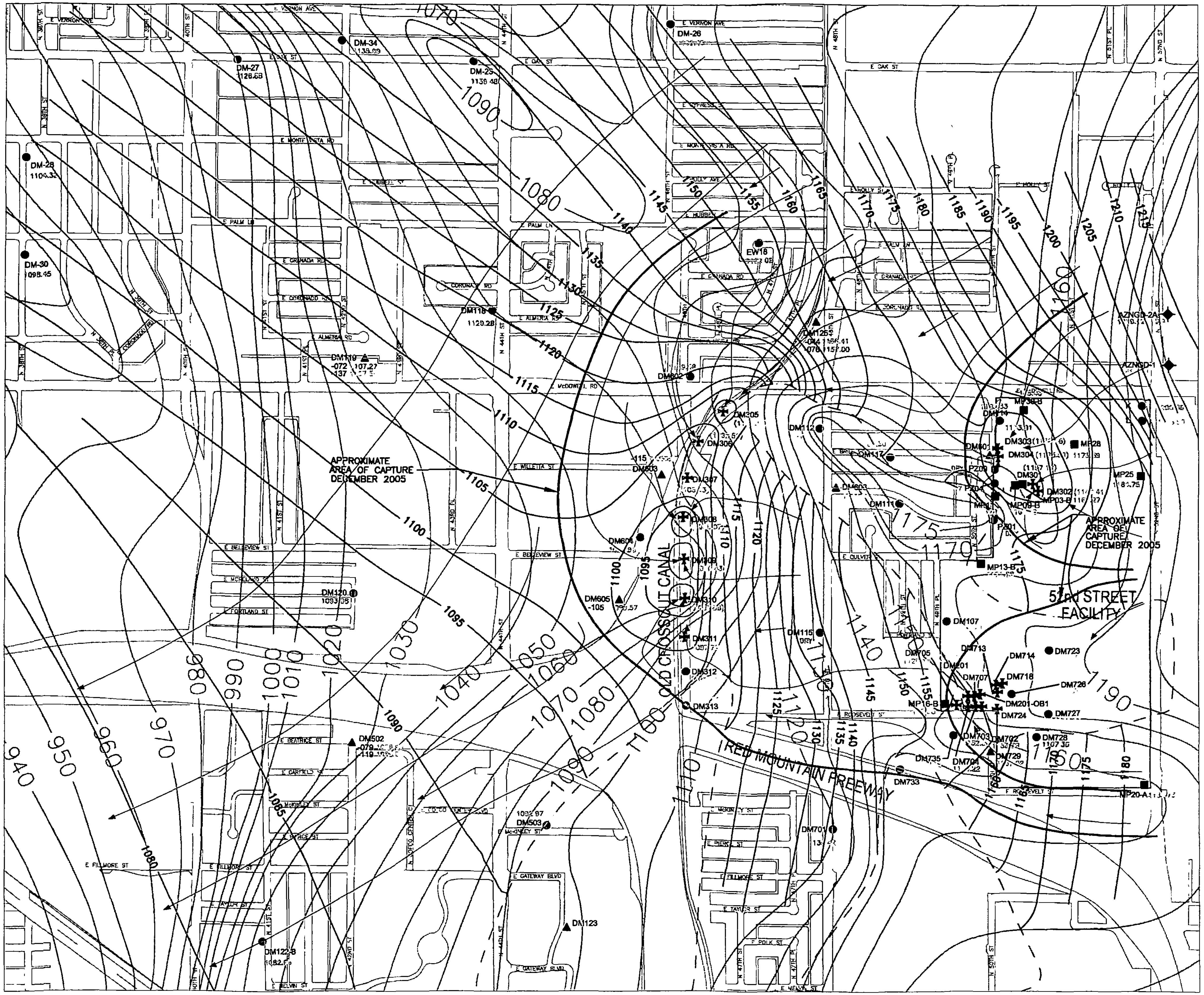
FALL 2003
TCE CONCENTRATIONS
SECTION B-B'

Figure 3.11

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2004 OPERATIONS
MARCH 2005

OU1-2004-3-11.DWG 3-18-05



LEGEND:

✚ ● ▲ ■ ✦	WELL LOCATION SYMBOLS
DM 602	WELL NAME
1120.62	GROUNDWATER ELEVATION (FEET AMSL)
—1100—	GROUNDWATER ELEVATION CONTOUR (FEET AMSL)
———	APPROXIMATE AREA OF CAPTURE
( )	APPROXIMATE AREA OF BEDROCK ABOVE WATER TABLE
←	DIRECTION OF GROUNDWATER FLOW
—1070—	BEDROCK ELEVATION CONTOUR (FT AMSL)

NOTES:

1. FOR MORE DETAILED INFORMATION ON WELLS, REFER TO MI52 QUARTERLY AND SEMI ANNUAL REPORTS AND THE 1992 MI52 FR RI REPORT.
2. DM123 AND DM 606 WATER LEVEL POSTED IS FROM THE UPPERMOST BEDROCK PORT; ALLUVIAL PORT WAS DRY.
3. WATER LEVELS FOR WELLS DM305, DM306, DM307, DM308, DM309 AND DM310 ADJUSTED FOR WELL EFFICIENCY; SEE DISCUSSION IN SECTION 2 OF THIS REPORT.
4. WELLS WITH ( ) WERE PUMPING WHEN WATER MEASUREMENTS WERE RECORDED.
5. WATER LEVELS IN WELLS DM-23, DM-26, DM-27, DM-28, DM-30 AND DM-34 WERE MEASURED IN OCTOBER 2005.

N

0 400 800 1600
SCALE IN FEET
1"=800'

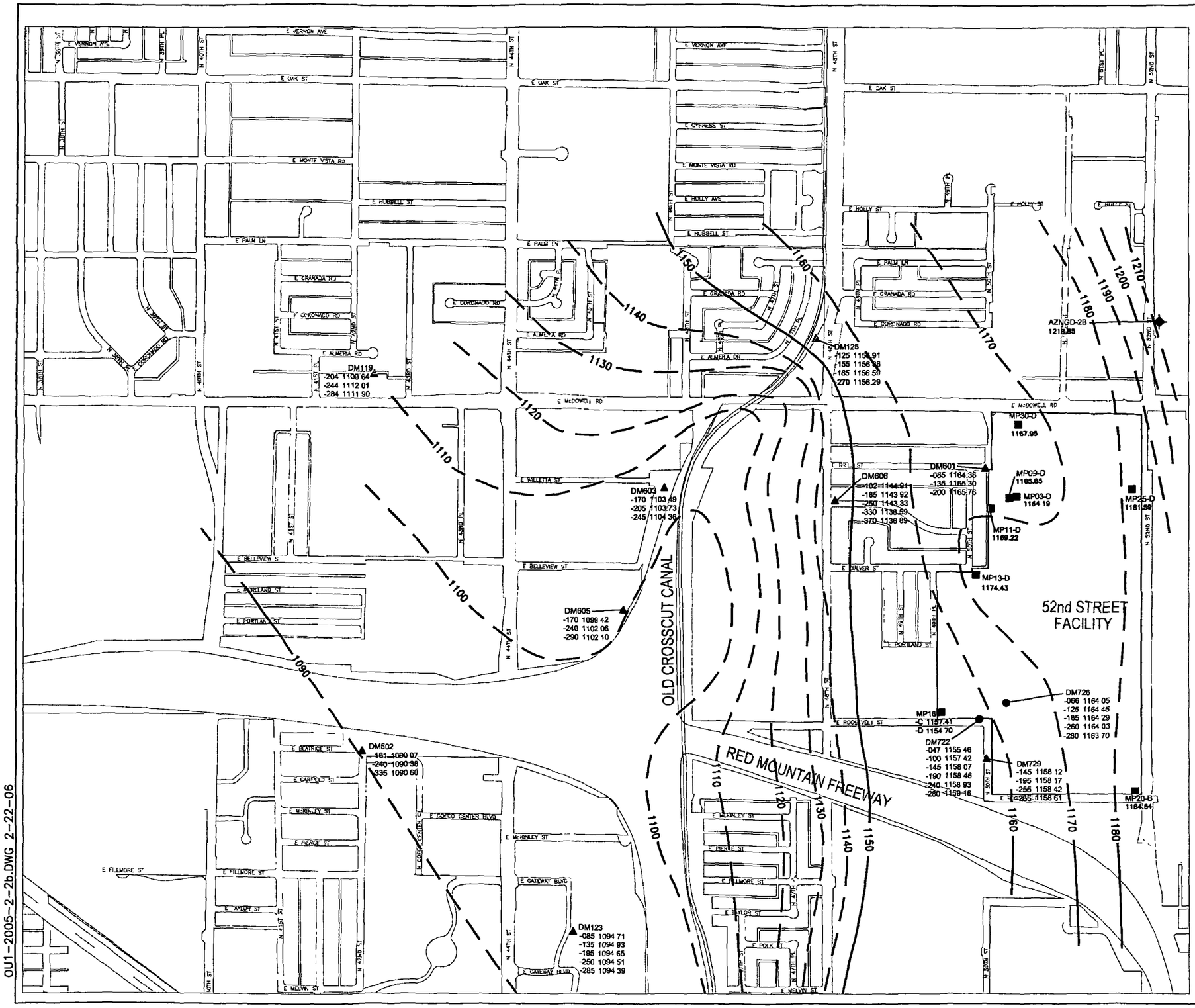
DECEMBER 2005 WATER LEVEL ELEVATIONS ALLUVIAL AQUIFER PLAN VIEW

Figure 2.2a

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2005 OPERATIONS
MARCH 2006

OU1-2005-2.2A.DWG 2-22-06



LEGEND:

✚ ● ▲ ■ ✦	WELL LOCATION SYMBOLS
DM 602	WELL NAME
1120.62	GROUNDWATER ELEVATION (FEET AMSL)
—1100—	GROUNDWATER ELEVATION CONTOUR (FEET AMSL)

N

0 400 800 1600

SCALE IN FEET
1"=800'

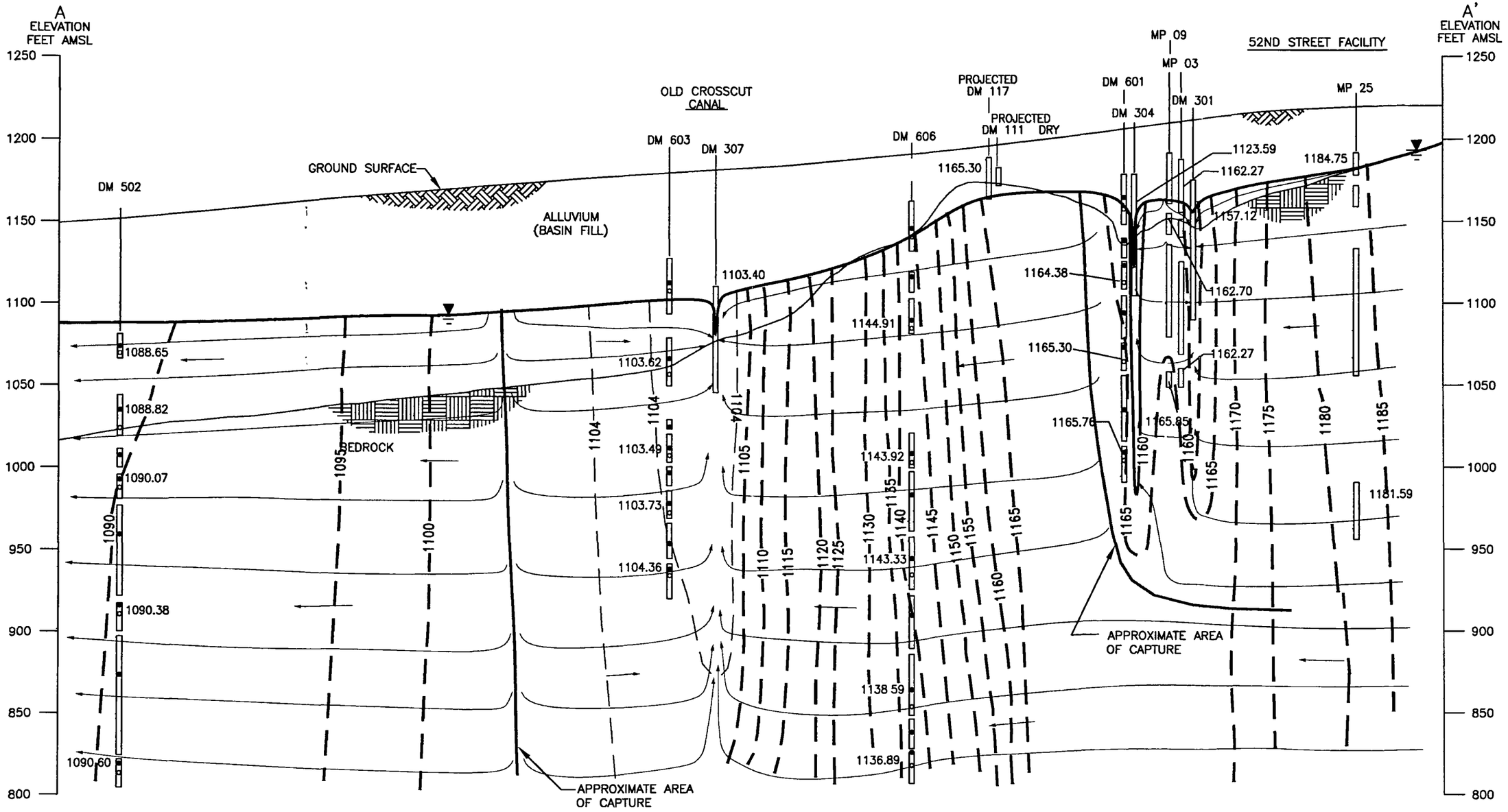
DECEMBER 2005 WATER LEVEL ELEVATIONS IN BEDROCK

Figure 2.2b

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2005 OPERATIONS
MARCH 2006

OU1-2005-2-2b.DWG 2-22-06



LEGEND:

- DM 502 — NAME OF WELL
- GROUND SURFACE
- BEDROCK CONTACT
- 2005 WATER TABLE
- MONITOR ZONE
- MEASUREMENT PORT
- PUMPING PORT
- MONITOR ZONE
- 1088.65 WATER LEVEL ELEVATION (IN FEET AMSL)
- APPROXIMATE AREA OF CAPTURE
- 1000 — WATER LEVEL ELEVATION CONTOUR (IN FEET AMSL)
- DIRECTION OF GROUNDWATER FLOW

NOTES:

1. LOCATION OF SECTION A–A' IS SHOWN ON FIGURE 1.1.
2. THE WATER TABLE WAS PLOTTED USING DECEMBER 2005 DATA.
4. WATER LEVEL FOR DM 307 ADJUSTED FOR WELL EFFICIENCY. SEE DISCUSSION IN SECTION 2 OF THIS REPORT.
3. FIGURE 2.2 SHOWS WHERE THE CROSS SECTION CROSSES THE CAPTURE ZONE NEAR THE OCC. GROUNDWATER FLOW IS SOUTH–EAST TOWARD THE EXTRACTION WELLS. IN FIGURE 2.7 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. THEREFORE, THE STAGNATION POINT DOES NOT APPEAR AS THE HIGH POINT IN THE WATER LEVEL ELEVATION PROFILE.

HORIZONTAL SCALE
0 600 1200
IN FEET

VERTICAL EXAGGERATION
10X

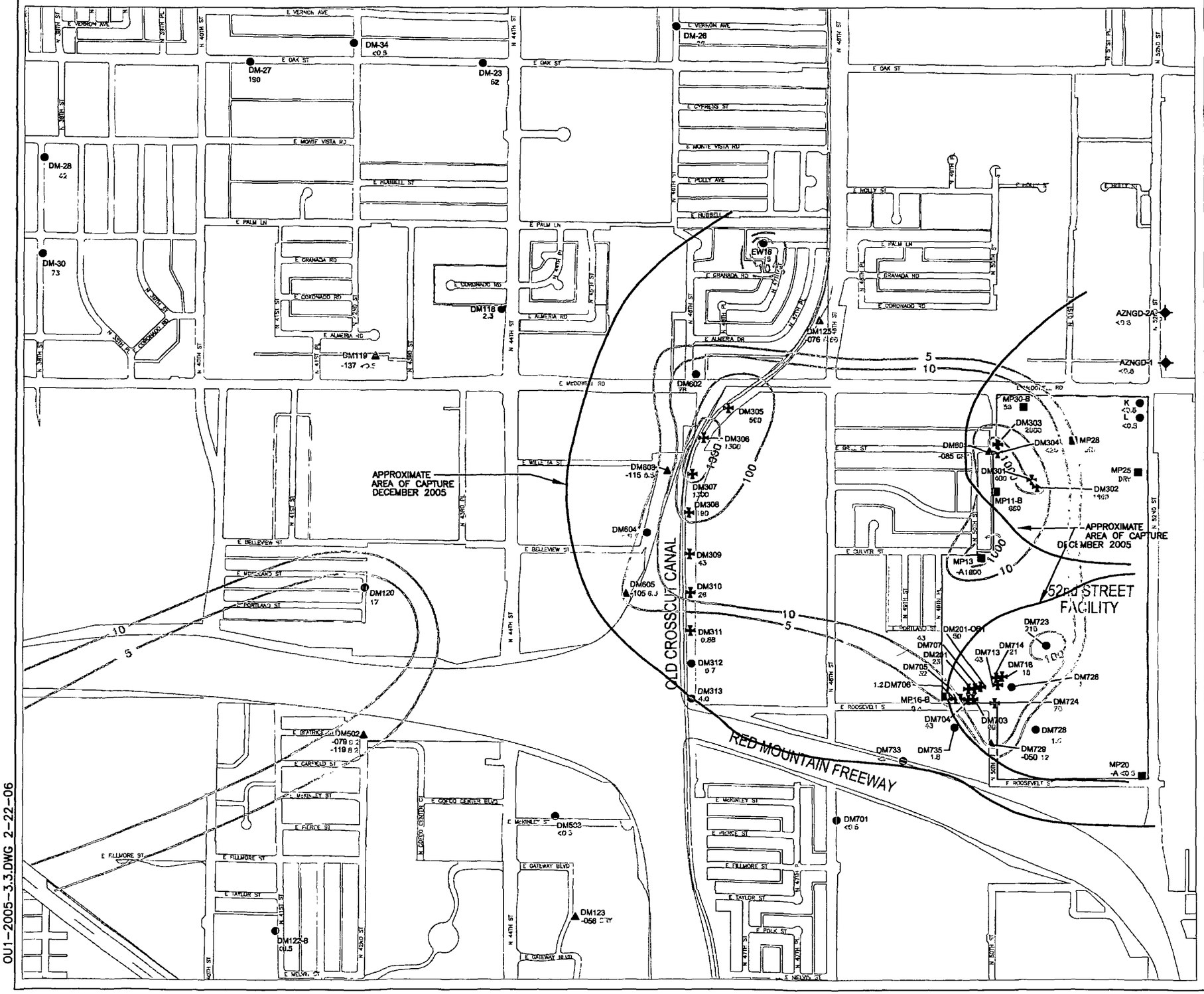
DECEMBER 2005 WATER LEVEL ELEVATIONS SECTION A-A'

Figure 2.7

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2005 OPERATIONS
MARCH 2006

OU1-2005-2.7.DWG 2-22-06



LEGEND:

✚ ● ▲ ■ ✦	WELL LOCATION SYMBOLS
DM 603	WELL NAME
−115 6.5	DEPTH OF WESTBAY SAMPLE PORT (IN FEET BGS) OR COMPLETION INTERVAL DESIGNATION; TCE CONCENTRATION (ug/L)
—5—	TCE CONCENTRATION CONTOUR (ug/l)
	APPROXIMATE AREA OF CAPTURE
NS	NOT SAMPLED

NOTES:

1. THE TCE CONTOURS DRAWN ON THIS FIGURE ARE APPROXIMATE, AND ARE REPRESENTED TO ILLUSTRATE GENERAL CONCENTRATIONS OF TCE IN THE AREA.
2. WELLS DM−23 THROUGH DM−34 ARE PART OF THE 56TH ST. AND EARLL DRIVE MONITORING WELL NETWORK. THESE WELLS WERE SAMPLED IN OCTOBER 2005.

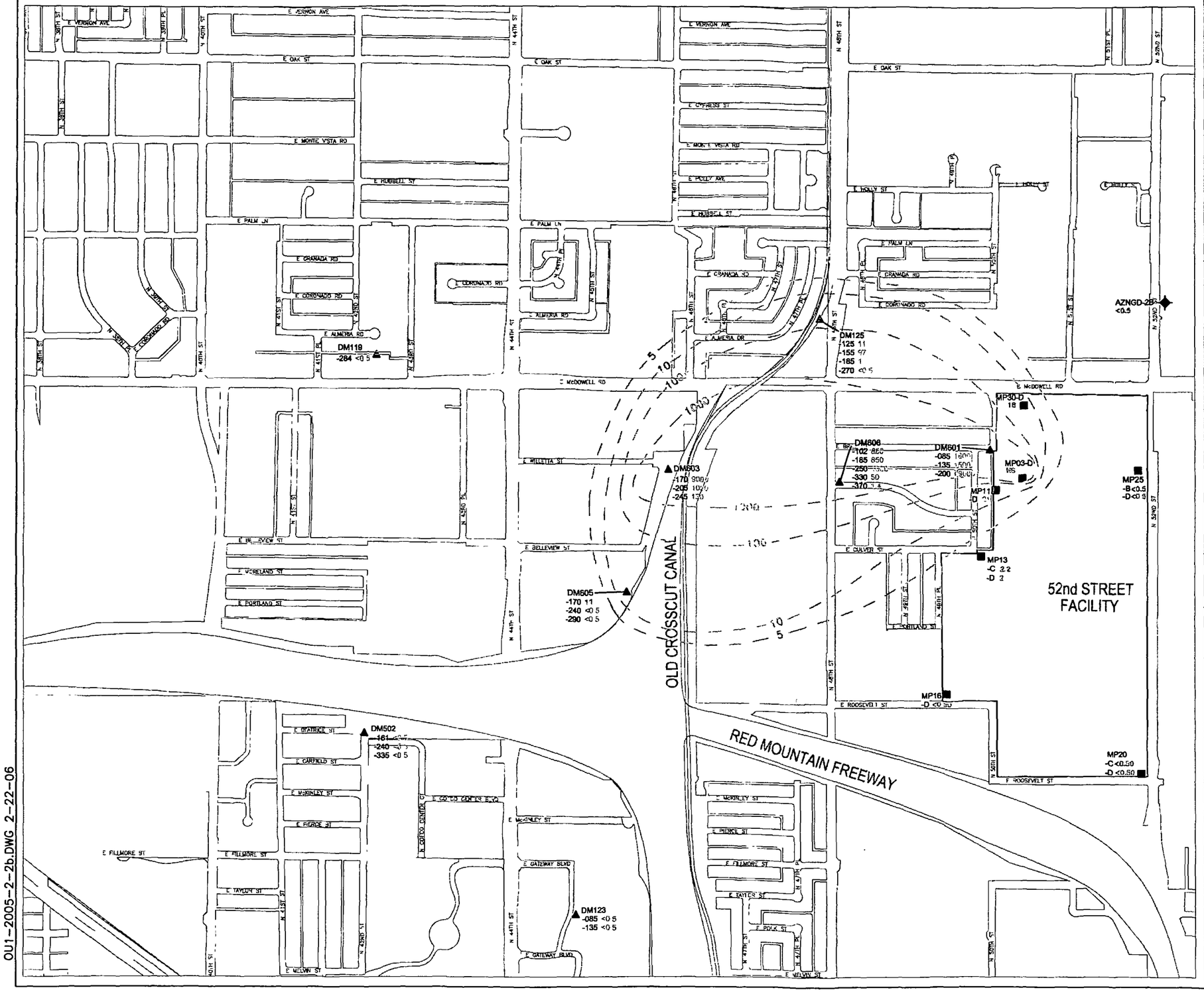
SEPTEMBER 2005 TCE CONCENTRATIONS ALLUVIAL AQUIFER PLAN VIEW

Figure 3.3a

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2005 OPERATIONS
MARCH 2006

OU1−2005−3.3.DWG 2−22−06



LEGEND:

✚ ● ▲ ■ ✦	WELL LOCATION SYMBOLS
DM602	WELL NAME
-185 11	DEPTH OF WESTBAY SAMPLE PORT (IN FEET) OR COMPLETION INTERVAL DESIGNATION, TCE CONCENTRATION (ppb)
~ —5— →	TCE CONCENTRATION CONTOUR (ppb)
NS	NOT SAMPLED

NOTES:

1. THE TCE CONTOURS DRAWN ON THIS FIGURE ARE APPROXIMATE, AND ARE PRESENTED TO ILLUSTRATE THE GENERAL LIMIT OF TCE IN BEDROCK. THE CONTOURS ARE DRAWN TO REPRESENT THE HIGHEST CONCENTRATION OBSERVED IN BEDROCK IN EACH WELL AND THEREFORE DO NOT REPRESENT THE TRUE EXTENT IN THREE DIMENSIONS.

N

0 400 800 1600

SCALE IN FEET
1"=800'

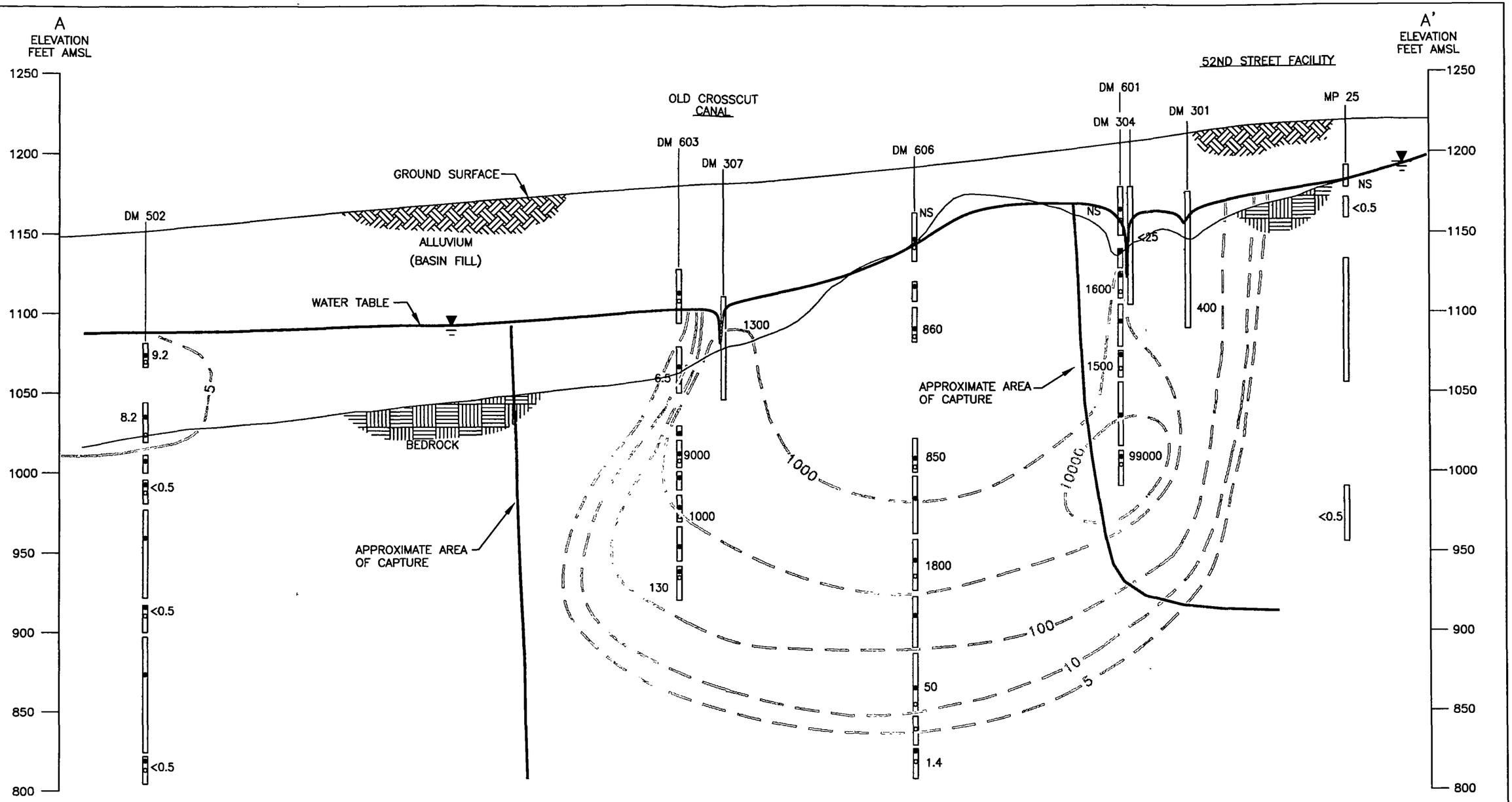
SEPTEMBER 2005 TCE CONCENTRATIONS BEDROCK AQUIFER PLAN VIEW

Figure 3.3b

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2005 OPERATIONS
MARCH 2006

OU1-2005-2-2b.DWG 2-22-06



LEGEND:

DM 606 — NAME OF WELL
GROUND SURFACE
BEDROCK CONTACT
2005 WATER TABLE
MONITOR ZONE
MEASUREMENT PORT
PUMPING PORT

50 TCE CONCENTRATION (ppb)

10 TCE CONCENTRATION CONTOUR (ppb)

NOTES:

1. LOCATION OF SECTION A–A' IS SHOWN ON FIGURE 1.1.
2. THE TCE CONTOURS DRAWN ON THIS FIGURE ARE APPROXIMATE AND ARE PRESENTED TO ILLUSTRATE THE RELATIVE CHANGE IN TCE CONCENTRATIONS BETWEEN DIFFERENT PERIODS.
3. THE WATER TABLE WAS PLOTTED USING DECEMBER 2005 DATA.

HORIZONTAL SCALE
0 600 1200
IN FEET

VERTICAL EXAGGERATION
10X

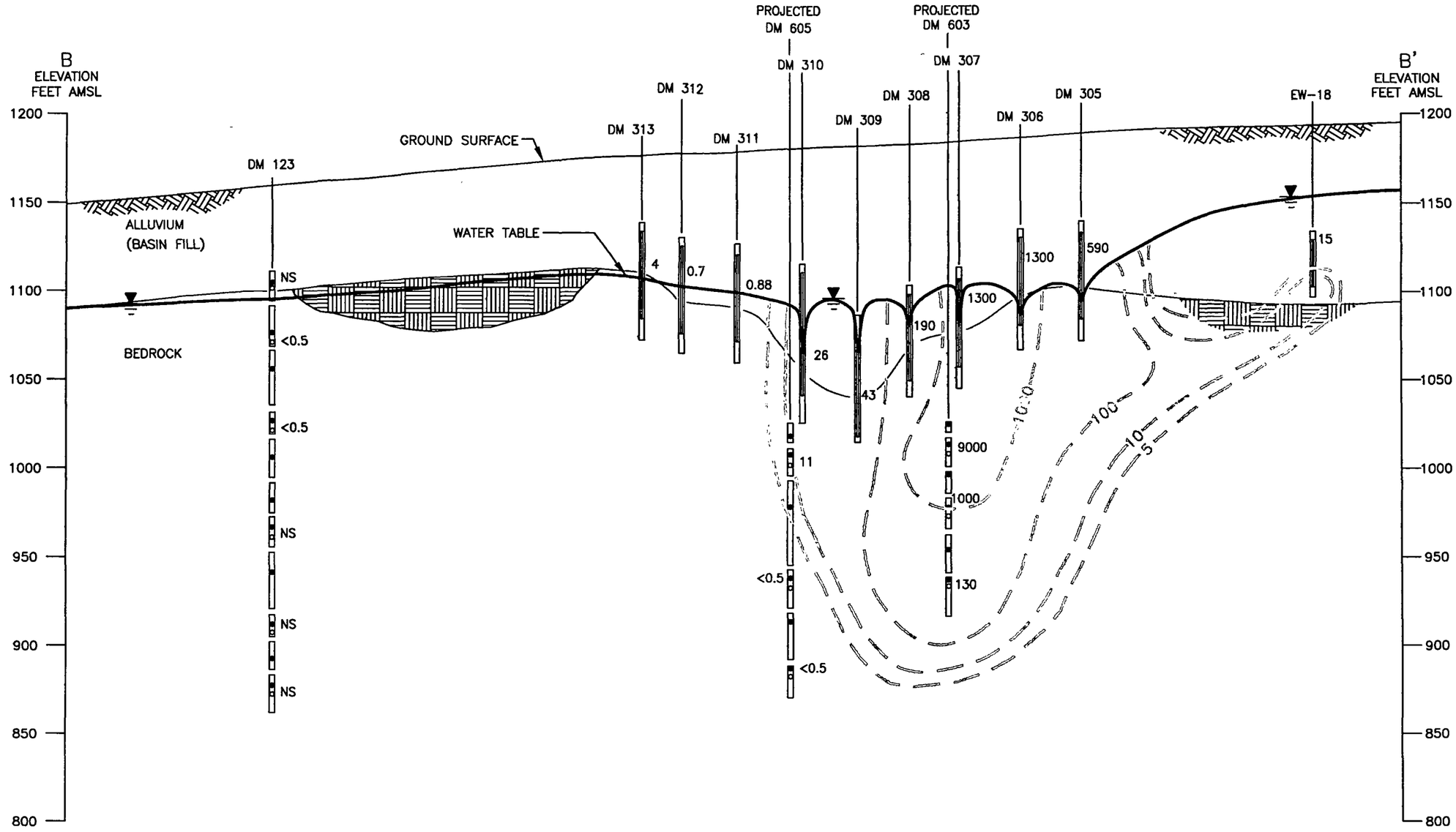
SEPTEMBER 2005 TCE CONCENTRATIONS SECTION A-A'

Figure 3.10

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2005 OPERATIONS
MARCH 2006

OU1-2005-3.10.DWG 2-22-06



LEGEND:

DM 123 — NAME OF WELL
— GROUND SURFACE
— BEDROCK CONTACT
— 2005 WATER TABLE
— MONITOR ZONE
— MEASUREMENT PORT
— PUMPING 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 1.1.
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 TCE CONTOURS DRAWN ON THIS FIGURE ARE APPROXIMATE AND ARE PRESENTED TO ILLUSTRATE THE RELATIVE CHANGE IN TCE CONCENTRATIONS BETWEEN DIFFERENT PERIODS.
4. THE WATER TABLE WAS PLOTTED USING DECEMBER 2005 DATA.

HORIZONTAL SCALE
0 600 1200
IN FEET

VERTICAL EXAGGERATION
10X

SEPTEMBER 2005 TCE CONCENTRATIONS SECTION B-B'

Figure 3.12

CLEAR CREEK ASSOCIATES

OU1 EFFECTIVENESS REPORT
2005 OPERATIONS
MARCH 2006

OU1-2005-3-12.DWG 2-22-06

APPENDIX D

FREESCALE AND ADEQ CORRESPONDENCE REGARDING NO FURTHER ACTION DETERMINATIONS FOR SWPL

MOTOROLA

September 18, 2002

Ms. Kristina Kommalan, Project Manager
Arizona Department of Environmental Quality
1110 West Washington Street
Phoenix, Arizona 85007

RE: Southwest Parking Lot (SWPL) Request for Closure

Dear Ms. Kris Kommalan:

In response to your recent questions about Motorola's request for closure of the SWPL soil vapor extraction (SVE) system, I am providing some additional data and information in support of Motorola's request. Some of this data was previously provided to ADEQ in Motorola's "Closure of SWPL Soil Vapor Extraction System, Former Motorola 52nd Street Facility" letter dated March 21, 2001 and in the *Soil Vapor Extraction System Evaluation Report, Motorola 52nd Street Facility, Southwest Parking Lot, 5005 East McDowell Road, Phoenix, Arizona* (Kleinfelder, 1998) (the "Kleinfelder SVE Report"). The new data being provided relate to the voluntary air sparging effort Motorola undertook in May and June 1997. These data confirm that the SVE system was effective, that the applicable consent order requirements have been met, and that Motorola's request for closure should be granted.

As a brief reminder, Motorola conducted a pilot SVE operation in the SWPL in 1993 (Dames & Moore) to test the feasibility of SVE in the SWPL, and then a full-scale operation from November of 1996 through April of 1997 (Kleinfelder). A voluntary air sparging pilot test was also conducted in 1993 and on a larger scale in May-June of 1997. In accordance with the SWPL Remediation System Operation Plan submitted to ADEQ on March 29, 1996 (Dames & Moore), monitoring of the SVE system was conducted using a flame ionization detector (FID) calibrated to 1,1,1-TCA. Additionally, pre- and post-SVE operations data were collected for laboratory analysis by method TO-14. Data were gathered from the SVE/air sparging wells (SVE/AS wells) and numerous shallow and deep vapor monitor probes by both methods prior to the start-up of the full- scale SVE (October and early November 1996) and after completion of the SVE operation (April 1997). The pre- and post-SVE TO-14 data (as Total VOCs) are presented in Table 1 and the pre- and post-SVE FID data are presented in Table 2. Table 1 is based on Tables 6 and 8 from the Kleinfelder SVE Report and Table 2 is based on Plates 4,5 and 6 of the same report (also Figures 25, 26 and 27 of Motorola's March 21, 2001 letter). Copies of these tables and plates from the Kleinfelder SVE Report are included behind Tables 1 and 2, respectively, for your convenience.

Both the TO-14 and the FID data show significant reductions in VOCs in all sampled or measured SVE/AS wells or vapor monitoring probes after completion of the SVE operation. Although the FID data is more generalized than the TO-14 data, it is likely more conservative in that it picks up everything capable of measurement, rather than just the VOCs targeted in a TO-14 analysis. The fact that the FID data show the same significant reductions that the TO-14 data show confirms the validity of the FID data and the use of an FID to monitor system performance in accordance with the operations plan. By April 23, 1997, the data show that VOC concentrations were greatly reduced in all monitoring points and, as discussed below, there was no rebound by May 16, 1997.

Motorola, Inc., Environmental Affairs & Remediation
3102 North 56th St., Phoenix, AZ 85018

Motorola then began its voluntary air sparging pilot testing program. The SVE/AS wells were measured with an FID on May 16, 1997 as a pre-air sparging baseline sample. This baseline data was previously provided to ADEQ in Table 15 and Figure 28 of Motorola's March 21, 2001 closure letter request as further indication that the system had not rebounded after the SVE operation had been off for almost a month. Motorola began its air sparging pilot testing and gathered FID data from all monitoring points during Phase I and Phase II of the test. These tests were of limited duration – only 3 days each. The FID data (as Total VOCs) for the SVE/AS wells are shown on Table 3 and for the vapor monitor probes on Table 4. These data demonstrate that the air sparging test did not transfer VOCs into or otherwise adversely impact the vadose zone. In fact, no VOCs were detected at the end of Phase II in most of the vapor monitor probes and only very low concentrations were being measured in the SVE/AS wells.

Several days after the completion of the final air sparging pilot test, FID data were gathered from the SVE/AS wells. Table 5 presents these final data and compares them to the pre- and post-SVE FID data and the pre-air sparging data for the same wells. This table clearly confirms what the other SVE data and the operational air sparging data already show -- the SVE system effectively reduced VOCs in the vadose zone to very low concentrations and the air sparging system reduced the concentrations even further or kept them at insignificant levels (SASW-6). There has been no rebound of VOC levels in the vadose zone in the SWPL area. Prior submissions by Motorola demonstrated that post-SVE levels of VOCs in the vadose zone met ADEQ's most conservative groundwater protection levels for soils – conclusions that were accepted by ADEQ and EPA in their March 1999 review.

In conclusion, we believe Motorola has met and exceeded the requirements of the 1989 Consent Order for closure of the SWPL SVE system. With the presentation of this air sparging data demonstrating that the pilot testing had no adverse impact on the vadose zone in the SWPL area, we believe that ADEQ has all the information it needs to grant a No Further Action Determination for the SWPL Area soils remediation. Feel free to contact me if you have any additional questions.

Sincerely,

Thomas R. Suriano, R.G.
Manager, Remediation
Motorola SPS

Attachments

cc: Nadia Hollan – EPA
John Kivett – ADEQ

Table 1

Pre- and Post-SVE TO-14 Data
Total VOCs
Southwest Parking Lot
SVE/AS Wells and Vapor Monitor Probes

Well	Pre-SVE Total VOCs (ppmv) November 4-5, 1996	Post-SVE Total VOCs (ppmv) April 21-23, 1997
SASW-1	NS	0.238
SSW-3	NS	1 012
SASW-4	23.08	0.279
SASW-5	NS	2.195
SASW-6	NS	1.285
SASW-7	9.1	0.758
VP-1S	149.67	0.274
VP-1D	NS	0.332
VP-2S	195.2	0.312
VP-2D	NS	1.35
VP-3S	240.61	0.068
VP-3D	NS	0.521
VP-4S	405	0.19
VP-4D	NS	0.387
VP-5S	108.2	0.057
VP-5D	NS	5.324
VP-6S	192 74	0 319
VP-6D	NS	1.545
VP-7S	18 9	0.019
VP-7D	148.7	0.185
VP-8S	82.42	0.168
VP-8D	NS	0.239
VP-9S	10 82	0.041
VP-9D	NS	0.298
VP-10S	40.38	1 001
VP-10D	NS	0.177
VP-11	NS	0 25
VP-12	0.9	0.051
VP-13	11.73	0.034
VP14	0 57	0.034
VP-15S	69.4	1.017
VP-15D	NS	2.714
VP-16S	39.02	0.862
VP-16D	8.66	0.057
VP-17S	34.5	1.288
VP-17D	NS	3.188
VP-18S	87.09	1.217
VP-18D	NS	19.15
VP-19S	104	22.1
VP-19D	NS	4.076

NS = Not sampled or measured

Total VOCs derived from Tables 6 and 8 from the Soil Vapor Extraction System Evaluation Report, Motorola 52nd Street Facility Soutwest Parking Lot, 5005 East McDowell Road, *Phoenix*, Arizona (Kleinfelder, 1998)

Total VOCs = 1,1-DCE, 1,1-DCA, 1,1,1-TCA, TCE, Toluene, 1,1,2-TCA, PCE, Ethylbenzene, m,p-Xylene, and o-Xylene

A Report Prepared For:

Motorola
Environmental, Health, and Safety
Communications, Power, and Signal Technologies
5005 McDowell Road
Phoenix, Arizona 85008

SOIL VAPOR EXTRACTION
SYSTEM EVALUATION REPORT
MOTOROLA 52ND STREET FACILITY
SOUTHWEST PARKING LOT
5005 EAST McDOWELL ROAD
PHOENIX, ARIZONA

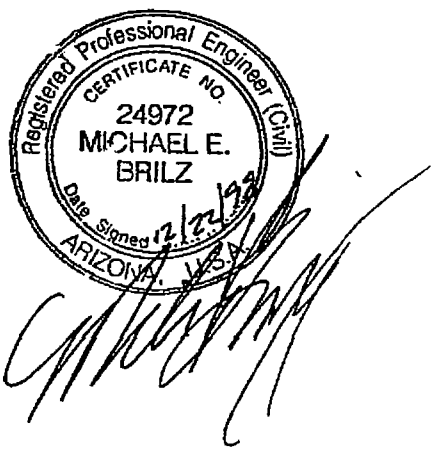
Kleinfelder Project No. 52-1529-01(001)

Prepared by:

Paul J. Wilhelmsen, E.I.T.
Supervisory Technician

Michael E. Brilz, P.E.
Manager, Environmental Services

KLEINFELDER, INC.
3249 East Harbour Drive
Phoenix, Arizona 85034-7227
Phone: (602) 437-8433



December 1998

Table 6

Baseline Data Collection
Phase Three Soil Gas Sampling Analytical Results

Compound	SAMPLE IDENTIFICATION																															
	SASW-4	SASW-7		VP-1 S	VP-2 S	VP-3 S	VP-4 S		VP-5 S	VP-6 S	VP-7 S	VP-7 D	VP-8 S	VP-9 S	VP-10 S	VP-12	VP-13	VP-14	VP-15 S	VP-16 S	VP-16 D	VP-17 S	VP-18 S		VP-19 S	T. BLANK	T. BLANK
	mg/l	mg/l		mg/l	mg/l	mg/l	mg/l		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l		mg/l	mg/l	mg/l
Freon 12	< 0 05	< 0.03	< 0 01	< 0.28	< 0 86	< 0.86	< 1.26	< 1.56	< 0.34	< 0 65	< 0.07	< 0.50	< 0.25	< 0.03	< 0.09	< 0.01	< 0.03	< 0.01	< 0.13	< 0.09	< 0.02	< 0.09	< 0.23	< 0.30	< 0.34	< 0.01	< 0 01
Freon 114	< 0.07	< 0.04	< 0 01	< 0 40	< 1.21	< 1.21	< 1.78	< 2.20	< 0.48	< 0 92	< 0.09	< 0 71	< 0 36	< 0.05	< 0.12	< 0.01	< 0.04	< 0 01	< 0.18	< 0.12	< 0.03	< 0.12	< 0 32	< 0.42	< 0 48	< 0.01	< 0.01
Chloromethane	< 0.02	< 0.01	< 0 00	< 0.12	< 0.36	< 0.36	< 0.53	< 0 65	< 0.14	< 0 27	< 0.03	< 0.21	< 0.11	< 0.01	< 0 04	< 0 00	< 0.01	< 0.00	< 0 05	< 0.04	< 0.01	< 0 04	< 0.09	< 0 12	< 0.14	< 0.00	< 0.00
Vinyl Chloride	< 0.03	< 0.01	< 0 01	< 0.15	< 0.44	< 0.44	< 0.65	< 0.81	< 0.17	< 0 34	< 0.03	< 0.26	< 0.13	< 0 02	< 0.04	< 0.01	< 0.01	< 0.01	< 0.07	< 0.04	< 0.01	< 0 04	< 0.12	< 0.15	< 0 17	< 0 01	< 0.01
Bromomethane	< 0.04	< 0 02	< 0 01	< 0.22	< 0.67	< 0.67	< 0.99	< 1.22	< 0.26	< 0 51	< 0 05	< 0.40	< 0.20	< 0.03	< 0 07	< 0.01	< 0.02	< 0.01	< 0 10	< 0.07	< 0.02	< 0.07	< 0.18	< 0.23	< 0.26	< 0.01	< 0.01
Chloroethane	< 0.03	< 0 01	< 0.01	< 0.15	< 0 46	< 0 46	< 0.67	< 0.83	< 0 18	< 0.35	< 0 03	< 0.27	< 0.13	< 0.02	< 0 05	< 0.01	< 0.01	< 0.01	< 0 07	< 0.05	< 0.01	< 0.05	< 0.12	< 0.16	< 0.18	< 0.01	< 0 01
Freon 11	< 0.06	0.16	< 0.01	< 0.32	< 0.97	< 0.97	< 1 43	< 1.77	< 0 38	< 0 74	< 0.07	< 0.57	< 0.29	< 0 04	< 0.10	0.01	0.03	0.02	< 0.14	< 0 10	< 0.02	< 0.10	< 0.26	< 0.34	< 0.38	0.02	< 0.01
1,1-Dichloroethene	12	4.4	0.19	81	177	193	314	371	77	157	16	129	56	8.1	19	0.09	2.7	0.18	12	2.6	0.69	0.22	1.0	1.0	< 0.27	< 0.01	< 0 01
Freon 113	0.11	< 0.04	< 0.02	0.61	< 1.32	< 1.32	< 1.94	< 2.41	< 0.52	< 1.01	< 0.10	< 0 78	< 0.39	< 0.05	< 0.13	< 0.02	0.08	< 0 02	0.27	0.17	0.04	< 0.13	< 0.35	< 0 46	< 0.52	< 0.02	< 0.02
Methylene Chloride	0.10	0.02	0.02	< 0.20	< 0.60	< 0.60	< 0.88	< 1.09	< 0.24	< 0.46	< 0.05	< 0.35	< 0 18	< 0.02	0.07	0.02	0.02	0.02	< 0.09	< 0.06	0.04	< 0.06	< 0.16	< 0.21	< 0.24	0.09	0.09
1,1-Dichloroethane	< 0 04	0.09	< 0.01	0.45	< 0.70	1.61	< 1 03	< 1.28	1.2	0.74	< 0.05	< 0 41	0.21	< 0.03	0.07	< 0.01	< 0.02	< 0.01	< 0.10	< 0.07	< 0.02	< 0 07	< 0.19	< 0 24	< 0.28	< 0.01	< 0.01
cis-1,2-Dichloroethene	< 0.04	< 0 02	< 0.01	< 0.22	< 0.68	< 0 68	< 1.00	< 1.24	< 0.27	< 0.52	< 0 05	< 0.40	< 0.20	< 0.03	0.16	< 0.01	< 0.02	< 0.01	< 0 10	< 0.07	< 0.02	< 0 07	< 0.18	< 0 24	< 0.27	< 0.01	< 0.01
Chloroform	2.5	< 0.02	< 0 01	< 0.28	< 0.84	< 0.84	< 1.24	< 1.53	< 0 33	< 0 64	0.37	1.58	< 0.25	0.12	0.14	< 0.01	< 0.02	< 0.01	< 0 12	< 0.08	0.05	< 0.08	< 0.22	< 0.29	< 0.33	< 0 01	< 0.01
1,1,1-Trichloroethane	2.5	2.8	0.10	15	2.2	22	13	17	18	17	1.2	7.7	6.6	0.40	1.9	0.13	2.3	0.11	5.4	1.1	0.21	0.34	0.46	0.48	< 0.37	< 0.01	< 0.01
Carbon Tetrachloride	< 0.06	< 0.03	< 0 01	< 0 36	< 1.09	< 1.09	< 1 60	< 1.98	< 0 43	< 0.83	< 0.08	< 0.64	< 0 32	< 0 04	< 0.11	< 0.01	< 0.03	< 0.01	< 0.16	< 0.11	< 0.03	< 0.11	< 0.29	< 0.38	< 0.43	< 0 01	< 0 01
Benzene	< 0.03	< 0 02	< 0 01	< 0.18	< 0.55	< 0.55	< 0.81	< 1.01	< 0.22	< 0.42	< 0.04	< 0 33	< 0 16	< 0.02	< 0.06	< 0.01	< 0.02	< 0.01	< 0.08	< 0 06	< 0 01	< 0 06	< 0 15	< 0.19	< 0.22	< 0.01	< 0.01
1,2-Dichloroethane	< 0.04	< 0.02	< 0.01	< 0.23	< 0 70	< 0.70	< 1.03	< 1.28	< 0.28	< 0.54	< 0.05	< 0.41	< 0.21	< 0.03	< 0.07	< 0.01	< 0.02	< 0.01	< 0.10	< 0.07	< 0 02	< 0.07	< 0.19	< 0.24	< 0.28	< 0.01	< 0.01
Trichloroethene	0.14	0.03	< 0 01	1.22	< 0.94	< 0.94	< 1.38	< 1.71	< 0.37	< 0.72	< 0.07	< 0.55	0.61	0.22	0.41	< 0.01	0.29	0.02	1.0	0.32	0.13	0.94	1.8	1.7	< 0.37	< 0.01	< 0 01
1,2-Dichloropropane	< 0.05	< 0.02	< 0.01	< 0.26	< 0.80	< 0 80	< 1.18	< 1.46	< 0.31	< 0.61	< 0 06	< 0.47	< 0.24	< 0.03	< 0.08	< 0.01	< 0.02	< 0.01	< 0 12	< 0.08	< 0.02	< 0.08	< 0.21	< 0.28	< 0.31	< 0 01	< 0 01
cis-1,3-Dichloropropene	< 0.05	< 0 02	< 0.01	< 0.26	< 0.78	< 0.78	< 1.15	< 1.43	< 0.31	< 0 60	< 0.06	< 0.46	< 0.23	< 0 03	< 0.08	< 0 01	< 0 02	< 0.01	< 0.12	< 0.08	< 0 08	< 0.21	< 0.27	< 0.31	< 0.01	< 0 01
Toluene	< 0.04	0.02	0.02	< 0.21	< 0.65	< 0.65	< 0.96	< 1.19	< 0.26	< 0.50	< 0.05	< 0.38	< 0.19	< 0.03	< 0.07	0.02	0.02	0.02	< 0.10	< 0.07	0.03	< 0.07	< 0.17	< 0 23	< 0.26	0.07	0.05
trans-1,3-Dichloropropene	< 0 05	< 0.02	< 0.01	< 0.26	< 0.78	< 0.78	< 1.15	< 1.43	< 0.31	< 0 60	< 0.06	< 0.46	< 0.23	< 0.03	< 0.08	< 0.01	< 0.02	< 0.01	< 0 12	< 0.08	< 0.02	< 0 08	< 0.21	< 0.27	< 0.31	< 0.01	< 0 01
1,1,2-Trichloroethane	< 0.06	< 0.03	< 0 01	< 0 31	< 0.94	< 0.94	< 1.38	< 1.71	< 0.37	< 0.72	< 0.07	< 0.55	< 0 28	< 0.04	< 0.09	< 0.01	< 0.03	< 0.01	< 0 14	< 0 09	< 0 02	< 0 09	0.83	< 0.33	< 0.37	< 0 01	< 0.01
Tetrachloroethene	8.3	1.7	0.21	52	16	24	16	17	12	18	1.7	12	19	2.1	19	0.52	6.4	0.18	51	35	7.6	33	83	83	104	< 0.01	0.01
Ethylene Dibromide	< 0 08	< 0.04	< 0 02	< 0.44	< 1.33	< 1.33	< 1.96	< 2.42	< 0.52	< 1.02	< 0.10	< 0 78	< 0.39	< 0.05	< 0.13	< 0.02	< 0.04	< 0 02	< 0.20	< 0.13	< 0.03	< 0.13	< 0.35	< 0.46	< 0.52	< 0 02	< 0.02
Chlorobenzene	< 0.05	< 0 02	< 0.01	< 0.26	< 0.80	< 0 80	< 1.18	< 1 46	< 0.31	< 0.61	< 0.06	< 0.47	< 0.24	< 0.03	< 0.08	< 0.01	< 0.02	< 0.01	< 0.12	< 0.08	< 0.02	< 0.08	< 0.21	< 0.28	< 0.31	< 0.01	< 0.01
Ethyl Benzene	< 0 04	< 0.02	0.02	< 0 25	< 0.75	< 0 75	< 1.10	< 1.36	< 0 29	< 0 57	< 0 06	< 0.44	< 0.22	< 0.03	< 0.07	0.02	< 0.02	0.01	< 0.11	< 0.07	< 0.02	< 0.07	< 0.20	< 0.26	< 0.29	< 0.01	< 0.01
m,p-Xylene	0.14	0.06	0.08	< 0.25	< 0 75	< 0.75	< 1 10	< 1.36	< 0 29	< 0 57	< 0 06	< 0.44	< 0.22	< 0 03	< 0.07	0.09	0.02	0.04	< 0 11	< 0.07	< 0 02	< 0 07	< 0.20	< 0.26	< 0 29	0.01	< 0 01
o-Xylene	< 0.04	< 0 02	0.03	< 0 25	< 0.75	< 0.75	< 1.10	< 1.36	< 0.29	< 0 57	< 0 06	< 0.44	< 0 22	< 0 03	< 0.07	0.03	< 0 02	0.01	< 0.11	< 0 07	< 0 02	< 0 07	< 0.20	< 0 26	< 0 29	< 0.01	< 0.01
Styrene	< 0.04	< 0 02	< 0 01	< 0.24	< 0.73	< 0.73	< 1.08	< 1.34	< 0.29	< 0.56	< 0.06	< 0.43	< 0.22	< 0.03	< 0 07	< 0.01	< 0 02	< 0.01	< 0 11	< 0.07	< 0.02	< 0 07	< 0.19	< 0.25	< 0.29	< 0.01	< 0 01
1,1,2,2-Tetrachloroethane	< 0 07	< 0.03	< 0.01	< 0.39	< 1 19	< 1.19	< 1 75	< 2.16	< 0.47	< 0.91	< 0.09	< 0.70	< 0.35	< 0.05	< 0.12	< 0.01	< 0.03	< 0.01	< 0.17	< 0 12	< 0.03	< 0.12	< 0.31	< 0 41	< 0 47	< 0 01	< 0.01
1,3,5-Trimethylbenzene	< 0.05	< 0.02	< 0.01	< 0.28	< 0 85	< 0 85	< 1.25	< 1.55	< 0.33	< 0.65	< 0.06	< 0.50	< 0.25	< 0.03	< 0.08	< 0.01	< 0 02	< 0 01	< 0.12	< 0 08	< 0.02	< 0.08	< 0.22	< 0.29	< 0 33	< 0 01	< 0.01
1,2,4-Trimethylbenzene	< 0.05	< 0.02	< 0.01	< 0.28	< 0.85	< 0.85	< 1.25	< 1.55	< 0.33	< 0 65	< 0.06	< 0.50	< 0.25	< 0 03	< 0.08	< 0.01	< 0.02	< 0 01	< 0.12	< 0 08	< 0.02	< 0.08	< 0.22	< 0.29	< 0.33	< 0 01	< 0.01
1,3-Dichlorobenzene	< 0.06	< 0.03	< 0 01	< 0.34	< 1.04	< 1 04	< 1.53	< 1 89	< 0.41	< 0.79	< 0.08	< 0 61	< 0.31	< 0.04	< 0.10	< 0.01	< 0 03	< 0.01	< 0.15	< 0.10	< 0 03	< 0.10	< 0.27	< 0.36	< 0.41	< 0 01	< 0.01
1,4-Dichlorobenzene	< 0.06	< 0 03	< 0.01	< 0 34	< 1 04	< 1.04	< 1.53	< 1 89	< 0.41	< 0 79	< 0 08	< 0.61	< 0.31	< 0.04	< 0.10	< 0.01	< 0.03	< 0.01	< 0 15	< 0.10	< 0 03	< 0.10	< 0 27	< 0.36	< 0.41	< 0 01	< 0 01
Chlorotoluene	< 0.05	< 0.03	< 0 01	< 0.30	< 0 90	< 0.90	< 1.32	< 1.64	< 0 35	< 0.69	< 0.07	< 0.53	< 0.26	< 0.04	< 0 09	< 0 01	< 0.03	< 0.01	< 0 13	< 0.09	< 0.02	< 0.09	< 0.24	< 0.31	< 0.35	< 0.01	< 0.01
1,2-Dichlorobenzene	< 0.06	< 0.03	< 0.01	< 0 34	< 1 04	< 1.04	< 1 53	< 1.89	< 0.41	< 0 79	< 0 08	< 0 61	< 0.31	< 0 04	< 0.10	< 0.01	< 0.03	< 0.01	< 0.15	< 0.10	< 0.03	< 0 10	< 0 27	< 0.36	< 0 41	< 0.01	< 0 01
1,2,4-Trichlorobenzene	< 0 08	< 0.04	< 0 02	< 0 42	< 1.28	< 1.28	< 1.88	< 2.33	< 0.50	< 0.98	< 0.10	< 0.75	< 0.38	< 0.05	< 0.13	< 0.02	< 0.04	< 0.02	< 0.19	< 0 13	< 0.03	< 0 13	< 0.34	< 0 44	< 0.50	< 0.02	< 0.02
Hexachlorobutadiene	< 0.11	< 0 05	< 0.02	< 0.61	< 1.84	< 1.84	< 2 71	< 3.36	< 0.73	< 1.41	< 0.14	< 1 09	< 0.54	< 0.07	< 0.18	< 0.02	< 0 05	< 0.02	< 0 27	< 0.18	< 0 05	< 0.18	< 0.49	< 0.64	< 0.73	< 0.02	< 0.02
Propylene	< 0.07	< 0.04	0.39	< 0.39	< 1.17	< 1.17	< 1.75	< 2.28	< 0.47	< 0 88	< 0.09	< 0.70	< 0 35	< 0.05	< 0.12	< 0.01	< 0 04	< 0.01	< 0.18	< 0.12	< 0 03	< 0.12	< 0 32	< 0.42	< 0.47	< 0 01	< 0 01
1,3-Butadiene	< 0.09	< 0 04	< 0.02	< 0.49	< 1.50	< 1.50	< 2.24	< 2 91	< 0.60	< 1.12	< 0.11	< 0.90	< 0.45	< 0.06	< 0.15	< 0.02	< 0.04	< 0.02	< 0.22	< 0.15	< 0.04	< 0.15	< 0 40	< 0.54	< 0.60	< 0.02	< 0.02
Acetone	< 0.10	0.12	0.03	< 0.53	< 1.61	< 1 61	< 2.41	< 3 13	< 0.65	< 1.21	< 0 12	< 0.96	< 0.48	< 0.07	< 0.16	0.05	< 0.05	0.05	< 0.24	< 0.16	< 0 04	< 0.16	< 0 43	< 0.58	< 0.65	0.04	0.04
Carbon Disulfide	< 0.13	< 0.06	< 0.03	< 0 70	< 2.12	< 2.12	< 3.16	< 4.11	< 0.85	< 1.58	< 0.16	< 1.26	< 0.63	< 0 09	< 0.21	< 0.03	< 0.06	< 0.03	< 0.32	< 0.21	0.05	< 0.21	< 0.57	< 0.76	< 0.85	< 0.03	0.03
2-Propanol	< 0 10	< 0.05	< 0 02	< 0 55	< 1 67	< 1.67	< 2.49	< 3.24	< 0 67	< 1.25	< 0.12	< 1.00	< 0.50	< 0.07	< 0 17	< 0 02	< 0.05	0.02	< 0.25	< 0.17	< 0 04	< 0 17	< 0.45	< 0.60	< 0.67	0.04	0.03
trans-1,2-Dichloroethene	< 0 16	< 0.08	< 0.03	< 0.88	< 2.67	< 2.67	< 3 99	< 5.19	< 1.08	< 2.00	< 0.20	< 1.60	< 0.80	< 0 11	< 0.27	< 0.03	< 0.08	< 0.03	< 0 40	< 0 27	< 0.07	< 0 27	< 0.72	< 0.96	< 1.08	< 0.03	< 0 03
Vinyl Acetate	< 0.14	< 0.07	< 0.03	< 0 79	< 2.39	< 2.39	< 3.57	< 4.64	< 0.96	< 1.79	< 0.18	< 1.43	< 0.71	< 0.10	< 0.24	< 0 03	< 0.07	< 0 03	< 0.36	< 0.24	< 0.06	< 0.24	< 0.64	< 0 86	< 0.96	< 0.03	< 0 03
Chloroprene	< 0.15	< 0.07	< 0.03	< 0.81	< 2.45	< 2 45	< 3.66	< 4.76	< 0.99	< 1.83	< 0.18	< 1 46	< 0.73	< 0.10	< 0.25	< 0.03	< 0 07	< 0.03	< 0.37	< 0.25	< 0.06	< 0.25	< 0.66	< 0.88	< 0 99	< 0.03	< 0 03
2-Butanone (Methyl Ethyl Ketone)	0.13	< 0 06	0.18	< 0.66	< 2.00	< 2 00	< 2.99	< 3 89	< 0.81	< 1.50	< 0.15	< 1 20	< 0 60	< 0.08	< 0.20	0.03	< 0.06	< 0 02	< 0.30	< 0.20	0.33	< 0.20	< 0.54	< 0.72	< 0.81	< 0.02	< 0.02
Hexane	< 0.14	< 0.07	< 0.03	< 0 79	< 2.39	< 2.39	< 3.57	< 4.64	< 0 96	< 1.79	< 0.18	< 1.43	< 0.71	< 0.10	< 0.24	< 0.03	< 0 07	< 0.03	< 0.36	< 0.24	< 0.06	< 0.24	< 0 64	< 0.86	< 0 96	< 0.03	< 0.03
Tetrahydrofuran	0.81	2.3	1.8	< 0.66	< 2 00	< 2.00	< 2.99	< 3.89	< 0.81	< 1.50	< 0 15	< 1.20	< 0.60	< 0.08	< 0.20	< 0 02	0.42	0.22	< 0 30	< 0.20	< 0 05	< 0.20	< 0.54	< 0.72	< 0.81	< 0.02	< 0.02
Cyclohexane	< 0 14	< 0.07	< 0.03	< 0 77	< 2 34	< 2.34	< 3 49	< 4.54	< 0.94	< 1 75	< 0.17	< 1.40	< 0.70	< 0 09	< 0.23	< 0 03	< 0.07	< 0.03	< 0 35	< 0.23	< 0.06	< 0.23	< 0 63	< 0.84	< 0.94	< 0.03	< 0.03
1,4-Dioxane	< 0 15	< 0.07	< 0 03	< 0.81	< 2.45	< 2.45	< 3.66	< 4.76	< 0 99	< 1.83	< 0.18	< 1.46	< 0.73	< 0.10	< 0.25	< 0.03	< 0.07	< 0.03	< 0.37	< 0.25	< 0.06	< 0 25	< 0.66	< 0 88	< 0.99	< 0 03	< 0.03
Bromodichloromethane	0.60	< 0.14	< 0.05	< 1.49	< 4.54	< 4.54	< 6.78	< 8.81	< 1.83	< 3.39	< 0.34	< 2.71	< 1.36	< 0.18	< 0.45	< 0.05	< 0.14	< 0.05	< 0 68	< 0.45	< 0.12	< 0.45	< 1.22	< 1.63	< 1.83	< 0.05	< 0 05
4-Methyl-2-pentanone	< 0.17	< 0 08	0.11	< 0.92	< 2.79	< 2.79	< 4.16	< 5.41	< 1.12	< 2.08	< 0.21	< 1.66	< 0 83	< 0.11	< 0.28	0.12	< 0.08	0.03	< 0 42	< 0.28	< 0.07	< 0.28	< 0.75	< 1.00	< 1.12	< 0 03	< 0.03
2-Hexanone	< 0.17	< 0 08	< 0.03	< 0.92	< 2.79	< 2 79	< 4.16	< 5 41	< 1.12	< 2.08	< 0.21	< 1.66	< 0 83	< 0.11	< 0.28	< 0.03	< 0.08	< 0 03	< 0.42	< 0 28	< 0.07	< 0.28	< 0.75	< 1.00	< 1.12	< 0.03	< 0 03
Dibromochloromethane	< 0.35	< 0.17	< 0.07	< 1.90	< 5 80	< 5.80	< 8.65	< 11 2	< 2.34	< 4 33	< 0.43	< 3 46	< 1.73	< 0.23	< 0.58	< 0.07	< 0.17	< 0.07	< 0.87	< 0.58	< 0.15	< 0.58	< 1.56	< 2.08	< 2.34	< 0.07	< 0.07
Bromoform	< 0 42	< 0.21	< 0 08	< 2 31	< 7.04	< 7.04	< 10 5	< 13 7	< 2 84	< 5.25	< 0 53	< 4.20	< 2.10	< 0.28	< 0.70	< 0 08	< 0.21	< 0.08	< 1.05	< 0.70	< 0.18	< 0.70	< 1.89	< 2.52	< 2 84	< 0.08	< 0.08
4-Ethyltoluene	< 0.18	< 0.09	< 0.04	< 0.97	< 2 95	< 2.95	< 4 41	< 5.73	< 1.19	< 2.21	< 0.22	< 1.76	< 0.88	< 0.12	< 0.30	< 0.04	< 0.09	< 0.04	< 0.44	< 0.30	< 0 07	< 0.30	< 0.79	< 1.06	< 1.19	< 0.04	< 0.04
Ethanol (Ethyl Alcohol)	0.40	0.05	0.05	< 0.42	< 1.28	< 1.28	< 1 91	< 2.48	< 0.52	10	0.52	< 0.76	< 0.38	< 0.05	< 0.13	< 0 02	< 0.04	0.03	< 0.19	< 0.13	< 0.03	< 0 13	< 0.34	< 0 46	< 0.52	0.03	0.19
Methyl tert-Butyl Ether (MTBE)	< 0.15	< 0 07	< 0.03	< 0.81	< 2.45	< 2.45	< 3.66	< 4.76	< 0.99	< 1.83	< 0.18	< 1.46	< 0.73	< 0.10	< 0.25	< 0.03	< 0.07	< 0.03	< 0.37	< 0 25	< 0.06	< 0.25	< 0.66	< 0.88	< 0.99	< 0.03	< 0.03
Heptane	< 0.17	< 0 08	< 0.03	< 0.92	< 2.79	< 2.79	< 4.16	< 5.41	< 1.12	< 2.08	< 0.21	< 1.66	< 0 83	< 0.11	< 0.28	< 0.03	< 0 08	< 0 03	< 0.42	< 0.28	< 0.07	< 0.28	< 0.75	< 1 00	< 1.12	< 0.03	< 0.03

Notes:

All samples collected on November 4-5, 1996
All samples analyzed by Air Toxics Ltd. by EPA Method TO-14
Samples SASW-7, VP-4 S, and VP-18 S had blind QC duplicates submitted to the analytical lab, Primary result presented first, duplicate result presented second
< = Constituent was not detected above the stated method detection limit.
µg/l = Micrograms per liter.

Table 8

Analytical Results - Post SVE Baseline Testing

Sample Point	Sample Date	Constituents (µg/l)									
		1,1-DCE	1,1-DCA	1,1,1-TCA	TCE	Toluene	1,1,2-TC	PCE	Ethylbenzene	m,p-Xylene	O-Xylene
SASW-1	04/23/97	0.025	< 0.008	0.024	< 0 011	0.046	< 0 011	0.13	< 0.009	0.013	< 0 009
SSW-3	04/23/97	0.048	0.018	0.45	< 0.011	0.021	< 0 011	0.28	0.023	0.097	0.075
SSW-103	04/23/97	0.048	0.017	0.46	< 0.011	0.023	< 0 011	0.29	0.024	0.097	0.075
SASW-4	04/23/97	< 0.008	< 0.008	0.033	< 0 011	0.021	< 0 011	0.21	< 0.009	0.015	< 0.009
SASW-5	04/23/97	< 0 008	< 0.008	< 0.011	0.061	0.017	< 0 011	2.1	< 0.009	0.017	< 0.009
SASW-6	04/23/97	< 0.008	< 0.008	< 0.011	0.088	0.021	< 0 011	1.1	0.010	0.044	0.022
SASW-7	04/23/97	0.44	< 0.008	0.029	< 0.011	0.022	< 0.011	0.25	< 0.009	0.017	< 0.009
VP-1 S	04/21/97	< 0.008	< 0.008	< 0.011	< 0.011	0.014	< 0.011	0.25	< 0.009	0.010	< 0.009
VP-1 D	04/21/97	0.14	< 0.008	< 0.011	< 0 011	0.012	< 0 011	0.18	< 0 009	< 0.009	< 0.009
VP-2 S	04/21/97	0.20	< 0 008	< 0.011	< 0.011	0.015	< 0 011	0.097	< 0 009	< 0.009	< 0.009
VP-2 D	04/21/97	1.1	< 0.008	0.014	0.011	0.015	< 0 011	0.21	< 0.009	< 0.009	< 0.009
VP-3 S	04/21/97	0.021	< 0.008	< 0.011	< 0.011	0.014	< 0 011	0.033	< 0.009	< 0.009	< 0.009
VP-3 D	04/21/97	0.31	< 0.008	0.048	< 0.011	0.013	< 0.011	0.15	< 0.009	< 0.009	< 0.009
VP-4 S	04/21/97	0.081	< 0 008	0.036	< 0.011	0.016	< 0.011	0.057	< 0.009	< 0.009	< 0.009
VP-4 D	04/21/97	0.30	< 0.008	0.018	< 0.011	0.018	< 0.011	0.051	< 0.009	< 0 009	< 0.009
VP-104 D	04/21/97	0.28	< 0.008	0.019	< 0.011	0.015	< 0.011	0.051	< 0.009	< 0.009	< 0.009
VP-5 S	04/21/97	0.021	< 0.008	< 0.011	< 0.011	0.014	< 0.011	0.022	< 0.009	< 0.009	< 0.009
VP-5 D	04/21/97	4.4	0.034	0.077	0.043	0.010	< 0 011	0.76	< 0.009	< 0.009	< 0.009
VP-6 S	04/21/97	0.056	< 0.008	0.111	< 0.011	0.012	< 0.011	0.14	< 0.009	< 0.009	< 0 009
VP-6 D	04/21/97	1.2	< 0.008	0.022	0.028	0.015	< 0.011	0.28	< 0.009	< 0.009	< 0 009
VP-106 D	04/21/97	1.3	< 0.008	0.024	0.030	0.017	< 0.011	0.32	< 0.009	< 0.009	< 0.009
VP-7 S	04/22/97	0.008	< 0.008	< 0.011	< 0.011	0.011	< 0.011	< 0.014	< 0.009	< 0.009	< 0 009
VP-7 D	04/22/97	0.11	< 0.008	< 0.011	< 0.011	0.015	< 0.011	0.060	< 0.009	< 0.009	< 0.009
VP-107 D	04/22/97	0.14	< 0.008	< 0.011	< 0.011	0.015	< 0.011	0.076	< 0.009	< 0.009	< 0.009
VP-8 S	04/22/97	0.017	< 0.008	< 0.011	< 0.011	0.011	< 0.011	0.14	< 0.009	< 0.009	< 0.009
VP-8 D	04/22/97	0.069	< 0.008	< 0.011	0.044	0.016	< 0 011	0.11	< 0.009	< 0.009	< 0.009
VP-9 S	04/22/97	0.008	< 0.008	< 0.011	< 0 011	0.016	< 0.011	0.017	< 0.009	< 0.009	< 0.009
VP-9-D	04/22/97	0.13	< 0.008	< 0.011	0.055	0.016	< 0.011	0.097	< 0.009	< 0.009	< 0.009
VP-10 S	04/22/97	< 0 008	< 0.008	0.012	< 0.011	0.019	< 0.011	0.97	< 0.009	< 0.009	< 0.009
VP-10 D	04/22/97	< 0 008	< 0.008	< 0 011	0.050	0.017	< 0 011	0.11	< 0 009	< 0.009	< 0.009
VP-11	04/23/97	< 0 008	< 0.008	< 0.011	< 0.011	0.025	< 0.011	< 0.014	< 0.009	< 0.009	< 0.009
VP-12	04/23/97	< 0 008	< 0.008	< 0 011	< 0 011	0.018	< 0 011	< 0 014	< 0.009	0.022	0.011
VP-13	04/23/97	< 0 008	< 0.008	< 0.011	< 0 011	0.020	< 0 011	0.014	< 0.009	< 0 009	< 0.009
VP-14	04/23/97	< 0 008	< 0.008	< 0 011	< 0.011	0.020	< 0.011	< 0.014	< 0.009	0.014	< 0.009
VP-15 S	04/22/97	< 0 008	< 0.008	0.033	< 0.011	0.014	< 0.011	0.97	< 0.009	< 0 009	< 0 009
VP-15 D	04/22/97	< 0 008	< 0.008	0.019	0.18	0.015	< 0.011	2.5	< 0.009	< 0 009	< 0.009
VP-16 S	04/22/97	< 0.008	< 0 008	< 0 011	0.014	0.018	< 0 011	0.83	< 0.009	< 0 009	< 0 009
VP-16 D	04/22/97	< 0.008	< 0.008	< 0 011	< 0.011	0.017	< 0 011	0.040	< 0.009	< 0 009	< 0.009
VP-17 S	04/22/97	< 0.008	< 0.008	< 0.011	0.077	0.011	< 0 011	1.2	< 0.009	< 0.009	< 0 009
VP-17 D	04/22/97	0.012	< 0 008	< 0.011	0.15	0.017	< 0 011	3.0	< 0 009	0.009	< 0.009
VP-18 S	04/23/97	< 0.008	< 0.008	< 0.011	< 0.011	0.017	< 0.011	1.2	< 0.009	< 0.009	< 0.009
VP-18 D	04/23/97	< 0.024	< 0.024	< 0.033	0.55	< 0.023	< 0.033	18.6	< 0.026	< 0.026	< 0.026
VP-19 S	04/23/97	< 0.034	< 0 035	< 0.046	< 0.046	< 0.032	< 0.046	22.1	< 0.037	< 0.037	< 0.037
VP-19 D	04/23/97	< 0.008	< 0.008	0.016	0.24	0.020	< 0.011	3.8	< 0.009	< 0 009	< 0 009
TRIP BLANK	04/21/97	< 0.008	< 0.008	< 0 011	< 0 011	< 0.008	< 0.011	< 0 014	< 0.009	< 0 009	< 0.009
TRIP BLANK	04/22/97	< 0 008	< 0.008	< 0 011	< 0.011	< 0 008	< 0.011	< 0.014	< 0.009	< 0.009	< 0.009
TRIP BLANK	04/23/97	< 0.020	< 0.021	< 0 028	< 0.028	0.065	< 0 028	< 0.035	< 0.022	< 0.022	< 0.022

All samples analyzed by Air Toxics Ltd. by EPA Method TO-14

QC Duplicate samples were collected and submitted under blind conditions

Duplicate samples are identified as 100-series, for example VP-104D is a duplicate of VP-4D.

µg/l = Micrograms per liter

1,1-DCE = 1,1-Dichloroethene

1,1-DCA = 1,1-Dichloroethane

1,1,1-TCA = 1,1,1-Trichloroethane

TCE = Trichloroethene

1,1,2-TCA = 1,1,2-Trichloroethane

PCE = Tetrachloroethene

< = Compound was not detected above the stated method detection limit

Table 2

Pre- and Post-SVE FID Data
Total VOCs
Southwest Parking Lot
SVE/AS Wells and Vapor Monitor Probes

	Pre-SVE Total VOCs (ppmv)	Post-SVE Total VOCs (ppmv)
Well	October 22-23 or November 4-5, 1996	April 21-23, 1997
SASW-1	136	1.7
SSW-3	84 2	38 2
SASW-4	8.8	2.4
SASW-5	49.3	7.7
SASW-6	37.2	0.4
SASW-7	86.2	1.2
VP-1S	46 1	9.0
VP-1D	44.8	0.3
VP-2S	57.1	0.8
VP-2D	171	1.3
VP-3S	88.7	1.0
VP-3D	89.7	1.3
VP-4S	105	1.6
VP-4D	286	2.0
VP-5S	54.7	1.7
VP-5D	49.6	2.5
VP-6S	80.2	2.4
VP-6D	94 2	2.2
VP-7S	19.6	0.4
VP-7D	39.4	0.3
VP-8S	41 3	0.9
VP-8D	46.3	1.8
VP-9S	2.9	0.2
VP-9D	16 1	0.5
VP-10S	27 7	0.7
VP-10D	28.7	0.0
VP-11S	2.1	0.0
VP-12S	3.5	0.0
VP-13S	2.4	0.0
VP-14S	1.0	0.0
VP-15S	113	6.8
VP-15D	53.2	4.1
VP-16S	INS	0.0
VP-16D	11.7	0.0
VP-17S	INS	0.0
VP-17D	INS	0.0
VP-18S	67 4	7.0
VP-18D	38.7	11.9
VP-19S	INS	12.6
VP-19D	INS	3.1

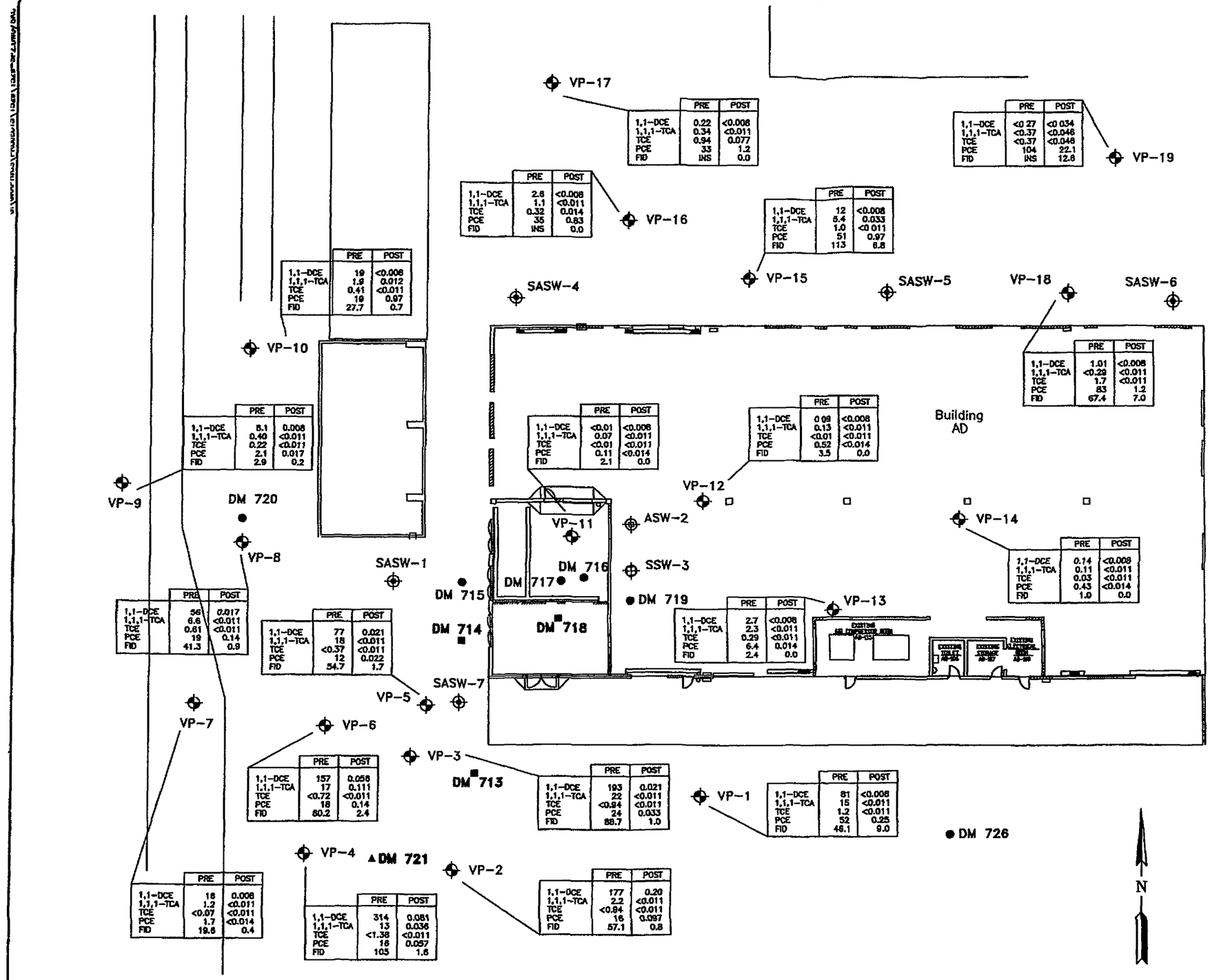
INS = Insufficient oxygen to obtain measurement

FID = Flame Ionization Detector

S = Shallow

D = Deep

Total VOCs FID data from Plates 4, 5, and 6 of the Soil Vapor Extraction System Evaluation Report, Motorola 52nd Street Facility Southwest Parking Lot, 5005 East McDowell Road, Phoenix, Arizona (Kleinfelder, 1998)



EXPLANATION

VP-1	Vapor Monitoring Point
SASW-1	SVE/Air Sparging Well
ASW-2	Air Sparging Well
SSW-3	SVE Well
DM 726	Conventional Groundwater Well
DM 721	Westbay Groundwater Well
DM 714	Groundwater Extraction Well

CONCENTRATION Pre SVE / Post SVE	
1,1-DCE	1,1-Dichloroethene
1,1,1-TCA	1,1,1-Trichloroethane
TCE	Trichloroethene
PCE	Tetrachloroethene
FID	Flame Ionization Detector

Concentrations reported in micrograms per liter (ug/l), except for FID which is reported in parts per million (ppm).

< = Compound not detected above the *stated method detection limit*

INS = Insufficient Oxygen to Obtain Measurement

Pre-SVE samples collected October 22-23, and November 4-5, 1996.

Post-SVE samples collected April 21-23, 1997, following sustained and cyclical SVE operation.

30 0 30

SCALE IN FEET

MOTOROLA - SWPL
52nd STREET FACILITY
PHOENIX, ARIZONA

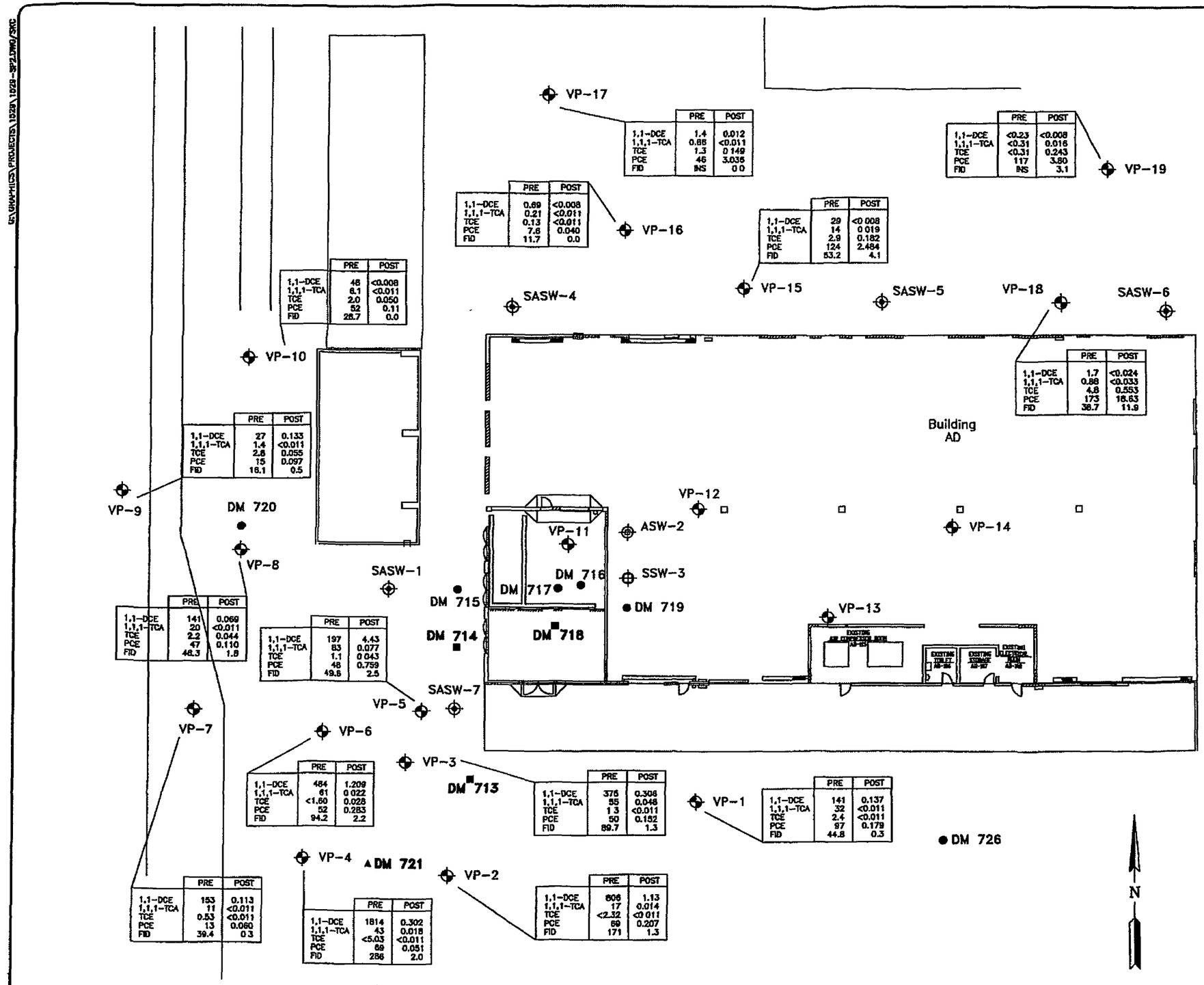
SOIL GAS ANALYTICAL RESULTS SHALLOW VAPOR PROBES

PLATE **4**

KLEINFELDER

PROJECT NUMBER 52-1529-01

12/22/98



EXPLANATION

VP-1	Vapor Monitoring Point
SASW-1	SVE/Air Sparging Well
ASW-2	Air Sparging Well
SSW-3	SVE Well
DM 726	Conventional Groundwater Well
DM 721	Westbay Groundwater Well
DM 714	Groundwater Extraction Well

CONCENTRATION	Pre SVE	Post SVE
1,1-DCE	1,1-Dichloroethene	
1,1,1-TCA	1,1,1-Trichloroethane	
TCE	Trichloroethene	
PCE	Tetrachloroethene	
FID	Flame Ionization Detector	

Concentrations reported in micrograms per liter (ug/l), except for FID which is reported in parts per million (ppm).

< = Compound not detected above the stated method detection limit

INS = Insufficient Oxygen to Obtain Measurement

Pre-SVE samples collected October 22-23, and November 4-5, 1996.

Post-SVE samples collected April 21-23, 1997, following sustained and cyclical SVE operation.

30 0 30

SCALE IN FEET

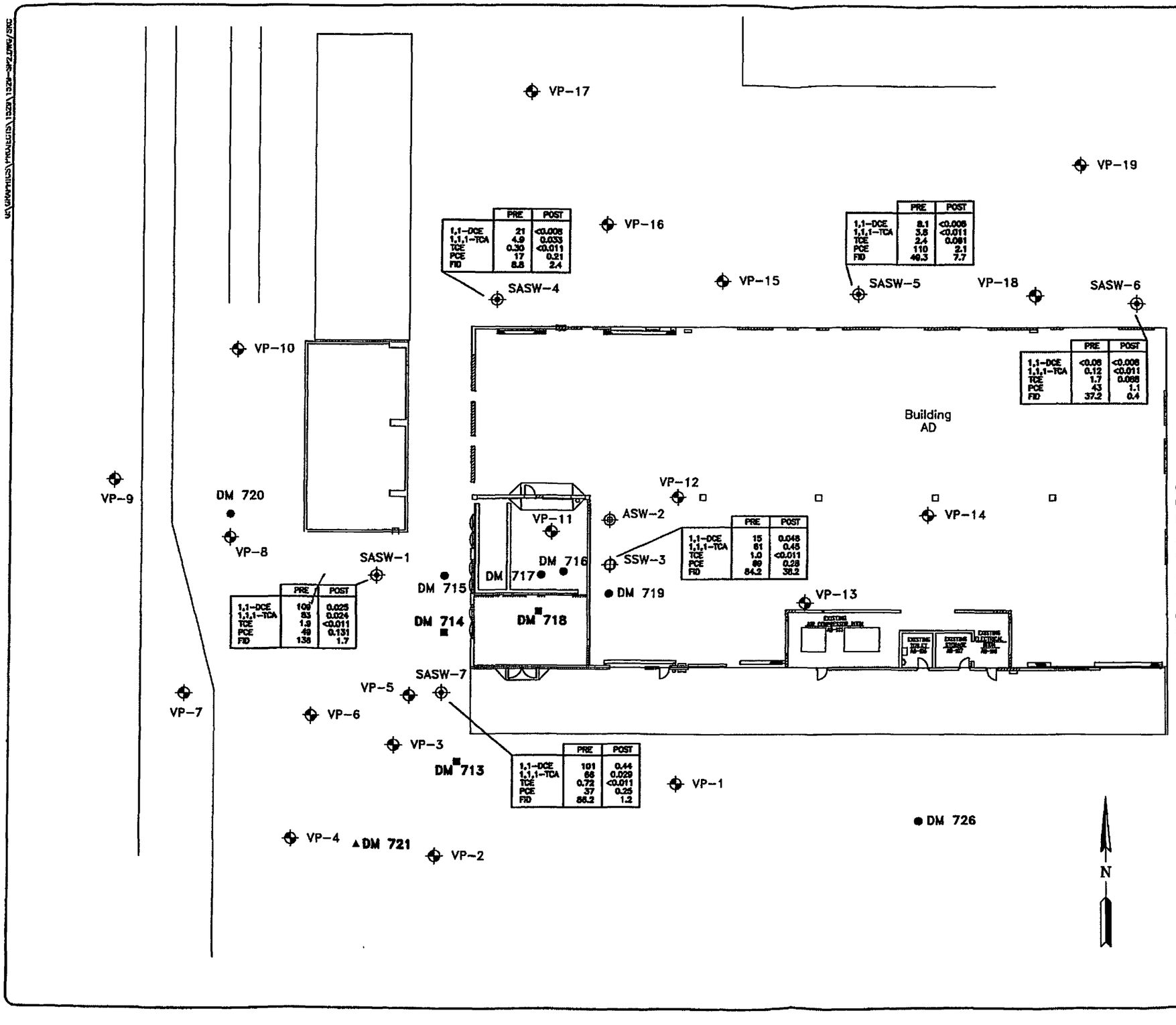
MOTOROLA - SWPL
52nd STREET FACILITY
PHOENIX, ARIZONA

SOIL GAS ANALYTICAL RESULTS
DEEP VAPOR PROBES

PLATE 5

KLEINFELDER

PROJECT NUMBER 52-1529-01 12/22/98



EXPLANATION

VP-1	Vapor Monitoring Point
SASW-1	SVE/Air Sparging Well
ASW-2	Air Sparging Well
SSW-3	SVE Well
DM 726	Conventional Groundwater Well
DM 721	Westbay Groundwater Well
DM 714	Groundwater Extraction Well

	CONCENTRATION Pre SVE | Post SVE
1,1-DCE	1,1-Dichloroethene
1,1,1-TCA	1,1,1-Trichloroethane
TCE	Trichloroethene
PCE	Tetrachloroethene
FID	Flame Ionization Detector

Concentrations reported in micrograms per liter (ug/l), except for FID which is reported in parts per million (ppm).

< = Compound not detected above the stated method detection limit

Vapor monitoring points inside of Building AD are shallow completion only.

Pre-SVE samples collected October 23, and November 5, 1996. TO-14

Post-SVE samples collected April 21-23, 1997.

30 0 30

SCALE IN FEET

MOTOROLA - SWPL
52nd STREET FACILITY
PHOENIX, ARIZONA

SOIL GAS ANALYTICAL RESULTS VAPOR EXTRACTION WELLS

PLATE 6

KLEINFELDER

PROJECT NUMBER 52-1529-01

12/22/98

Table 3

Phase I and Phase II Air Sparging Test FID Data
Total VOCs
Southwest Parking Lot
SVE/AS Wells

Phase I Air Sparging Test									Phase II Air Sparging Test								
Date	Time of Day	Test Time (Minutes)	Soil Vapor Extraction Wells						Date	Time of Day	Test Time (Minutes)	Soil Vapor Extraction Wells					
			SASW-1	SSW-3	SASW-4	SASW-5	SASW-6	SASW-7				SASW-1	SSW-3	SASW-4	SASW-5	SASW-6	SASW-7
5/19/97	1000	60	0 0	21 6	0.1	0.2	0 0	0 0	5/27/97	1900	60	0.0	32 0	2 5	5 0	0.0	3.6
5/19/97	1100	120	0.0	21 4	0.0	0 0	0.0	0.7	5/27/97	2000	120	0.0	27.1	0 0	1.0	0 0	3.5
5/19/97	1200	180	0.2	21.5	0 0	0 0	0.0	0.0	5/27/97	2100	180	6 4	25 1	0.4	2.5	0 0	1.0
5/19/97	1300	240	10.1	13.4	0 0	0.0	0 0	0 0	5/27/97	2200	240	6 1	23.3	0.5	2.1	0 0	1 4
5/19/97	1400	300	13.6	23.5	0 0	0.0	0 0	0.0	5/27/97	2300	300	7.2	21 4	1.6	2.8	0 0	0 0
5/19/97	1500	360	10.5	26.9	0.0	0.0	0.0	0 0	5/28/97	2400	360	8 2	24 3	1.9	2 5	0 0	1.2
5/19/97	1600	420	9.8	31.3	0 0	0.0	0 0	0.0	5/28/97	0100	420	3 2	24.0	0.5	2 3	0.0	0 0
5/19/97	1700	480	6 8	16.8	0.0	0.0	0 0	0.0	5/28/97	0200	480	0.1	18.0	0.2	1 6	0.0	0.0
5/19/97	1800	540	21 8	15.8	0.0	0.0	0.0	7 0	5/28/97	0300	540	3 5	17.7	0.0	0 9	0 0	0.0
5/19/97	1900	600	20.9	16 1	0.0	0.0	0.0	6.3	5/28/97	0400	600	2 8	21.0	1 7	2 2	0.0	0.0
5/19/97	2000	660	14 8	15 6	0.0	0 0	0.0	1 0	5/28/97	0500	660	2.4	19.6	1.0	2.5	0.0	0.0
5/19/97	2100	720	18.1	16.1	0 0	0 0	1.0	1 9	5/28/97	0600	720	*4 7*	*17.6*	*4 2*	*3 0*	*0 0*	*0 7*
5/19/97	2200	780	18 1	15.7	1 0	0.0	1 1	8 6	5/28/97	0700	780	8 3	14 3	1 2	1.5	0.0	1 4
5/19/97	2300	840	17.4	13.9	1.0	0 0	1.0	8.1	5/28/97	0800	840	8.1	14 2	1 0	1.6	0 0	1.4
5/20/97	2400	900	9.4	18.3	0 0	5.9	0 0	4.0	5/28/97	0900	900	3.1	18 9	2.2	9.3	0 0	1.2
5/20/97	0100	960	10.5	14 1	0.0	11.8	0 0	2.4	5/28/97	1000	960	3 5	22.8	8 3	10.0	0.0	2 2
5/20/97	0200	1020	9 4	16.1	0.0	0 0	0.6	2.1	5/28/97	1100	1020	2.9	25.3	12.2	13.5	0 0	0.4
5/20/97	0300	1080	8.6	13 2	0.0	2.3	0 7	1.3	5/28/97	1200	1080	2.4	26.1	13.5	14 2	0.0	0.0
5/20/97	0400	1140	9 0	19.9	2.2	9 7	0.0	2.2	5/28/97	1300	1140	2.4	19.4	16 4	15.0	0.0	0.0
5/20/97	0500	1200	12 2	20.9	0 0	1.9	0.0	3 4	5/28/97	1400	1200	2.1	19.1	3 8	12.2	0.0	0.0
5/20/97	0600	1260	9.6	17.2	0.0	1 4	0.0	2.3	5/28/97	1500	1260	3 7	19.8	12 0	12 5	0.0	0.7
5/20/97	0700	1320	20 5	*23.7*	3 4	4.3	0.0	11.5	5/28/97	1600	1320	3.1	23 7	13 3	15.1	0 0	0 9
5/20/97	0800	1380	17.1	26.0	*5 8*	*5.1*	*0 0*	6 0	5/28/97	1700	1380	2.8	24 9	5.1	4.2	0 0	2.9
5/20/97	0900	1440	15 5	27.5	6.3	5.9	0 0	6.4	5/28/97	1800	1440	*5.0*	*27.3*	*4.2*	*8.5*	*2.0*	*3.1*
5/20/97	1000	1500	11.0	30 4	5 5	10 2	0 0	3.5	5/28/97	1900	1500	6.2	34 0	5.8	6.4	3 2	6.7
5/20/97	1100	1560	10 6	30 8	4 0	11.9	0 0	3.7	5/28/97	2000	1560	11 2	31.0	3.5	2.0	5.0	5.3
5/20/97	1200	1620	10 4	29 9	2.5	10.4	0.0	2.2	5/28/97	2100	1620	3.1	30.5	3.0	15.2	3.9	2 3
5/20/97	1300	1680	10.7	30.8	2 7	11.4	0 0	3.6	5/28/97	2200	1680	10.1	27.9	3.7	6 9	4.2	3.3
5/20/97	1400	1740	9 8	26.4	8.0	23 5	0.0	1 9	5/28/97	2300	1740	12.9	34.5	5 5	4 0	4.1	4.8
5/20/97	1500	1800	7 4	18.4	8.2	23.7	0.0	1 4	5/29/97	2400	1800	4.7	29.7	2.3	2 7	1.5	2.6
5/20/97	1600	1860	*5.0*	*16 8*	*6.8*	*20 2*	*0.0*	*0.7*	5/29/97	0100	1860	5 2	31.9	1 5	2 7	2.2	3 2
5/20/97	1700	1920	2 6	*24.5*	5 4	16.7	0.0	0 0	5/29/97	0200	1920	0.9	18.9	2 2	2.2	1.1	0.0
5/20/97	1800	1980	*5.7*	*22.6*	2 7	18.5	0 0	*3.9*	5/29/97	0300	1980	1.3	21.0	3 4	1.7	1.5	0.6
5/20/97	1900	2040	8.9	30.4	2 0	9 5	0.0	7 9	5/29/97	0400	2040	8.0	19 5	0 6	1.3	0 5	0 0
5/20/97	2000	2100	8.2	24.6	0 0	9.4	0 0	2.1	5/29/97	0500	2100	7.1	19 7	2.5	1.0	0.0	0 7
5/20/97	2100	2160	*7.4*	23.3	0.0	9.3	0 0	*3.5*	5/29/97	0600	2160	8.2	33.6	6.1	10.1	8 0	0 0
5/20/97	2200	2220	6.7	22.0	0 0	9.8	0.0	4.8	5/29/97	0700	2220	8.6	31 3	8.6	8.7	6 3	0.6
5/20/97	2300	2280	6 3	23.8	0.0	9 3	0.0	3 9	5/29/97	0800	2280	11 2	39.1	6.1	10.1	8 0	6.3
5/21/97	2400	2340	4.1	26 3	0.0	9 3	0.0	3.9	5/29/97	0900	2340	13.3	37.2	8 5	8.7	6 3	10.5
5/21/97	0100	2400	17 5	28.3	0.0	10 0	0.0	4 0	5/29/97	1000	2400	11.1	35.4	5 3	0.8	1.9	1.1
5/21/97	0200	2460	14 1	25.8	1 3	10.4	0 0	2.1	5/29/97	1100	2460	8.9	35.2	5.3	8.5	7.7	1.3
5/21/97	0300	2520	17.2	28.6	4.6	13.2	0 0	1 9	5/29/97	1200	2520	5.8	33.8	5.8	8.7	7.2	4 2
5/21/97	0400	2580	14.2	28.4	5.1	16.3	0.0	0.8	5/29/97	1300	2580	3.4	26.4	6.6	6.9	6.9	1.5
5/21/97	0500	2640	15.9	26 0	*2.5*	*9.2*	*0 0*	2.9	5/29/97	1400	2640	3.2	25.7	7.3	7.2	7.0	1.1
5/21/97	0600	2700	4.7	16 3	0.0	8.7	0 0	0.4	5/29/97	1500	2700	4.4	27.4	6.6	8.6	8.5	1.3
5/21/97	0700	2760	7.5	16.3	0.0	5.5	0.0	2.0	5/29/97	1600	2760	5.8	28.3	6.8	6.8	7.6	4 9
5/21/97	0800	2820	6 2	14.9	0.0	21.3	0.0	1.3	5/29/97	1700	2820	4.7	24.4	6.2	3.9	5.2	3.1
5/21/97	0900	2880	2.5	16 6	0.0	10.0	0.0	0.6	5/29/97	1800	2880	12.6	32.1	5.8	4.0	5.4	4.6

Table 3

Phase I and Phase II Air Sparging Test FID Data
Total VOCs
Southwest Parking Lot
SVE/AS Wells

Phase I Air Sparging Test									Phase II Air Sparging Test								
Date	Time of Day	Test Time (Minutes)	Soil Vapor Extraction Wells						Date	Time of Day	Test Time (Minutes)	Soil Vapor Extraction Wells					
			SASW-1	SSW-3	SASW-4	SASW-5	SASW-6	SASW-7				SASW-1	SSW-3	SASW-4	SASW-5	SASW-6	SASW-7
5/21/97	1000	2940	2.3	16.4	5 6	16 2	0.0	0 3	5/29/97	1900	2940	10.7	28.4	4.5	4.4	6 3	3.9
5/21/97	1100	3000	4.6	16.3	5 8	10.5	0 0	0 0	5/29/97	2000	3000	2.4	27.3	0.0	0 0	0.0	1.1
5/21/97	1200	3060	2 6	15 2	6 4	10.3	0 0	0.0	5/29/97	2100	3060	1.6	24 8	0 0	0.0	0.0	0 5
5/21/97	1300	3120	6.6	14.8	5 5	12.0	0.0	0.0	5/29/97	2200	3120	1.3	24.2	0.0	0.0	0 0	1.6
5/21/97	1400	3180	3 8	17 0	6.5	13.5	0 0	0.8	5/29/97	2300	3180	1.8	26.0	3.8	6 2	0 3	1 2
5/21/97	1500	3240	2.1	16 6	6 8	14.0	0.0	0.0	5/30/97	2400	3240	2.3	26.5	2.2	4.6	3 4	1.2
5/21/97	1600	3300	3 4	16 8	6.0	11.5	0 0	0.6	5/30/97	0100	3300	1.9	24 8	1.7	3.2	2.9	1 6
5/21/97	1700	3360	5 2	14.9	5 5	15.0	0.0	0.8	5/30/97	0200	3360	3 4	19.7	1.8	3 4	2.8	0 0
5/21/97	1800	3420	0 8	11 0	0.0	5.5	0 0	0 0	5/30/97	0300	3420	2.0	17.1	4.8	6 7	5.1	0.0
5/21/97	1900	3480	0 3	10 2	0 0	*10.7*	0 0	0 0	5/30/97	0400	3480	1 8	17 3	1.3	1.8	1 4	0.0
5/21/97	2000	3540	0.2	10 0	0 0	*6.0*	0 0	0 0	5/30/97	0500	3540	0 9	14.0	0 8	1 8	1.6	0.0
5/21/97	2100	3600	0 0	9 6	0.0	4 2	0 0	0.0	5/30/97	0600	3600	1.4	16.2	0 4	1 4	1.3	0.6
5/21/97	2200	3660	0 0	9 4	1.1	6 6	0.4	0 0	5/30/97	0700	3660	9 3	24 1	2 0	3 0	2.5	0.0
5/21/97	2300	3720	0 0	9 3	1.0	7 1	0 0	0.0	5/30/97	0800	3720	9.1	25.3	1 7	2 8	2.1	0.0
5/22/97	2400	3780	0 6	9.7	0 8	6 5	0.0	0 0	5/30/97	0900	3780	**0.2**	18 3	3 2	**1.9**	**1.3**	**0.8**
5/22/97	0100	3840	0.1	9.6	0 7	5.7	0.0	0 0	5/30/97	1000	3840	**4.0**	27.2	**3.2**	**2.4**	**1.7**	**1.1**
5/22/97	0200	3900	2.8	8.9	0.9	5 9	0 4	1.2	5/30/97	1100	3900	**3.1**	32 0	**3.5**	**3.4**	**3.4**	**1.8**
5/22/97	0300	3960	9.4	**10.4**	0 2	6.1	3.0	6 2	5/30/97	1200	3960	**2.8**	31 4	**4.3**	**3.4**	**3.5**	**1 2**
5/22/97	0400	4020	12 2	**8.9**	1 1	6 2	0.0	4 2	5/30/97	1300	4020	**3.0**	33 6	**3.5**	**3.5**	**3.2**	**1.1**
5/22/97	0500	4080	10 6	**9.0**	0.5	6.0	0 0	1 5	5/30/97	1400	4080	**2.7**	32 3	**3.5**	**3.7**	**2.6**	**1.4**
5/22/97	0600	4140	**6.0**	**12.4**	**1.2**	**3.5**	**0.0**	**0.5**	5/30/97	1500	4140	**2.2**	33 4	**3.4**	**3.1**	**2.7**	**0.8**
5/22/97	0700	4200	12 1	**12.3**	3.0	6.7	0 0	2 2	5/30/97	1600	4200	**3.4**	32.6	**2.1**	**1.9**	**2.8**	**0 8**
5/22/97	0800	4260	15 1	**9.9**	4.8	12 5	2 7	2 1	5/30/97	1700	4260	**3.3**	31.1	**2.2**	**2.2**	**2.5**	**1.6**
5/22/97	0900	4320	**7.3**	**10.7**	**3.3**	**6.5**	**0.8**	**2.0**	5/30/97	1800	4320	**1.7**	25.7	**0.2**	**0.8**	**0.6**	**0.3**
5/22/97	1000	4380	**8.3**	**11.5**	**1.9**	**7.2**	**0.7**	**1.7**	5/30/97	1900	4380	**3 0**	27.8	**1.8**	**1.7**	**1.6**	**2.0**
5/22/97	1100	4440	**8.5**	**13.5**	**0.5**	**4.1**	**0.1**	**0.6**	5/30/97	2000	4440	**1.7**	26.6	**1.7**	**1.7**	**1.8**	**1.6**
5/22/97	1200	4500	**4 5**	**14.5**	**0.0**	**2.2**	**0.1**	**0.8**	5/30/97	2100	4500	**1.4**	32.5	**1.3**	**2.0**	**1.7**	**1.6**
5/22/97	1300	4560	**5.4**	**13.9**	**0.0**	**3.7**	**0.0**	**1.0**	5/30/97	2200	4560	**1.0**	30.2	**1.4**	**2.0**	**1.9**	**1 6**
5/22/97	1400	4620	**4.7**	**11.6**	**0.0**	**4.0**	**0.0**	**1.7**	5/30/97	2300	4620	**1.5**	29.1	**1.4**	**1.6**	**1.6**	**0.9**
5/23/97	0515	4680	1 4	**9.4**	0 0	1 3	0.0	1.2	5/31/97	1200	5400	1 7	22 7	0 4	0.4	0.0	0 0
5/24/97	0800	4740	1.2	**10.3**	0.0	1 1	0.0	0 6	6/1/97	0900	6660	0.0	16.3	0.0	0.0	0 0	0 0
5/25/97	0800	4800	1.4	**10.6**	0 0	1 0	0.0	1 1	6/2/97	0800	8040	0.0	1.2	0.6	2.2	1 5	0.1
									6/3/97	1500	9900	*0 0*	*1 2*	*0.6*	2.2	*1 5*	*0 1*

All concentrations in parts per million by volume (ppmv).
Total VOCs measured with a flame ionization detector (FID) calibrated with 100 ppmv 1,1,1-Trichloroethane.
VOC concentrations corrected for instrument out of calibration conditions and erroneous data.

Italicized measurements are simple averages of those taken prior to and following missing or erroneous measurement
Bolded measurements are corrected for field instrument variation/calibration errata

Table 4
Phase I and Phase II Air Sparging Test FID Data
Total VOCs
Southwest Parking Lot
Vapor Monitoring Probes

Vapor Probe	Phase I Test (date and time)						Phase II Test (date and time)						
	5/19/97 2000	5/20/97 0800	5/20/97 1800	5/21/97 0600	5/21/97 1800	5/22/97 0600	5/27/97 1200	5/28/97 0600	5/28/97 1800	5/29/97 0600	5/29/97 1800	5/30/97 0600	5/30/97 1600
VP-1S	0	2 2	1	3.5	4	4.1	3 5	0	0	1.3	0	0	0
VP-1D	0	2.9	0	4.1	4 1	3 7	3.2	0	0	0.7	0	0	0
VP-2S	0	2.5	0	3 5	0	4.2	0	0	0	0	0	2	0
VP-2D	107.7	91.6	31.5	15.3	26	24.2	0	85	35.3	14 5	9.6	15.6	5.7
VP-3S	0	5.2	2.5	3.5	4.6	4.7	0.3	0	2.4	2.2	0	2.3	0
VP-3D	0	4.5	2.9	2.7	6	5.2	0.8	0	3.2	2.8	0.1	2.9	0
VP-4S	0	2.1	3	4 2	5.5	4.7	0	0	0	2	0	1.5	0
VP-4D	0.2	3.2	3.5	4.7	5.5	0	1	0	0	1.6	0	1.8	0
VP-5S	0	3.6	1 5	4.5	0	0	0	0	0	1.1	0	2.3	0
VP-5D	1.5	10.5	1.7	7.5	0.1	0	1	0.7	0	0	0	1 9	0
VP-6S	0	2 5	0	3.8	2 2	0	0	0	0	2.6	0	2.3	0
VP-6D	0	1.7	4	3.3	4.2	0	1.7	0	0	2.7	0	1.5	0
VP-7S	0	3.7	0	8.5	0	4.2	1	0	0	1 8	0	1.6	0
VP-7D	0.5	0.5	0	4.5	2.6	4.1	0.8	0	0	2.8	0	1.8	0
VP-8S	0	1.5	0	13.7	3.6	3.8	2.2	0	0	2.2	0	1.1	0
VP-8D	0	2.2	0	13	4.5	4.2	1.5	0	0	2.1	0	1.3	0
VP-9S	0	0	0	2.6	0	4.4	0	0	0.2	1.2	0	1.8	0
VP-9D	0	0	0	2.1	0	5.4	0.9	0 7	0	1.5	0	2.8	0
VP-10S	0.2	1.6	0	12.2	0	3.7	2.1	0.5	0	1.2	0	1 2	0
VP-10D	2	2.4	0	2.7	0	0	0	0	0	0	0	0	0
VP-11S	0	3 1	0	0	4	3.8	0	0 4	0	0.1	0	0	0
VP-12S	0	3.7	0	0	3.5	1 5	0	0.8	0	2.3	0	0	1.6
VP-13S	0	4	0	2.8	3.7	2 1	0	0	0	0.8	0	0	1.5
VP-14S	0.3	4	0	4.2	4	2.6	1 4	0	0	0.9	0	0	1.1
VP-15S	0	0	0	5.5	11	5.3	0.4	1.6	0	0	0	3.2	0
VP-15D	4.3	0	1.5	8.4	4.4	4.8	1.1	0	0	1	0	4	0
VP-16S	0	0	0	4.2	2.5	0	1.1	0	0	0	0	1.9	0
VP-16D	0	0	0	3.6	2.4	0	1 8	1.1	1	0	0	2.6	0
VP-17S	0	0	0	3 2	1.6	5.4	0.8	1	0	0	0	2.1	0
VP-17D	0	0	0	3.6	1	4.3	0	0	0.6	0	0	1.7	0
VP-18S	0	0	0	4.7	0	5.8	0	1.2	0	1.7	0	2.3	0
VP-18D	1.5	0	0	5.6	5	6	1.9	1 7	0	2	0	1.9	0
VP-19S	0	0	3	4.7	3	6.8	2.6	1.9	2 5	0.2	3.2	3.9	0
VP-19D	0	0	0	4.1	0	5 2	0.5	1.7	0	0	0	2.2	0

All concentrations in parts per million by volume (ppmv).
Total VOCs measured with a flame ionization detector (FID) calibrated with 100 ppmv 1,1,1-Trichloroethane
Deep = Deep completed vapor monitoring point
Shallow = Shallow completed vapor monitoring point

Table 5

Pre- and Post-Air Sparging FID Data
Total VOCs
Southwest Parking Lot
SVE/AS Wells

	Pre-SVE Total VOCs (ppmv)	Post-SVE Total VOCs (ppmv)	Pre-air sparging Total VOCs (ppmv)	Post-air sparging Total VOCs (ppmv)
Well	October 22-3 or November 4-5, 1996	April 21-23, 1997	May 16, 1997	June 2, 1997
SASW-1	136	1.7	0.2	0
SSW-3	84.2	38.2	23	1.2
SASW-4	8.8	2.4	0	0.6
SASW-5	49.3	7.7	0	2.2
SASW-6	37.2	0.4	0	1.5
SASW-7	86.2	1.2	0 8	0.1

Total VOCs measured with a flame ionization detector (FID) calibrated with 100 ppmv 1,1,1-Trichloroethane

APPENDIX E

PUBLIC NOTICE OF FIVE-YEAR REVIEW

ADEQ Arizona Department of Environmental Quality

Janet Napolitano, Governor
Stephen A. Owens, ADEQ Director

PUBLIC COMMENT FOR 5-YEAR REVIEW

Motorola 52nd Street Superfund Site April 2006

Operable Units 1 and 2, Public Notice of Five-Year Review

The Arizona Department of Environmental Quality (ADEQ) and the United States Environmental Protection Agency (EPA) are announcing the start of the third Five-Year Review for the Motorola 52nd Street Federal Superfund Site and are soliciting input from the community regarding the cleanup. ADEQ is conducting the Five-Year Review of the two interim groundwater cleanup remedies at the Site. The purpose of a five-year review is to evaluate whether the ***remedies at a site are protective of human health and the environment;*** *or in other words, whether the cleanup methods are working as designed. ADEQ will also assess if any factors suggest that the remedies may not continue to be protective in the future. During the five-year review process, ADEQ would like to address any concerns from the public specifically regarding the cleanup activities being conducted at the Motorola 52nd Street Site.*

FIVE-YEAR REVIEW

These are the U.S. laws that govern the Five-Year Review:

Section 121(c) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) state that a remedial action that resulted in hazardous substances, pollutants, or contaminants remaining at the site shall be reviewed no less frequently than every five years. It requires that the EPA make a determination whether the remedial actions are protective. Thus, the Motorola 52nd Street Superfund Site requires a five-year review of the selected remedies. ADEQ will provide a Five-Year Review Report with a protectiveness statement for EPA's review and approval.

In order to determine the protectiveness of the remedy, ADEQ will conduct studies, perform inspections of the treatment systems, and review existing operation and maintenance information. ADEQ will also interview key project personnel, evaluate any changes of site conditions, and review federal and state requirements.

BACKGROUND

The Motorola 52nd Street Site is located in a residential and commercial area in eastern and central Phoenix. The site boundaries are approximately 52nd Street to the east, Seventh Avenue to the west, Palm Lane to the north and Buckeye Road to the south. The site encompasses a large plume of groundwater contamination which, to facilitate the clean up of the site, has been divided into three separate areas, or operable units (OUs). The focus of this notice is Operable Unit 1 (OU1) and Operable Unit 2 (OU2). See map for location of the OU1 and OU2 boundaries and the groundwater remedies.

The contamination at the Motorola 52nd Street Site is a result of historic commercial and industrial solvent disposal throughout the area. The primary groundwater contaminants are trichloroethene (TCE), tetrachloroethene (PCE), and 1,1,1-trichloroethane (TCA). The Motorola 52nd Street Site was placed on the National Priorities List (NPL) in September 1989. Since the site was discovered, ADEQ has had the lead enforcement role at the site.

More detailed information on this site can be found on the ADEQ Web page at: http://www.azdeq.gov/environ/waste/sps/download/phoenix/m52.pdf.

OPERABLE UNIT 1

In 1989, Motorola signed a Consent Order (a legal agreement between ADEQ and Motorola) with ADEQ to construct and operate a groundwater treatment system to contain and treat groundwater contaminated with chlorinated solvents for OU1. The OU1 remedy involves the cleanup of both soil and groundwater. Three areas at the former Motorola 52nd Street Facility are required to be cleaned up by soil vapor extraction (SVE). The soil remedy is currently not in operation; one area has been completed and the other two areas are being evaluated.

The groundwater treatment system at OU1 has been in operation since 1992 and consists of three

separate well fields (two on the Facility and one along the Old Cross Cut Canal) and a treatment plant located at the Facility. The groundwater is pumped at a rate of 230 gallons per minute (gpm) from these well fields and conveyed via an underground dual-wall pipe to the treatment plant. The contaminated groundwater then enters the air stripper towers where the contaminants are moved from the water into the air. The air then moves through a vapor phase granular activated carbon system to trap the contamination within the carbon filter. The treated water is used in plant operations at the 52nd Street Facility.

OPERABLE UNIT 2

In 1998, the EPA issued a Unilateral Administrative Order (a legal document requiring work) to Motorola and Honeywell to construct and operate a groundwater treatment system. The system is designed to contain and treat groundwater contaminated with chlorinated solvents within OU2. The system became fully operational in September 2001 and currently extracts groundwater at approximately 2000 gallons per minute from a series of three extraction wells located along 20th Street. The water is treated by pumping the contaminated water through a liquid phase granular activated carbon system to trap the contamination within the carbon filter. The treated water is then discharged to the Salt River Project (SRP) Grand Canal.

COMMUNITY INVOLVEMENT

In an effort to better involve and inform the community, ADEQ would like to interview people who have knowledge of operations of the cleanup systems as well as members of the public who have information or concerns about on-going cleanup activities. Please contact:

Linda Mariner
ADEQ Community Involvement Coordinator
(602) 771-4294
e-mail: mariner.linda@azdeq.gov
Hearing impaired persons call
ADEQ's TDD line: (602) 771-4829

before May 15, 2006 to schedule an interview.

ADEQ initiated the five-year review process in February 2006 and plans to complete the review and submit a report to EPA by September 2006. The findings of the five-year review will be available to the public at the local information repositories listed below in October 2006.

MOTOROLA 52ND STREET SITE INFORMATION REPOSITORIES:

ADEQ Records Center
1110 West Washington Street
Phoenix, AZ 85007
(602) 771-4420

U.S. EPA
Superfund Records Center
95 Hawthorne Street, Ste. 403S
San Francisco, CA 94105-3901
(415) 536-2000

City of Phoenix Public Library
Saguaro Branch
2808 North 46th Street
Phoenix, AZ 85008
(602) 262-6801

City of Phoenix Public Library
Burton Barr Branch
1221 North Central Avenue
Phoenix, AZ 85004
(602) 262-4636

Documents in electronic form (pdf) are available to be emailed or mailed to you on a CD from EPA or ADEQ. Electronic versions will also be in the libraries on CD and can be copied.

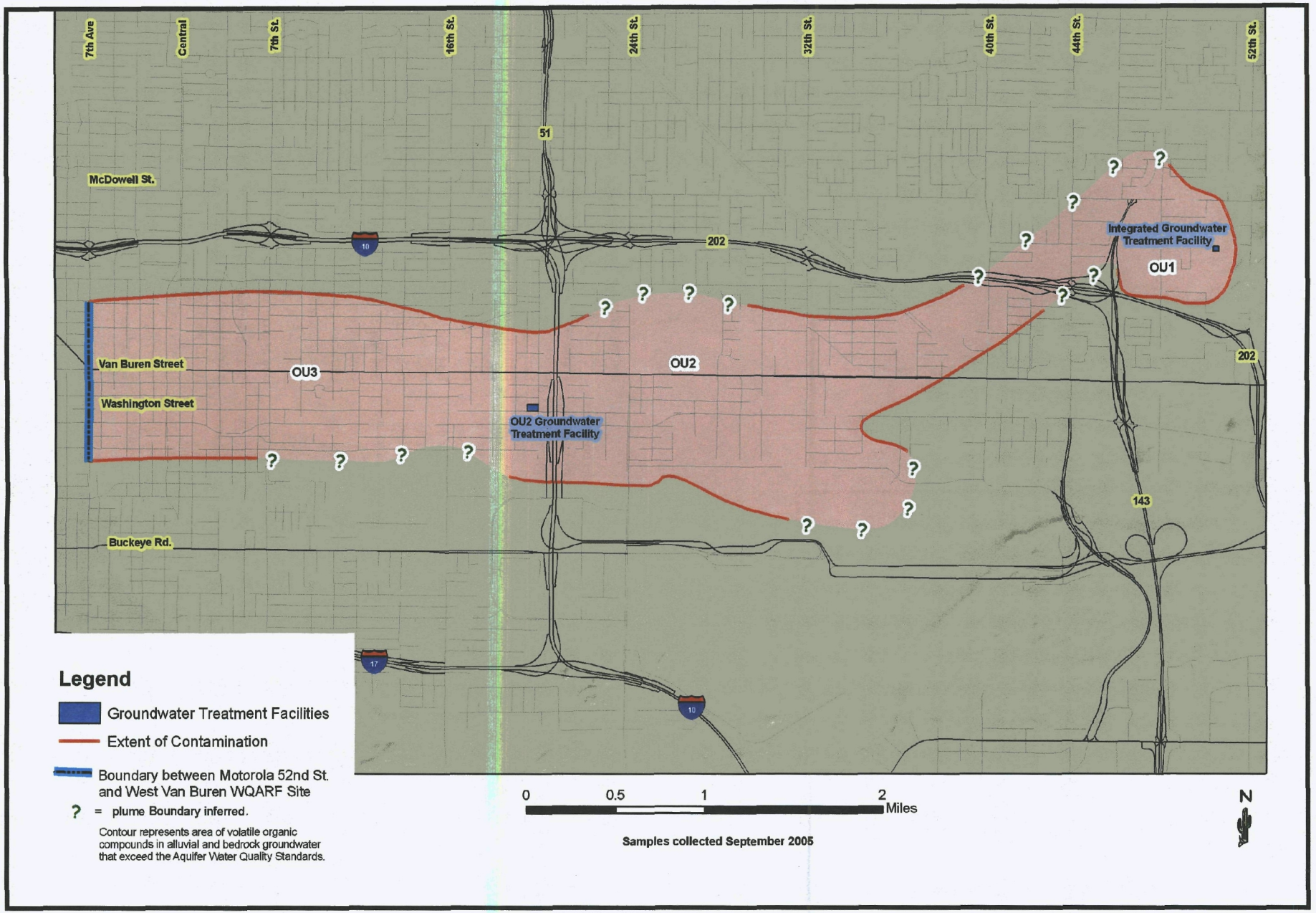
If you would like further information regarding the Motorola 52nd Street site, please contact:
Linda Mariner
ADEQ Community Involvement Coordinator
(602) 771-4294
e-mail: mariner.linda@azdeq.gov
Hearing impaired persons call
ADEQ's TDD line: (602) 771-4829

For general comments and questions regarding the Five-Year Review for the Motorola 52nd Street Site, please contact:
Kris Paschall
ADEQ Project Manager
(602) 771-4193
e-mail at paschall.kris@azdeq.gov

In Arizona, outside the Phoenix area, call 1(800) 234-5677. Hearing impaired may call TDD line at (602) 771-4829.

Web site: www.azdeq.gov

Motorola 52nd Street Superfund Site



ADEQ
Arizona Department of Environmental Quality
Janet Napolitano, Governor
Stephen A Owens, ADEQ Director

Linda Mariner,
Community Involvement Coordinator
1110 W Washington Street, 4415B-1
Phoenix, AZ 85007-9973

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GLOSSARY

Air strippers - Air Stripping is a treatment system that removes volatile organic compounds (VOCs) from contaminated groundwater or surface water by forcing an airstream through the water and causing the compounds to move from the water into the air within the stripping tower

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) - CERCLA is a federal law passed in 1980 that created a special tax that funds a trust fund, commonly known as Superfund, to be used to investigate and clean up abandoned or uncontrolled hazardous waste sites Under the program, EPA can pay for cleanup when parties responsible for the contamination cannot be located or are unwilling or unable to perform the work, or take legal action to force parties responsible for contamination to clean up the site or reimburse the federal government for the cost of the cleanup

Contamination - Any hazardous or regulated substance released into the environment

Extraction Well - An extraction well is a well specifically designed to withdraw groundwater or soil gas for treatment

Groundwater - Water found beneath the earth's surface that fills pores between materials such as sand, clay, or gravel and that often supplies wells and springs

Liquid Phase Granulated Activated Carbon - Liquid phase carbon adsorption is a full-scale technology in which ground water is pumped through one or more vessels containing activated carbon to which dissolved organic contaminants adsorb

National Oil and Hazardous Substances Pollution Contingency Plan (NCP) - The NCP is the major regulatory framework that guides the Superfund response effort The NCP is a comprehensive body of regulations that outlines a step-by-step process for implementing Superfund responses and defines the roles and responsibilities of EPA, other federal agencies, states, private parties, and the communities in response to situations in which hazardous substances are released into the environment

National Priorities List (NPL) - The NPL is EPA's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial response under Superfund Inclusion of a site on the list is based primarily on the score the site receives under the Hazard Ranking System Money from Superfund can be used for cleanup only at sites that are on the NPL EPA is required to update the NPL at least once a year

Soil Gas – Soil gas and soil vapor are the gaseous elements and compounds that occur in the small spaces between soil particles Such gases can move through or leave the soil or rock, depending on changes in pressure

Soil Vapor Extraction (SVE) – A commonly used technique for cleaning up contaminated soils SVE draws gases from contaminated soils and through the extraction system for treatment The term soil vapor extraction is often used interchangeably with soil gas extraction

Solvent – A substance, usually a liquid that is capable of dissolving or dispersing one or more other substances

Trichloroethene – TCE is a nonflammable, colorless solvent that readily evaporates at room temperature TCE is used mainly for degreasing/drying of metals and electronic components TCE is a potential occupational carcinogen

Trichloroethane – TCA is a solvent similar to TCE and used mainly for degreasing/drying of metals and electronic components

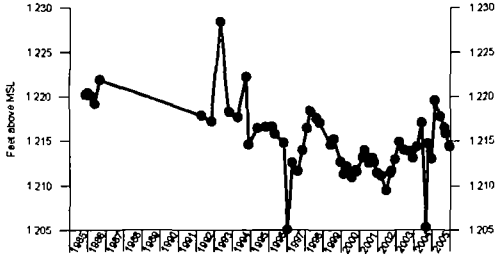
Tetrachloroethene – PCE is a clear, colorless, nonflammable liquid with a sweet odor and a low boiling point It is a solvent used for dissolving waxes, greases, oils, fats, gums, and widely used for dry cleaning of fabrics and degreasing/drying of metals PCE is a potential occupational carcinogen

Vapor Phase Granulated Activated Carbon – Vapor-phase carbon adsorption is a remediation technology in which pollutants are removed from air by physical adsorption onto activated carbon grains

APPENDIX F

GROUNDWATER ELEVATION AND CONCENTRATION HYDROGRAPHS FOR SELECTED WELLS

GW Elevation
AZNGD-1



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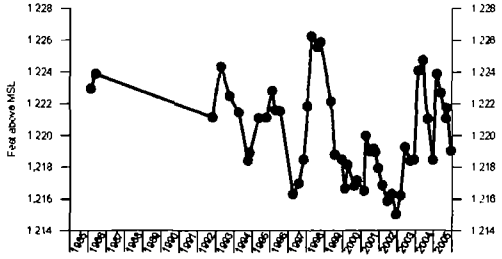
AZNGD-2A



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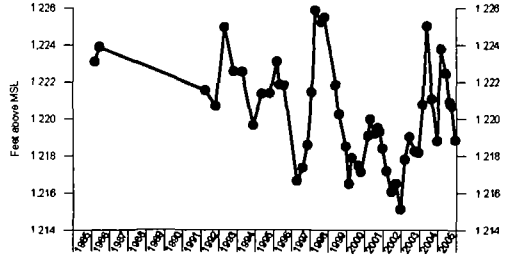
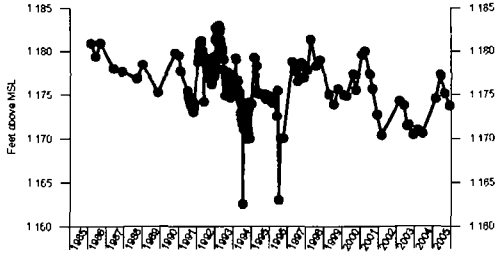
AZNGD-2B



GW Elevation
DM107



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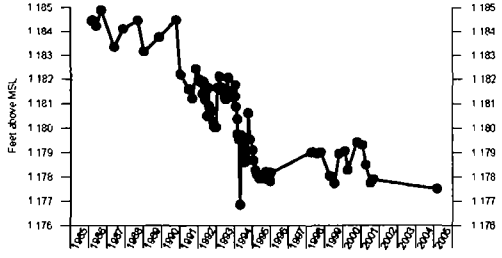
DM111



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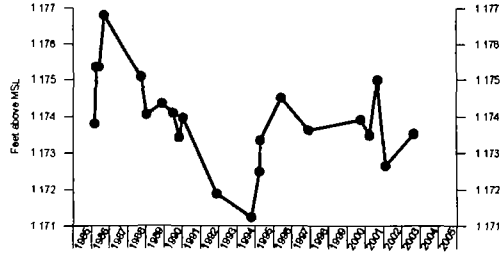
DM112



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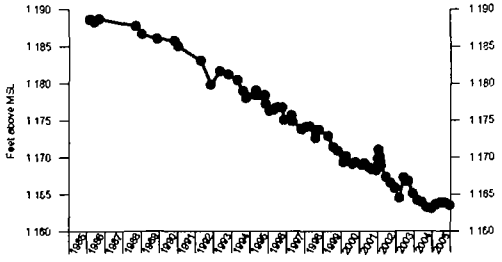

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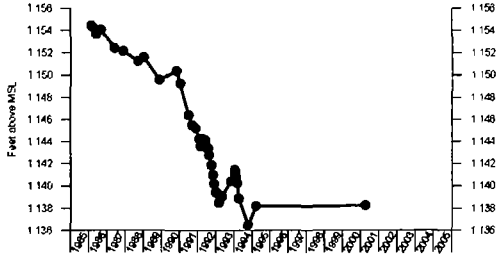
DM115



GW Elevation
DM117

EXPLANATION

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

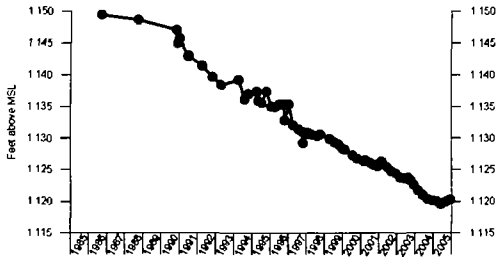
CLEAR CREEK ASSOCIATES

Project Name 52nd Street Superfund Site

Job No 00000-000-000 | Date March 2006

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

GW Elevation
DM118



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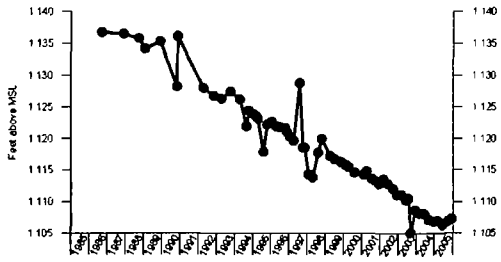
DM119-072



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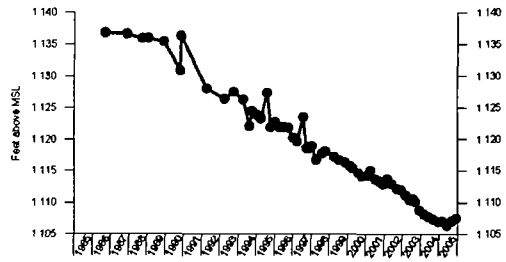

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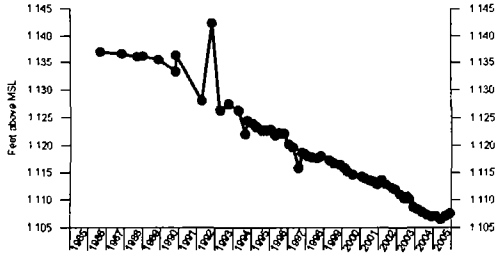
DM119-137



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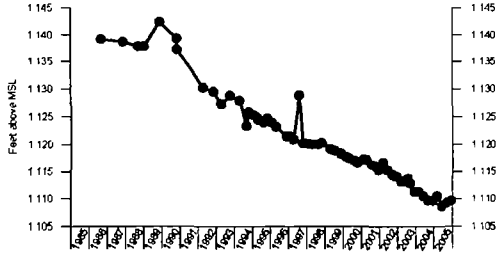
DM119-204



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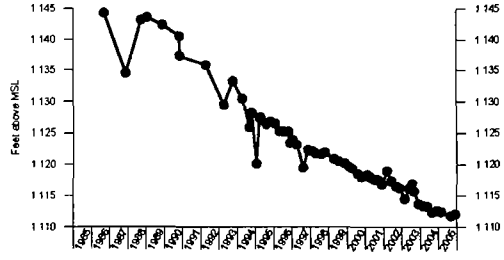

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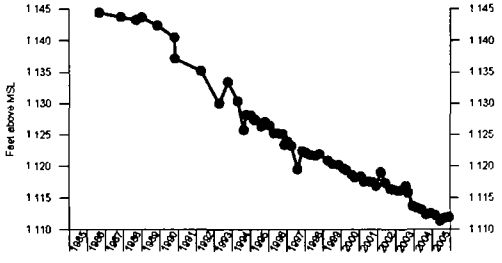
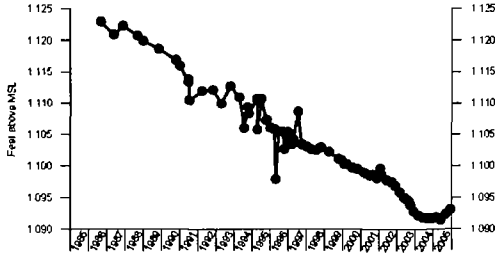


GW Elevation
DM120



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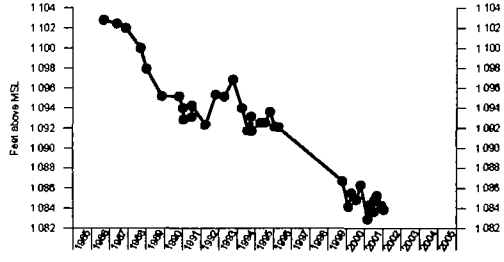
DM122-A



EXPLANATION

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

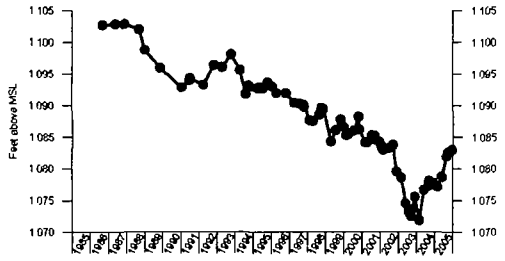
CLEAR CREEK ASSOCIATES

Project Name 52nd Street Superfund Site

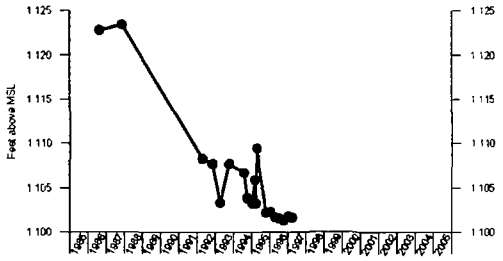
Job No 00000-000-000 | Date March 2006

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

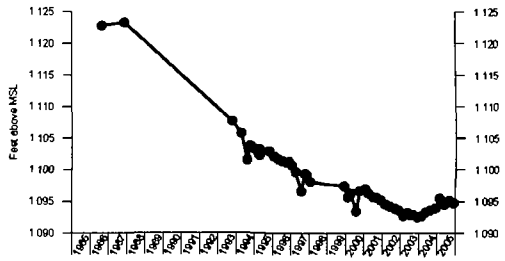
GW Elevation
DM122-B



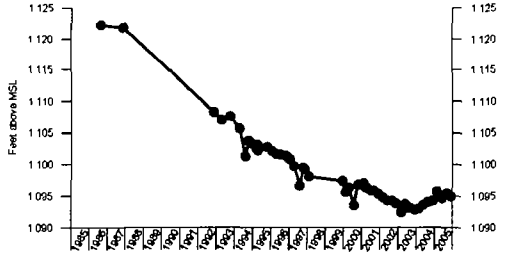
GW Elevation
DM123-056



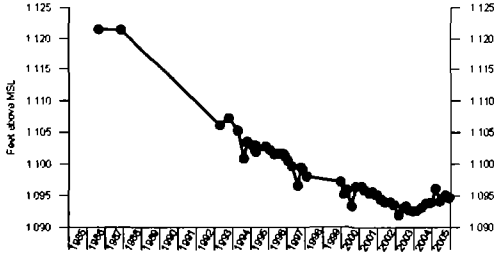
GW Elevation
DM123-085



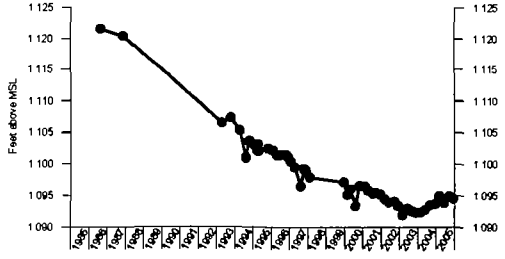
GW Elevation
DM123-135



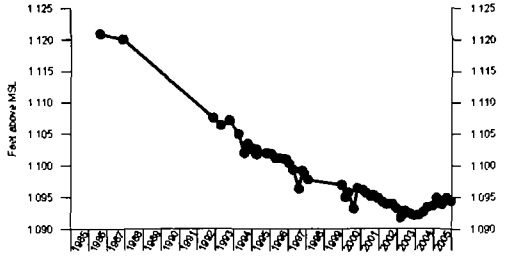
GW Elevation
DM123-195



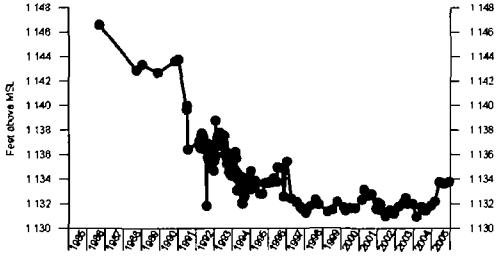
GW Elevation
DM123-250



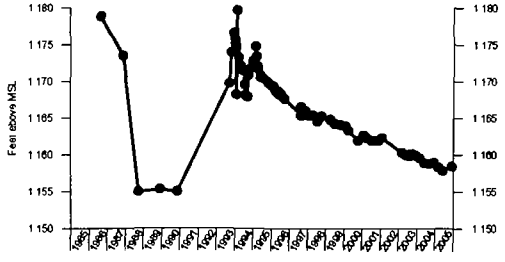
GW Elevation
DM123-285



GW Elevation
DM124



GW Elevation
DM125-044



EXPLANATION

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

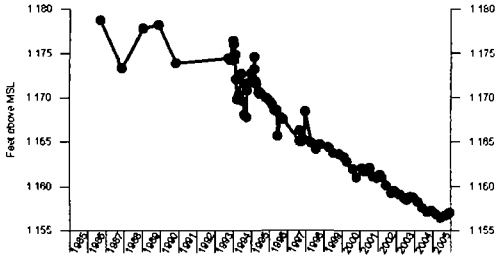
CLEAR CREEK ASSOCIATES

Project Name 52nd Street Superfund Site

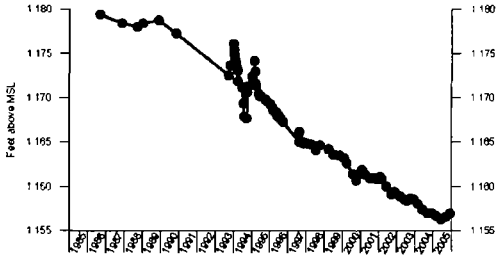
Job No 00000-000-000 | Date March 2006

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

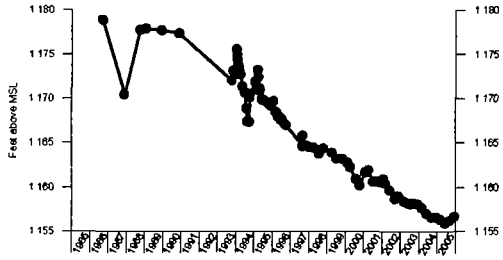
GW Elevation
DM125-076



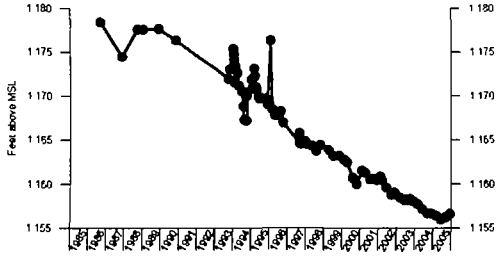
GW Elevation
DM125-125



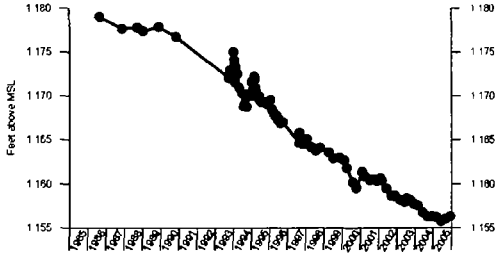
GW Elevation
DM125-155



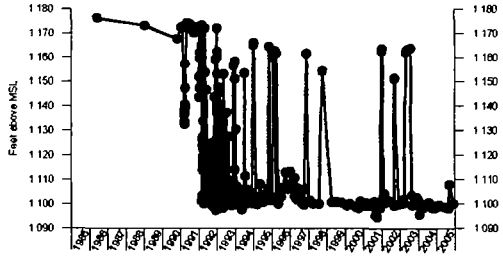
GW Elevation
DM125-185



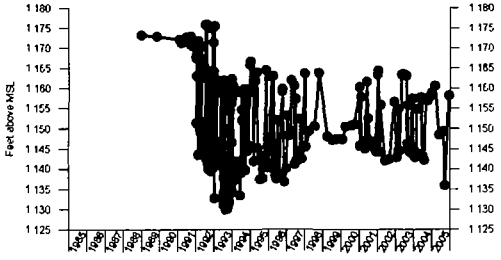
GW Elevation
DM125-270



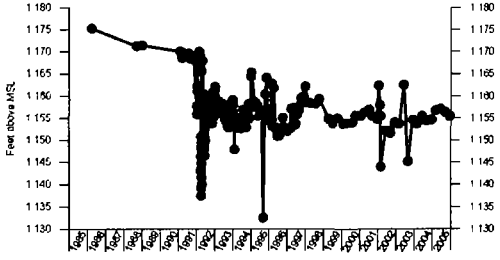
GW Elevation
DM201



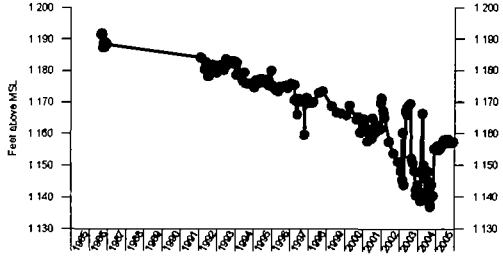
GW Elevation
DM201-OB1



GW Elevation
DM201-OB2



GW Elevation
DM301



EXPLANATION

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

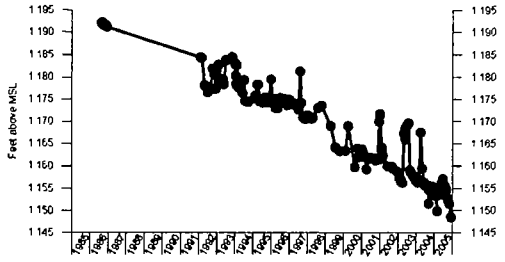
CLEAR CREEK ASSOCIATES

Project Name 52nd Street Superfund Site

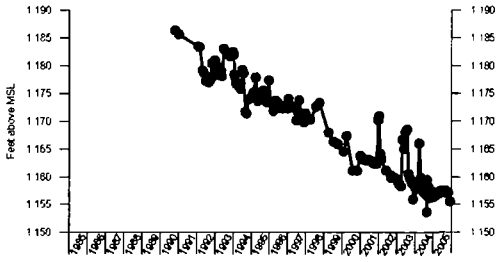
Job No 00000-000-000 | Date March 2006

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

GW Elevation
DM302

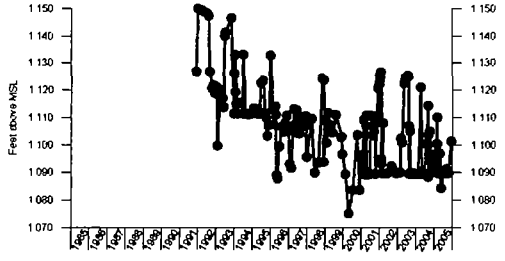


GW Elevation
DM303



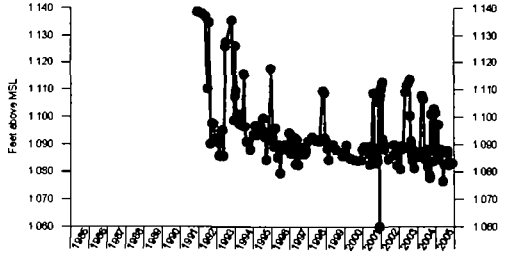
GW Elevation
DM304

GW Elevation
DM305

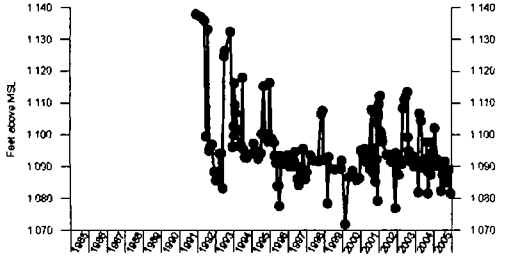


GW Elevation
DM306

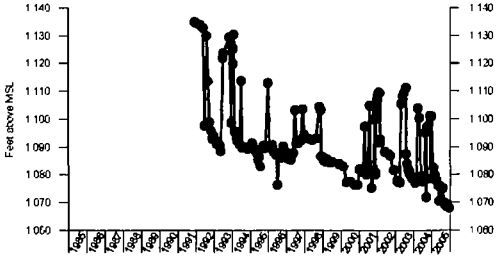
GW Elevation
DM307



GW Elevation
DM308



GW Elevation
DM309



GW Elevation
DM310

EXPLANATION

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

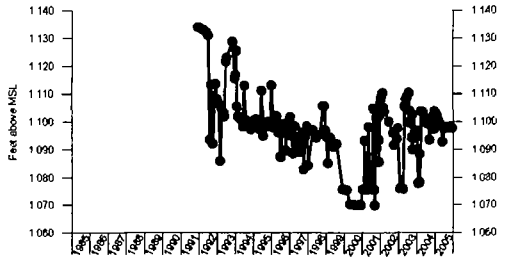
CLEAR CREEK ASSOCIATES

Project Name 52nd Street Superfund Site

Job No 00000-000-000 | Date March 2006

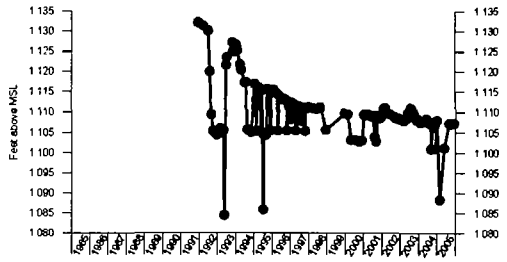
Time-Series Graphs
Selected Wells
52nd Street Superfund Site
Phoenix, Arizona

GW Elevation
DM311



GW Elevation
DM312

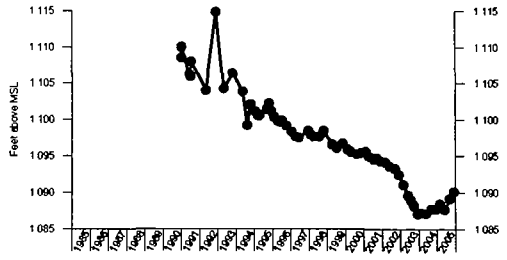
GW Elevation
DM313



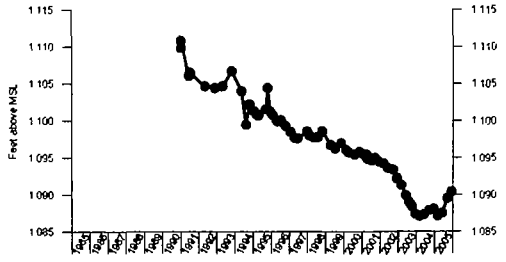
GW Elevation
DM502-079

GW Elevation
DM502-119

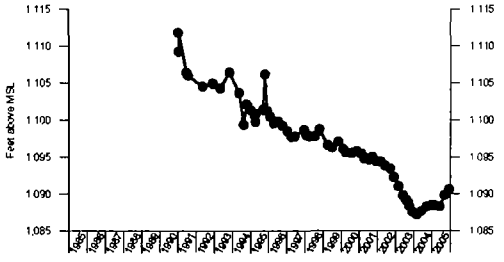
GW Elevation
DM502-161



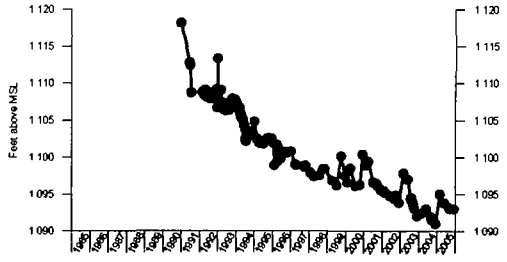
GW Elevation
DM502-240



GW Elevation
DM502-335



GW Elevation
DM503



EXPLANATION

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

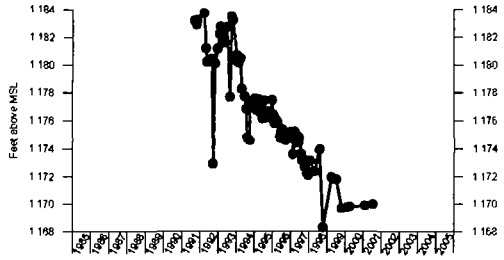
CLEAR CREEK ASSOCIATES

Project Name 52nd Street Superfund Site

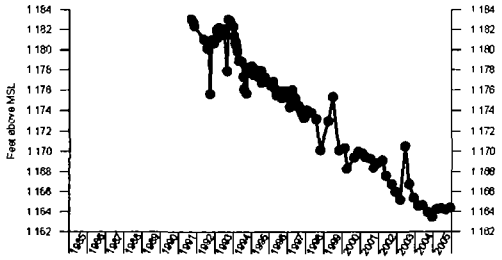
Job No 00000-000-000 | Date March 2006

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

GW Elevation
DM601-040



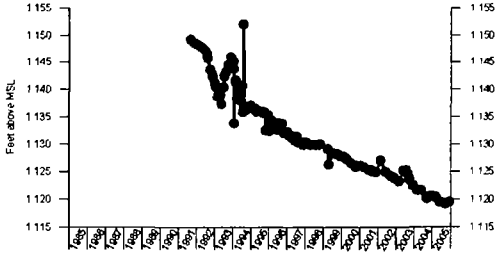
GW Elevation
DM601-085



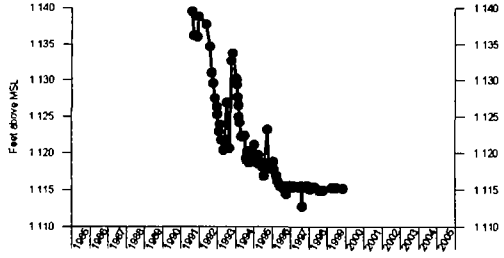
GW Elevation
DM601-135

GW Elevation
DM601-200

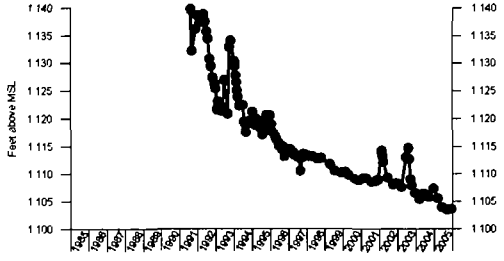
GW Elevation
DM602



GW Elevation
DM603-088

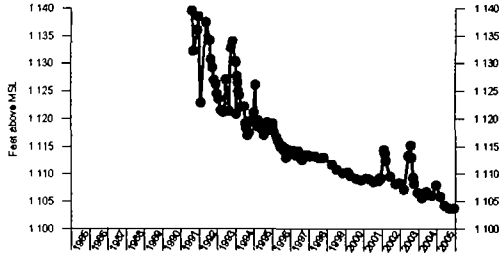


GW Elevation
DM603-115



GW Elevation
DM603-170

GW Elevation
DM603-205



EXPLANATION

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

CLEAR CREEK ASSOCIATES

Project Name 52nd Street Superfund Site

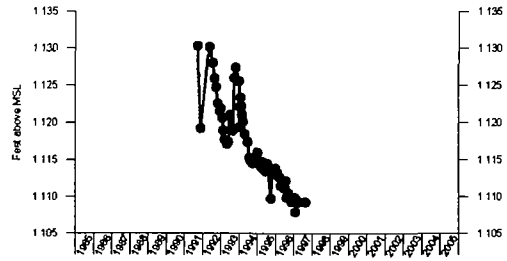
Job No 00000-000-000 | Date March 2006

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

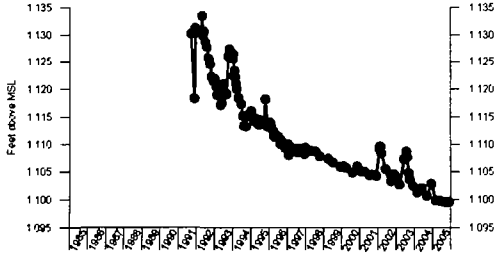
GW Elevation
DM603-245

GW Elevation
DM604

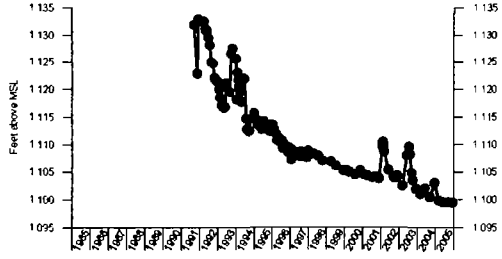
GW Elevation
DM605-066



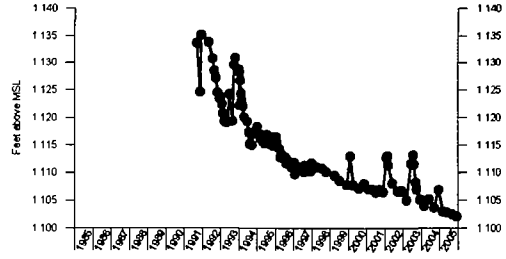
GW Elevation
DM605-105



GW Elevation
DM605-170

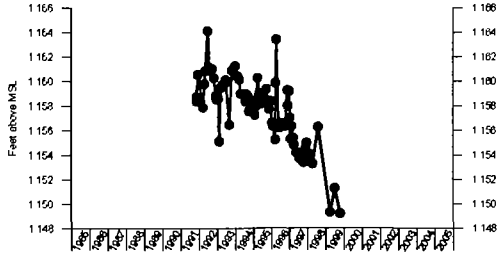


GW Elevation
DM605-240

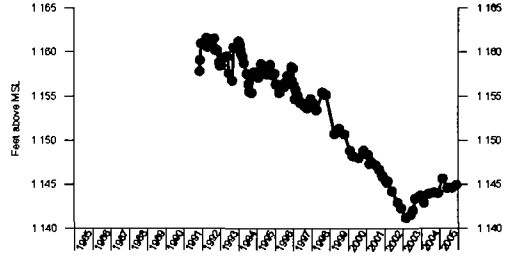


GW Elevation
DM605-290

GW Elevation
DM606-045



GW Elevation
DM606-102



EXPLANATION

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

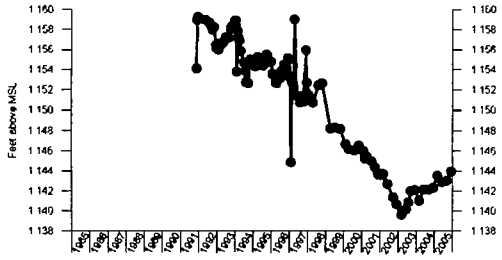
CLEAR CREEK ASSOCIATES

Project Name 52nd Street Superfund Site

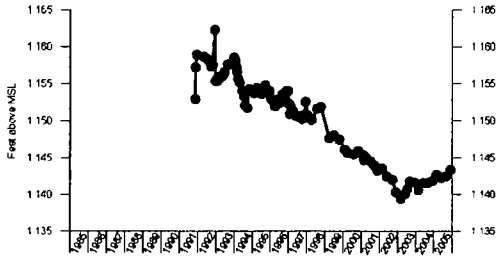
Job No 00000-000-000 | Date March 2006

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

GW Elevation
DM606-185

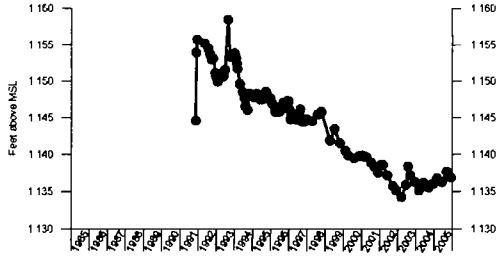


GW Elevation
DM608-250

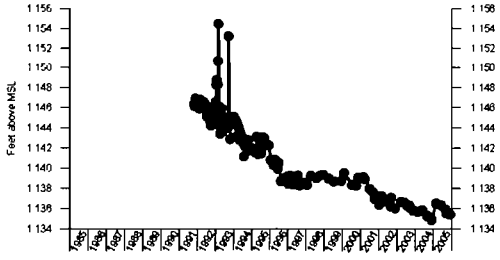


GW Elevation
DM608-330

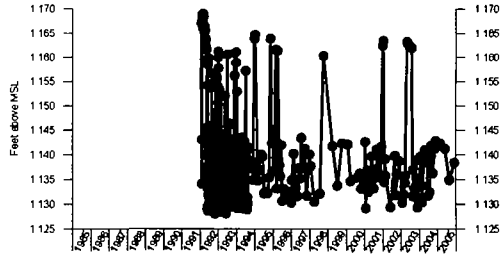
GW Elevation
DM606-370



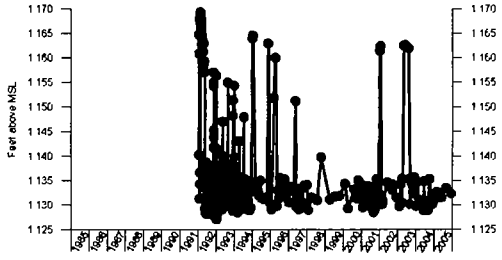
GW Elevation
DM701



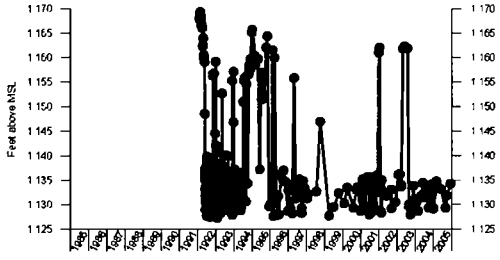
GW Elevation
DM702



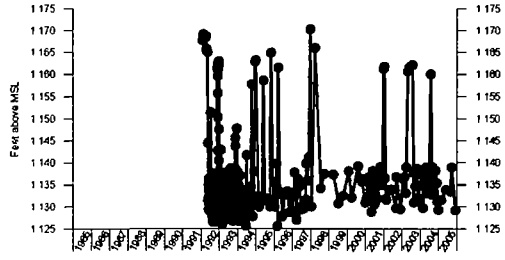
GW Elevation
DM703



GW Elevation
DM704



GW Elevation
DM705



EXPLANATION

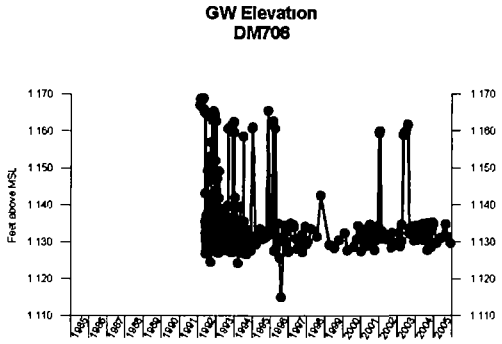
- ● - Measured Value
- o - Undetected (Displayed at RL)

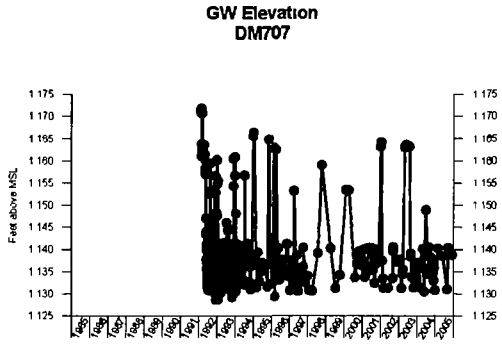
CLEAR CREEK ASSOCIATES

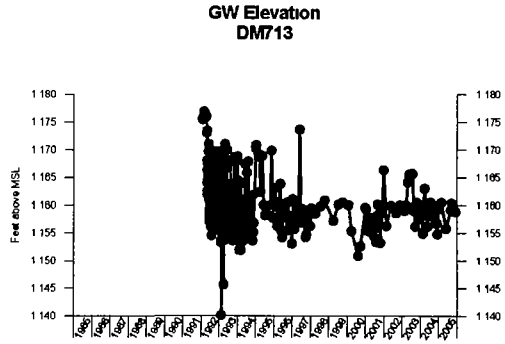
Project Name 52nd Street Superfund Site

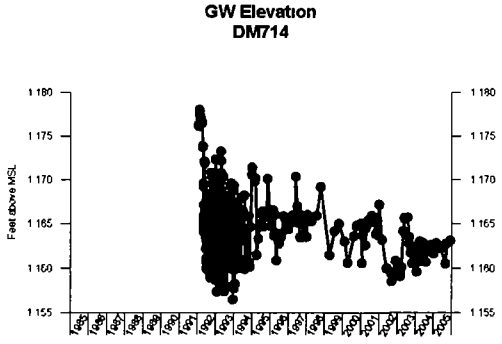
Job No 00000-000-000 | Date March 2006

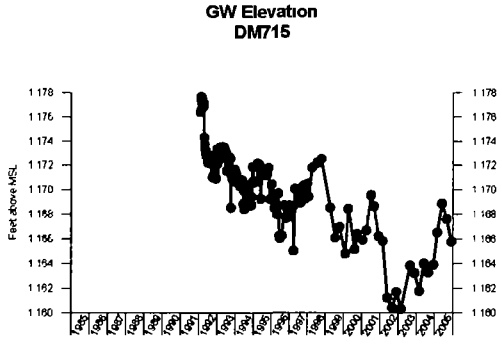
Time-Series Graphs
Selected Wells
52nd Street Superfund Site
Phoenix, Arizona

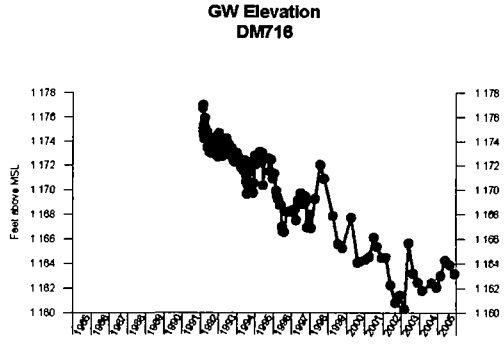


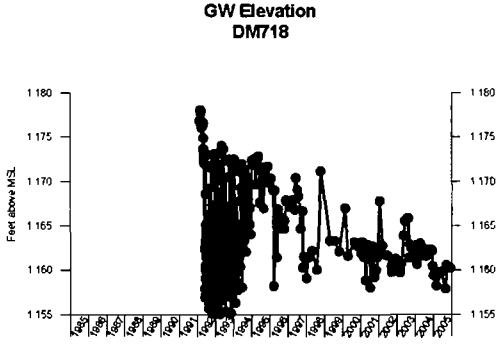


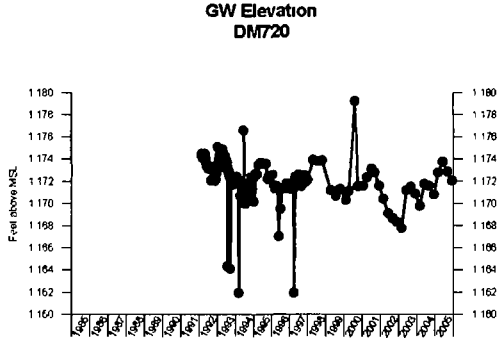


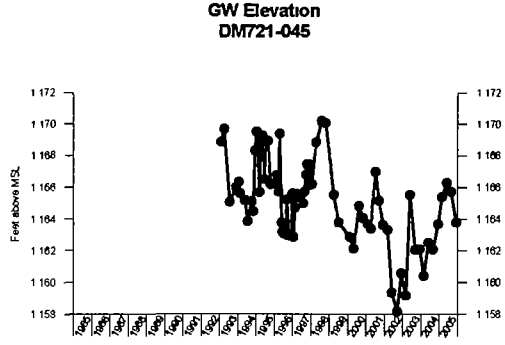












EXPLANATION

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

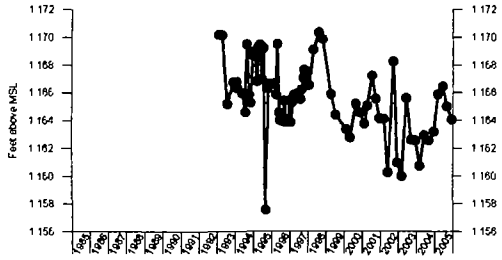
CLEAR CREEK ASSOCIATES

Project Name 52nd Street Superfund Site

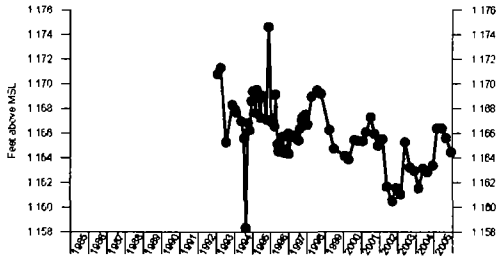
Job No 00000-000-000 | Date March 2006

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

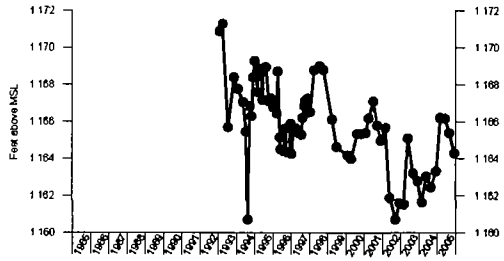
GW Elevation
DM721-065



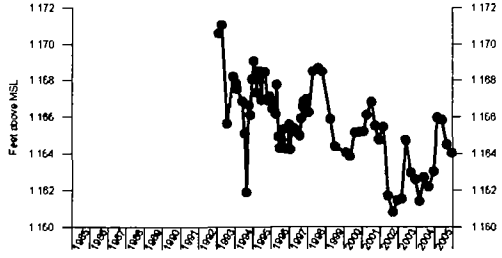
GW Elevation
DM721-125



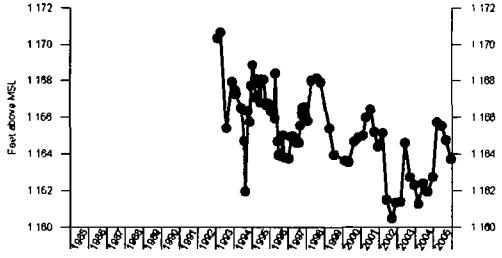
GW Elevation
DM721-185



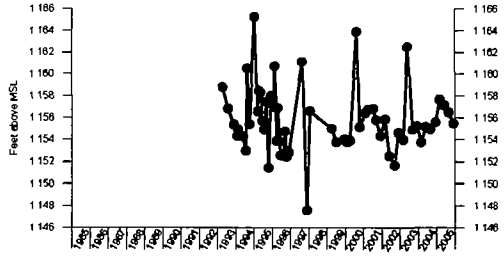
GW Elevation
DM721-260



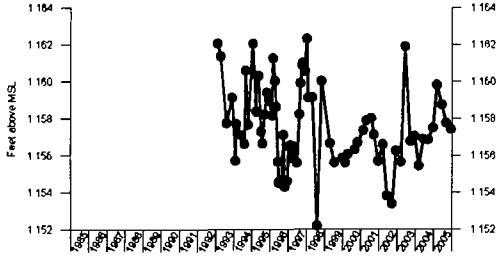
GW Elevation
DM721-280



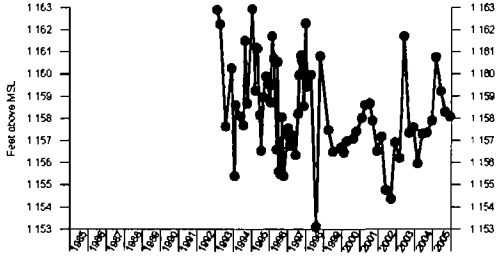
GW Elevation
DM722-047



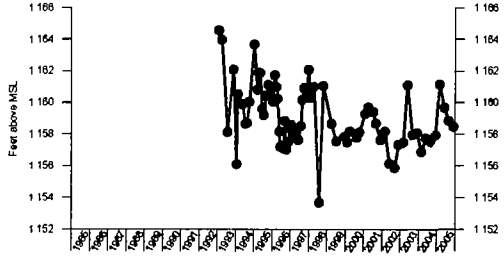
GW Elevation
DM722-100



GW Elevation
DM722-145



GW Elevation
DM722-190



EXPLANATION

- ● - Measured Value
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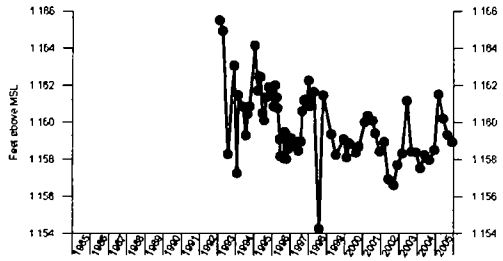
CLEAR CREEK ASSOCIATES

Project Name 52nd Street Superfund Site

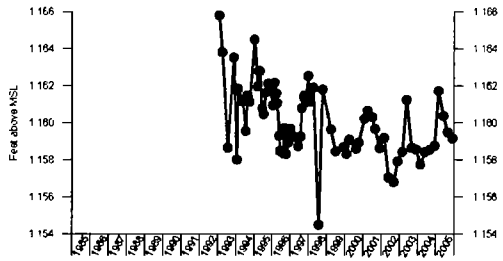
Job No 00000-000-000 | Date March 2006

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

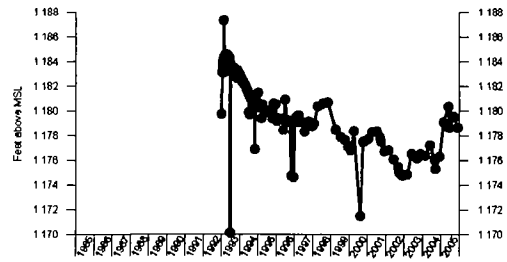
GW Elevation
DM722-240



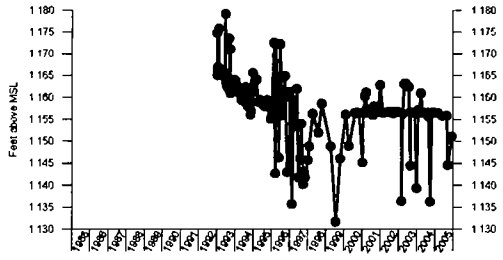
GW Elevation
DM722-280



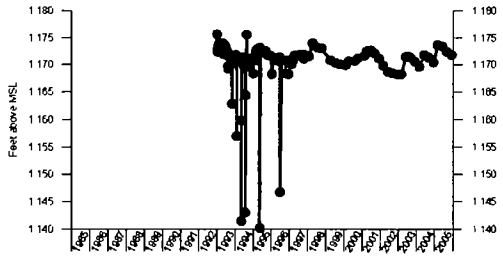
GW Elevation
DM723



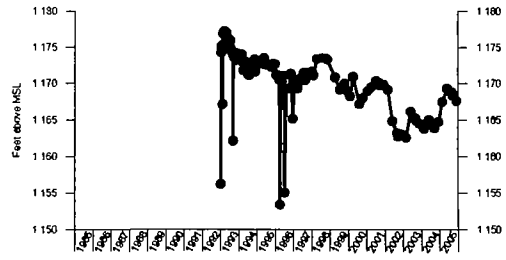
GW Elevation
DM724



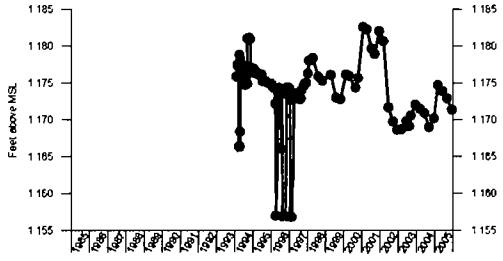
GW Elevation
DM725



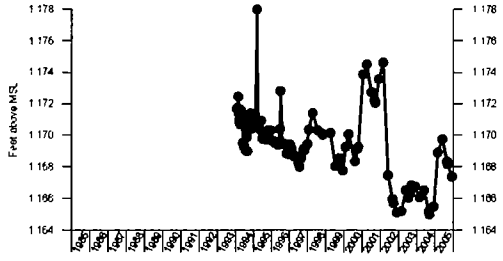
GW Elevation
DM726



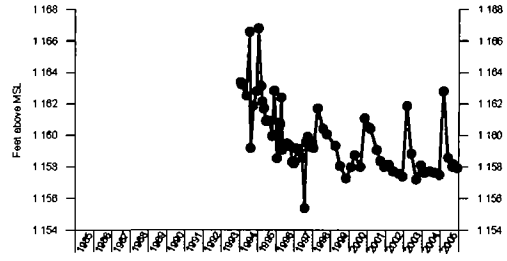
GW Elevation
DM727



GW Elevation
DM728



GW Elevation
DM729-050



EXPLANATION

- ● - Measured Value
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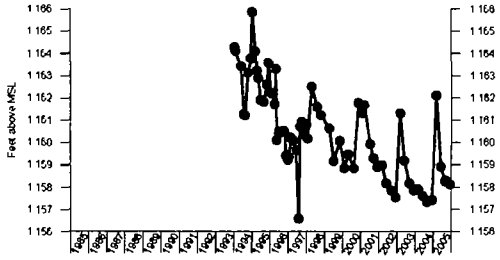
CLEAR CREEK ASSOCIATES

Project Name 52nd Street Superfund Site

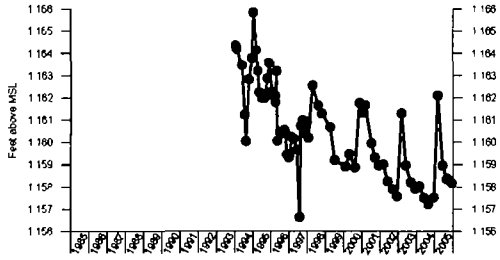
Job No 00000-000-000 | Date March 2006

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

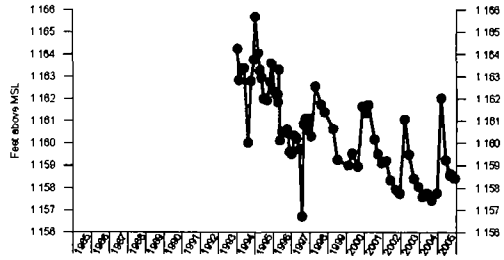
GW Elevation
DM729-145



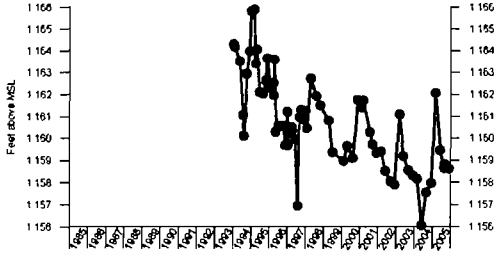
GW Elevation
DM729-195



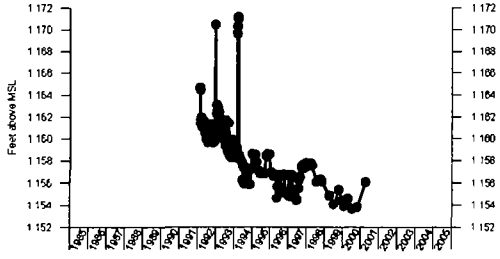
GW Elevation
DM729-255



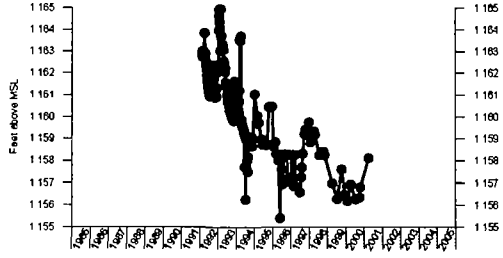
GW Elevation
DM729-285



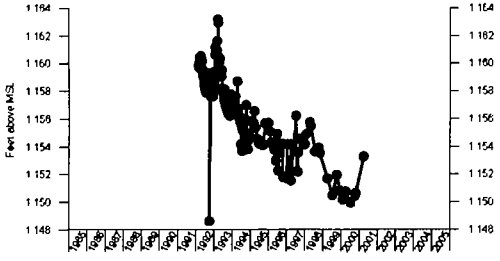
GW Elevation
DM730



GW Elevation
DM731

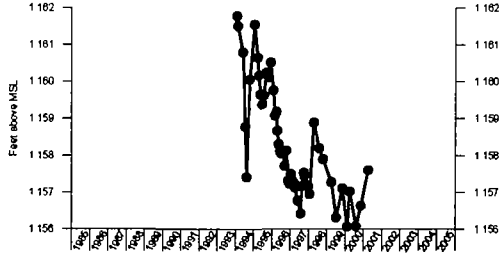


GW Elevation
DM732



GW Elevation
DM733

GW Elevation
DM734-045



EXPLANATION

- ● - Measured Value
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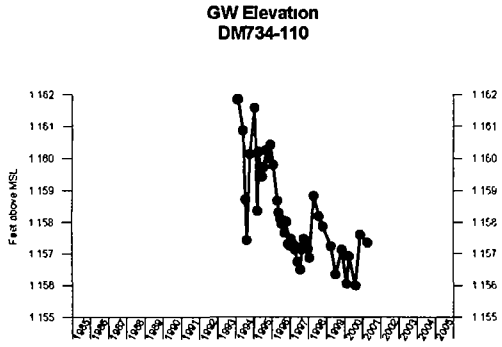
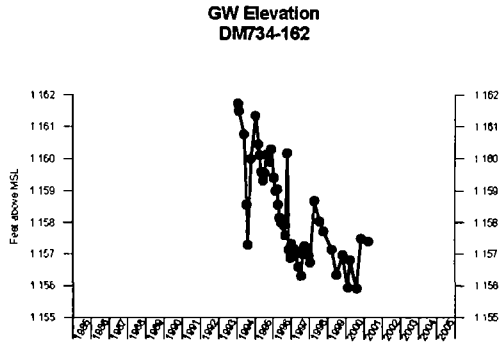
CLEAR CREEK ASSOCIATES

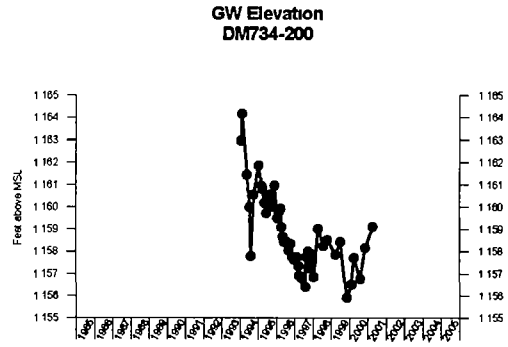
Project Name 52nd Street Superfund Site

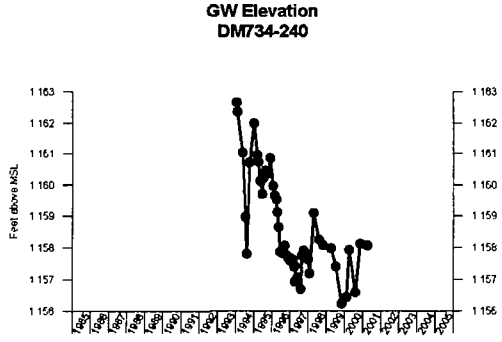
Job No 00000-000-000 | Date March 2006

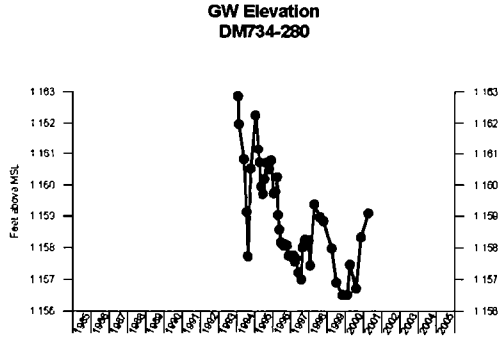
Time-Series Graphs
Selected Wells
52nd Street Superfund Site
Phoenix, Arizona

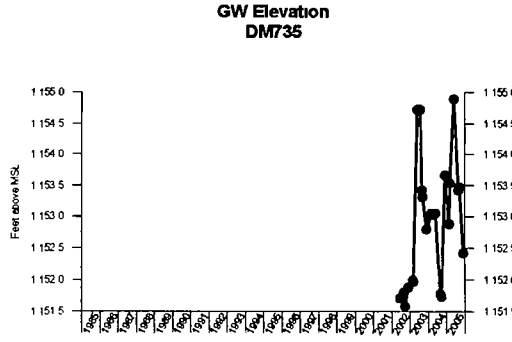


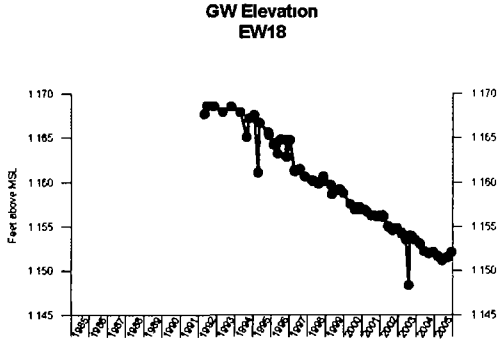


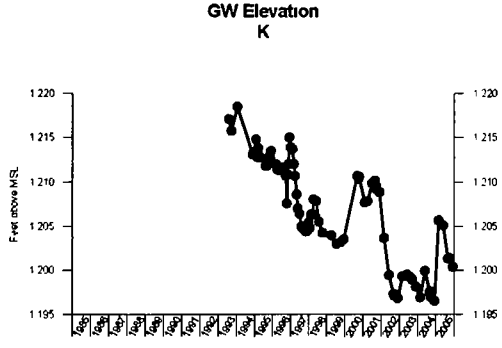


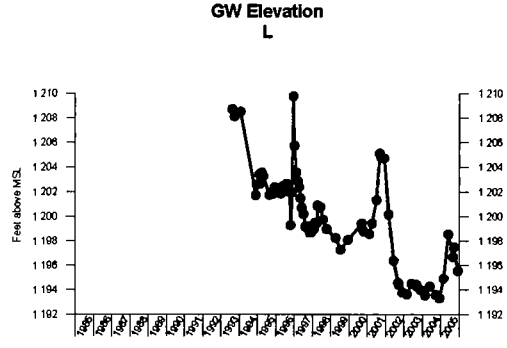












EXPLANATION

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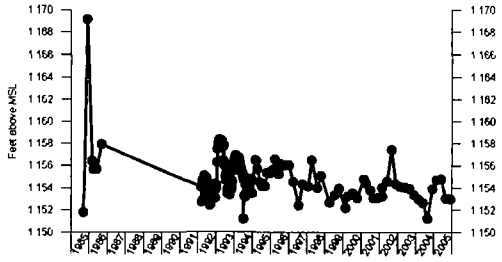
CLEAR CREEK ASSOCIATES

Project Name 52nd Street Superfund Site

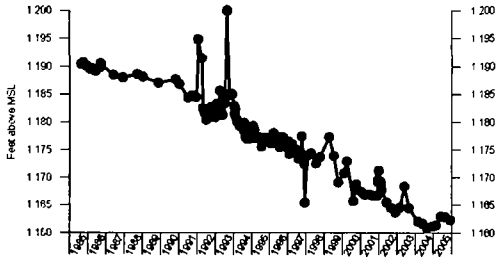
Job No 00000-000-000 | Date March 2006

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

GW Elevation
LANGMADE

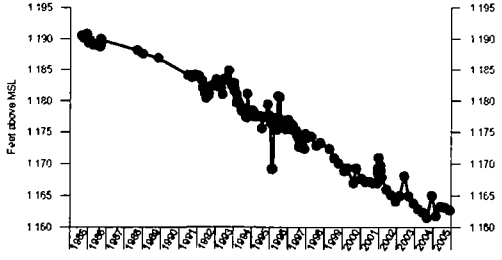


GW Elevation
MP03-B

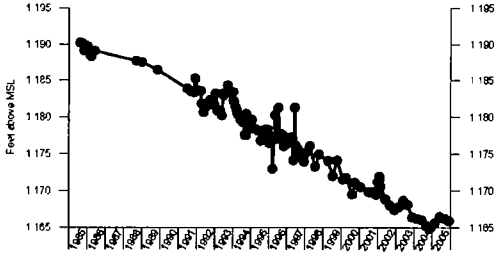


GW Elevation
MP03-D

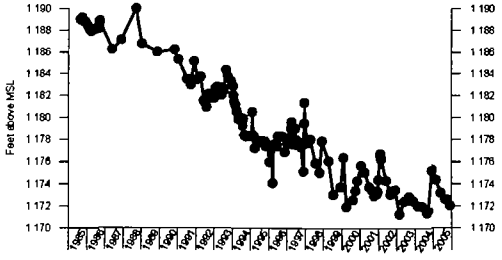
GW Elevation
MP09-B



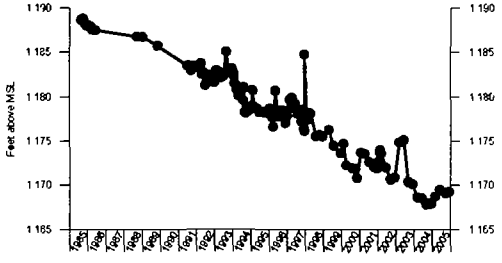
GW Elevation
MP09-D



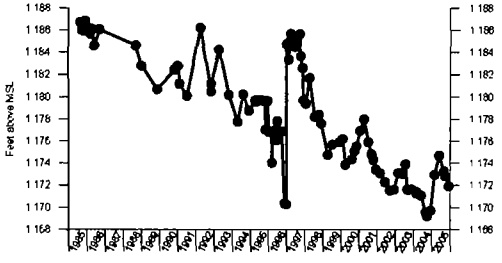
GW Elevation
MP11-B



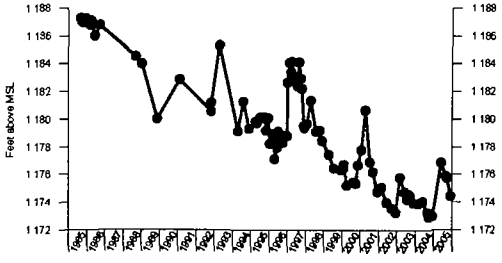
GW Elevation
MP11-D



GW Elevation
MP13-B



GW Elevation
MP13-D



EXPLANATION

- ● - Measured Value
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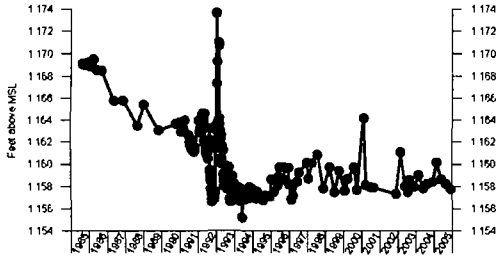
CLEAR CREEK ASSOCIATES

Project Name 52nd Street Superfund Site

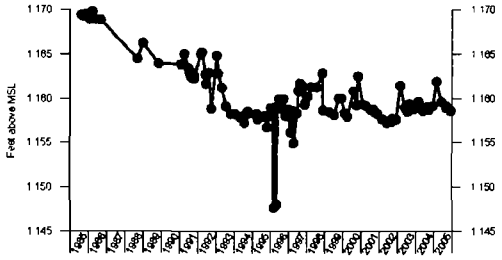
Job No 00000-000-000 | Date March 2006

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

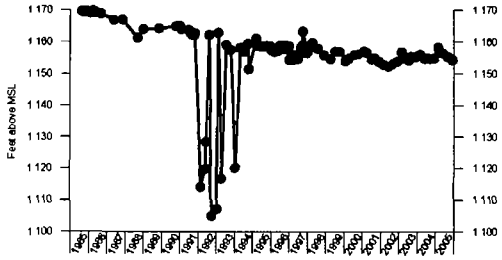
GW Elevation
MP16-A



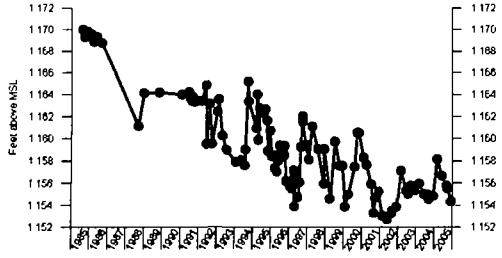
GW Elevation
MP16-B



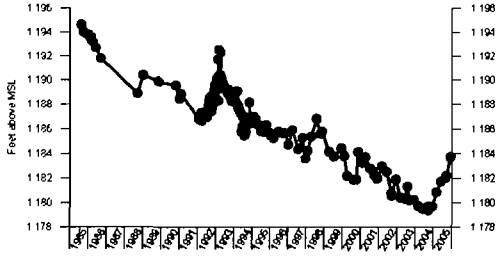
GW Elevation
MP16-C



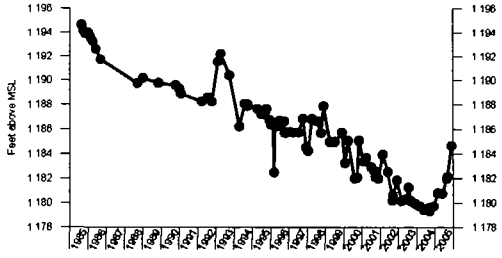
GW Elevation
MP16-D



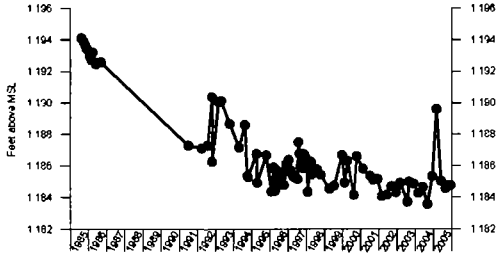
GW Elevation
MP20-A



GW Elevation
MP20-B



GW Elevation
MP25-A



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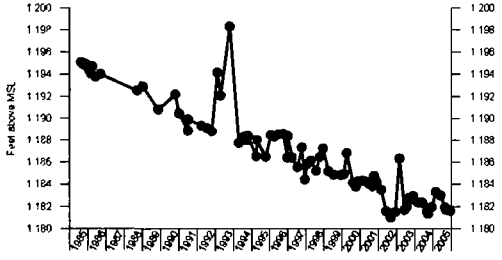
MP25-D



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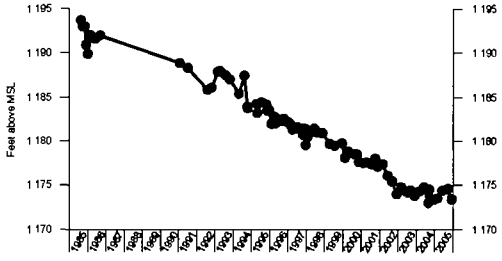


EXPLANATION

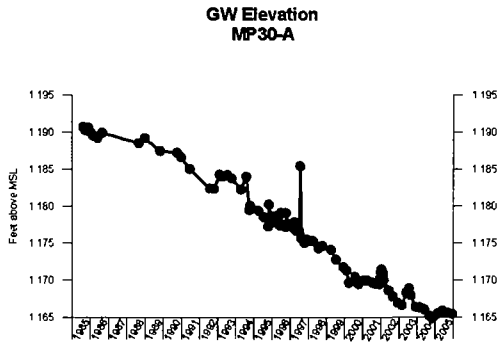
- ● - Measured Value
- o - Undetected (Displayed at RL)

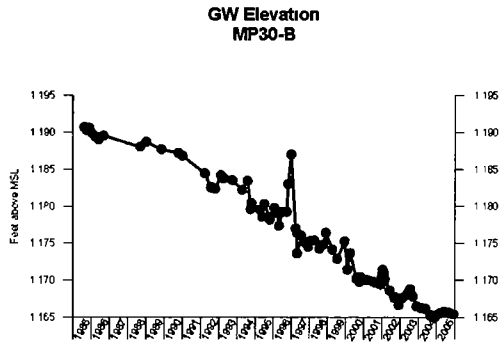
CLEAR CREEK ASSOCIATES

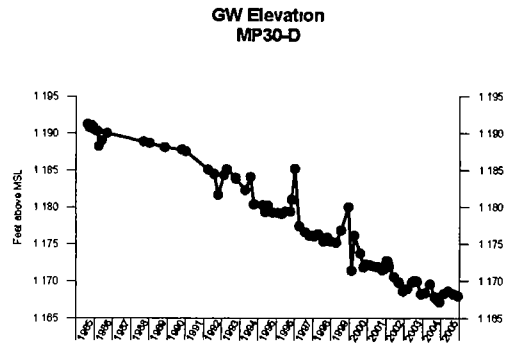
Project Name 52nd Street Superfund Site

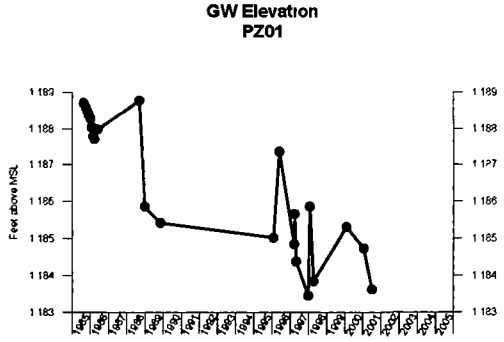
Job No 00000-000-000 | Date March 2006

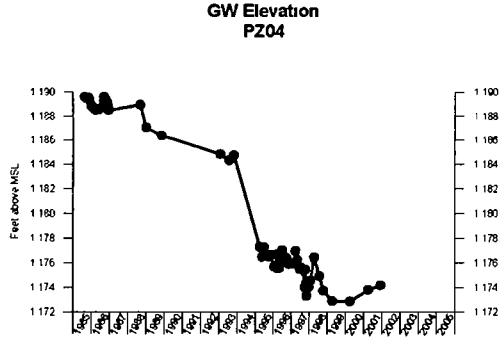
Time-Series Graphs
Selected Wells
52nd Street Superfund Site
Phoenix, Arizona

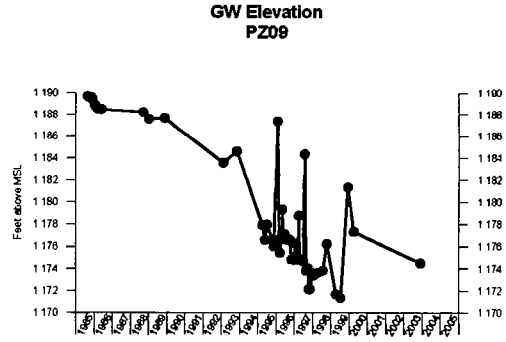












EXPLANATION

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

CLEAR CREEK ASSOCIATES

Project Name 52nd Street Superfund Site

Job No 00000-000-000 | Date March 2006

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

APPENDIX G

INTERVIEW DOCUMENTATION

INTERVIEW DOCUMENTATION FORM – OU1

The following is a list of individuals that were interviewed during the implementation of the five-year review conducted during the period from: 2001 to: 2005.

Name	Title/Position	Organization	Date
BOB ATKINSON	DIR. HEALTH & SAFETY	ON SEMICOND.	5/8/06
TOM SURIANO	REM. PROJECT MGR.	FREESCALE	5/10/06
NADIA HOLLAN	PROJ. MANAGER	EPA R9	5/10/06
MARTHA BRETTENBACH	CAB MEMBER	CAB	5/23/06
KAREN O'REGAN	ENV. MANAGER	CITY OF PHX	5/25/06
GEORGE RING, BOB FRANK & PHIL BURKE	HYDROGEOLOGISTS	CH2M HILL-HONEYWELL	5/30/06
LARRY RODRIGUEZ	SUPERVISOR	GPI	
LEO WILLSON	OPERATOR	GPI	
DAWN STOLTZFUS	ENV. PROG. SPECIALIST	CITY OF PHX	7/21/06

INTERVIEW QUESTIONNAIRE
MOTOROLA 52ND STREET SUPERFUND SITE, 5-YEAR REVIEW

INTERVIEWER(S): Kris Paschall (ADEQ) and Laura Malone (LFR)
DATE: May 10, 2006 **INTERVIEW METHOD:** In person at ADEQ

TOPIC: **SITE OPERATIONS, MAINTENANCE & MONITORING: SITE MANAGER, O&M MANAGER, SITE STAFF, & CONSULTANTS**

INTERVIEWEE: Tom Suriano **TITLE:** Remediation Program Manager
REPRESENTING: Freescale Semiconductor
ADDRESS: 2100 E Elliot Road **PHONE:** 480-413-5182
Tempe, Arizona 85284

1. **What is/was your understanding of the overall remedy (OU2) at the Site?**

   OU2 is a containment remedy that captures the contaminates in the vicinity of I-10 OU2 includes all the PRPs that have contributed

2. **What is your impression of the implemented remedy (OU2) at the Site?**

   OU2 is effective at achieving the objectives

3. **What is your responsibility at the site (i.e., Management, O&M, and Monitoring)?**

   Responsible for Freescale's involvement and coordinate with Honeywell on the OU2 remedy

4. **Please describe the O&M and Monitoring responsibilities of other staff and contractors directly under your supervision.**

   Freescale and Honeywell both use Conestoga Rovers for O&M, reporting and effectiveness reporting

5. **Describe any significant changes (or planned changes) to OU2 that are not addressed in the appropriate O&M manuals or plans.**

   Unilateral order from EPA to Consent order and negotiations on going

   Most recent monitoring wells are not part of the O&M plan and have been reported to ADEQ These will be incorporated

6. **Describe any O&M problems or difficulties, within the last 5-years, that may have affected the protectiveness or effectiveness of the remedy to meet remedial objectives.**

None regarding effectiveness and protectiveness Regional drought has decreased water levels and studies have been performed to show that remedy is still capturing

7. **Describe any activities implemented since the start-up of OU2 to optimize O&M.**

   Adjustments have been made to flow rates/pumping regime due to the lower water levels They are back to using all the wells

8. **Describe any activities implemented since start-up of OU2 to optimize on-site monitoring activities.**

   Due to the decrease in the water table – discussions needed on degree of capture Monitoring is more intensive than originally anticipated – more wells are being monitored more frequently Parameter list did not change

9. **Are the annual O&M costs for the past 5-years consistent with the original estimated cost? If significantly higher or lower, please describe why the annual cost varied from the estimated cost. (Note: Obtain written annual cost data, if available).**

   If the unanticipated costs (i e , additional wells, monitoring and evaluations), were backed out, then costs are consistent with expectations Oversight is fairly high at OU2 and this is an area that can be improved upon

   Written cost data will be provided

10. **Do you have any comments, suggestions, or recommendations to improve the site's operations, maintenance, or monitoring activities?**

    - Complete the O&M Consent Decree
    - Existing remedy is functioning fine
    - Advantageous for the overall remedy for PRP evaluation to be completed and any necessary corrective action to be implemented
    - Since last 5-year review – additional rules/regulations (i e ADWR and maybe City of Phoenix) have inhibited things
    - Freescale would like to opportunity to review and comment on the information provided by Honeywell and City of Phoenix

INTERVIEW QUESTIONNAIRE
MOTOROLA 52ND STREET SUPERFUND SITE, 5-YEAR REVIEW

INTERVIEWER(S): _____
DATE: _____; **INTERVIEW METHOD:** _____

TOPIC: **SITE OPERATIONS, MAINTENANCE & MONITORING: SITE MANAGER, O&M MANAGER, SITE STAFF, & CONSULTANTS**

INTERVIEWEE: Larry Rodriguez ; **TITLE:** Supervisor (602)
REPRESENTING: GpE / Free Scale
ADDRESS: 5005 E. McDowell Rd ; **PHONE:** 244-6317
Phoenix, AZ

1. What is/was your understanding of the overall remedy (OU1) at the Site?
To remove contaminates (voc's) from the upper Status of the water table. By creating a cone of depression with the extraction wells along the cross cut canal @ 46th St.

2. What is your impression of the implemented remedy (OU1) at the Site?
Since implemented 3 wells have been taken off line, To me, it means that the levels of contamination has dropped below the number set by the regulatory agency. So in the reports it shows separation of plumes.

3. What is your responsibility at the site (i.e , Management, O&M, Monitoring)?
Management - provide assistance to E2M personnel, and assure schedules and compliance of O&M's set up daily routines for the equipment, samples, and acts as a liaison to other parties involved with the project.

4. Please describe the O&M and Monitoring responsibilities of other staff and contractors directly under your supervision.
Lee - Operator maintains the logs and schedules regarding the Site, makes adjustments and repairs or refers units.
Gabe - is Lee's right hand man and back up. They both maintain the Site and operate the equipment

5. Describe any significant changes (or planned changes) to OU1 that are not addressed in the appropriate O&M manuals or plans.

The Vapor-Pac 10 is a temporary set up in its present location will it stay?
The addition of Sodium Hexametaphosate to the Air Stripper to control Scaling.

6. Describe any O&M problems or difficulties, within the last 5-years, that may have affected the protectiveness or effectiveness of the remedy to meet remedial objectives.

The drought lack of water especially in the three Northern most extraction wells E-305, 306, 307.
The hair line cracks found on the Vapor Phase Carbon Vessels which caused the shut down until the decision to change over from a closed loop system to a Single pass system was implemented.
The single pass system caused Scale to build up in the Liquid Phase carbon units. This caused a reduced flow to ROIDF (Transfer Tanks) and would shut down the pumps due to back up.

7. Describe any activities implemented since the start-up of OU1 to optimize O&M.

GPES Streamlining of the piping in the pump bays and single flow control valves.
GPES re-programing of the PLC 590 to allow real time monitoring of the system.
GPES re-motor of the 30 h.p. pumps and replacement with 15 H.p. pumps with trimmed impellers tuned to maximize flow & power.

8. Describe any activities implemented since start-up of OU1 to optimize on-site monitoring activities.

The use of modern technology such as paging systems on cell phones, pagers etc.

9. Are the annual O&M costs for the past 5-years consistent with the original estimated cost? If significantly higher or lower, please describe why the annual cost varied from the estimated cost. (Note: Obtain written annual cost data, if available).

Costs stay stable unless a carbon change out on the liquid phase units occurs or perhaps a de scaling is planned. Other Major cost would have to occur due to the wear and tear on the units and systems. As to the original costs they are quite a bit lower than the original estimate. However these could increase due to the new proposed Steam alone policy to be implemented. Annual cost data see Jason Weed @ GPI (p.M.)

10. Do you have any comments, suggestions, or recommendations to improve the site's operations, maintenance, or monitoring activities?

Allow more extraction from the courtyard area, possibly higher flows via hydro-fac methods. Plus re-injection of treated water. Utilize the 50th st. P2's to inject & form a water curtain and re-visit modeling and data with an open mind. Understand that this system has been in full operation (24/7) over ten years. Replace the current Computer System with a new set up including printers & phone communications paging set up. A wireless set up would eliminate the problem of being disconnected by the phone company or at the the various (junctions) connections @ On-Semi-Conductor. At present the connection in use runs via land line to the M.C.C. Bldg located @ 1001 N. 47th st.

INTERVIEW QUESTIONNAIRE
MOTOROLA 52ND STREET SUPERFUND SITE, 5-YEAR REVIEW

INTERVIEWER(S): _____
DATE: _____; **INTERVIEW METHOD:** _____

TOPIC: **SITE OPERATIONS, MAINTENANCE & MONITORING: SITE MANAGER, O&M MANAGER, SITE STAFF, & CONSULTANTS**

INTERVIEWEE: Leo Willson ; **TITLE:** Operator
REPRESENTING: GSI
ADDRESS: 2922 W Clarendon ; **PHONE:** 602 / 244-6217

1. What is/was your understanding of the overall remedy (OU1) at the Site?
   Obtain + Maintain a Capture Zone.
   Pump + Treat Well Water

2. What is your impression of the implemented remedy (OU1) at the Site?
   The Remedy is doing what it was designed for.

3. What is your responsibility at the site (i.e., Management, O&M, Monitoring)?
   Operate 40 Hrs a Week
   plus 24/7 on Call

4. Please describe the O&M and Monitoring responsibilities of other staff and contractors directly under your supervision.
   Pump Replacement, Clean up, Floor coating
   and General Maintenance.

5. Describe any significant changes (or planned changes) to OU1 that are not addressed in the appropriate O&M manuals or plans.
Vapor pac 10 in Place of the Vapor Phase units (AC601 + AC602)

Addition of Sodium Hexametaphosphate.

6. Describe any O&M problems or difficulties, within the last 5-years, that may have affected the protectiveness or effectiveness of the remedy to meet remedial objectives.
Drought

Vapor Phase units AC601 + AC602 Failure

Scaling in the air strippers and liquid carbon units.

7. Describe any activities implemented since the start-up of OU1 to optimize O&M
Trim the pump Impellers. Change out 30 Hp pump to 15 Hp pumps. Change piping to have on control valve on each series of pumps.

8. Describe any activities implemented since start-up of OU1 to optimize on-site monitoring activities.
Alarm paging System

9. Are the annual O&M costs for the past 5-years consistent with the original estimated cost? If significantly higher or lower, please describe why the annual cost varied from the estimated cost. (Note: Obtain written annual cost data, if available).

10 Do you have any comments, suggestions, or recommendations to improve the site's operations, maintenance, or monitoring activities?

Not At This time

INTERVIEW QUESTIONNAIRE
MOTOROLA 52ND STREET SUPERFUND SITE, 5-YEAR REVIEW

INTERVIEWER(S): Kris Paschall (ADEQ) and Laura Malone (LFR)
DATE: May 8, 2006 **INTERVIEW METHOD:** Telephone

TOPIC: **SITE OPERATIONS, MAINTENANCE & MONITORING: SITE MANAGER, O&M MANAGER, SITE STAFF, & CONSULTANTS**

INTERVIEWEE: Bob Atkinson **TITLE:** Director Health & Safety
REPRESENTING: On-Semiconductor
ADDRESS: **PHONE:**

1. **What is/was your understanding of the overall remedy (OU1) at the Site?**

   System pumps and treats the groundwater to remove TCE

2. **What is your impression of the implemented remedy (OU1) at the Site?**

   Seems to be going quite well Operation is well defined with a well defined team – doing a good job

3. **What is your responsibility at the site (i.e., Management, O&M, Monitoring)?**

   No responsibility at OU1 He gets involved with trucks/cranes, maintenance and access issues

4. **Please describe the O&M and Monitoring responsibilities of other staff and contractors directly under your supervision.**

   None

5. **Describe any significant changes (or planned changes) to OU1 that are not addressed in the appropriate O&M manuals or plans.**

   No Knowledge

6. **Describe any O&M problems or difficulties, within the last 5-years, that may have affected the protectiveness or effectiveness of the remedy to meet remedial objectives.**

   Not aware of any difficulties

7. **Describe any activities implemented since the start-up of OU1 to optimize O&M.**

   No knowledge

8. **Describe any activities implemented since start-up of OU1 to optimize on-site monitoring activities.**

   Not aware of any

9. **Are the annual O&M costs for the past 5-years consistent with the original estimated cost? If significantly higher or lower, please describe why the annual cost varied from the estimated cost. (Note: Obtain written annual cost data, if available).**

   No knowledge

10. **Do you have any comments, suggestions, or recommendations to improve the site's operations, maintenance, or monitoring activities?**

    No – operations are going quite well Good contractors on site

Additional information

- Treated water goes to DI plant and used in manufacturing wafer production
- Will need the use of the water in the future, if available
- On Semiconductor has a City of Phoenix permit that includes monthly monitoring
- On Semiconductor has a wastewater treatment plant – pH for neutralization
- OU1 supplies approximately 500-600 gallons of water per day – all treated water from OU1 goes to On Semiconductor

INTERVIEW QUESTIONNAIRE
MOTOROLA 52ND STREET SUPERFUND SITE, 5-YEAR REVIEW

INTERVIEWER(S): Laura Malone - LFR
DATE: May 25, 2006 **INTERVIEW METHOD:** Telephone

TOPIC: **STATE & LOCAL CONSIDERATION, STATE AGENCIES & LOCAL AUTHORITIES**

INTERVIEWEE: Donn Stoltzfus **TITLE:** Env Program Specialist
REPRESENTING: City of Phoenix
ADDRESS: 200 W Washington Street, 14th Floor **PHONE:** 602-256-5681
Phoenix, AZ 85003

1. **What is/was your understanding of implementation of the remedy (OU1) at the Site?**

   OU1 is a treatment system in the Courtyard area SVE was conducted in the parking lot to the south OU1 is a containment remedy

2. **What is your impression of the implemented remedy (OU1) at the Site?**

   Would like to see more investment in removing the DNAPL

3. **Have there been routine communications or activities conducted by your office related to the site?**

   No

4. **Have there been any complaints or other incidents related to the site requiring any response by your office?**

   No

5. **Are you aware of any current or planned changes to your regulations/ordinances, or current/future land development that may impact the operations or remedies that the site?**

   Aware of development plans The city is responsible for reviewing development plans He is not aware of any changes to regulations or ordinances that would impact OU1

6. **In your opinion, have appropriate O&M and monitoring activities been implemented for OU1, in accordance with approved manuals and plans?**

   Yes

7. **Are you aware of any community concerns regarding the site or its operation and administration?**

   Vapor intrusion is an issue with the City Not aware of any community concerns

8. **Do you feel that you were kept well informed about all phases of the projects?**

   Yes

9. **Do you have any comments, suggestions, or recommendations regarding the O&M and/or effectiveness of OU1 to be protective of human health and the environment?**

   Long term water resources are an issue with the city

INTERVIEW QUESTIONNAIRE
MOTOROLA 52ND STREET SUPERFUND SITE, 5-YEAR REVIEW

INTERVIEWER(S): Laura Malone - LFR
DATE: May 25, 2006 **INTERVIEW METHOD:** In person at ADEQ

TOPIC: **STATE & LOCAL CONSIDERATION, STATE AGENCIES & LOCAL AUTHORITIES**

INTERVIEWEE: Karen O'Regan **TITLE:** Env Programs Manager
REPRESENTING: City of Phoenix
ADDRESS: 200 W Washington Street, 14th Floor **PHONE:** 602-256-5654
Phoenix, AZ 85003

1. **What is/was your understanding of implementation of the remedy (OU1) at the Site?**

   OU1 is a pump and treat system for the groundwater Treated water is sold to On Semiconductor for use the plant OU1 is dewatering the aquifer which is a concern for the City of Phoenix

2. **What is your impression of the implemented remedy (OU1) at the Site?**

   OU1 has been fairly effective at containing the contamination

3. **Have there been routine communications or activities conducted by your office related to the site?**

   City of Phoenix has been copied on reports City of Phoenix very interested in the TI Waiver

4. **Have there been any complaints or other incidents related to the site requiring any response by your office?**

   Other than the taking the system off line a few years ago due to the issues with the GAC, there haven't been any complaints related to OU1 Air Quality is a big issue for the City of Phoenix

5. **Are you aware of any current or planned changes to your regulations/ordinances, or current/future land development that may impact the operations or remedies that the site?**

   Typical redevelopment of the Site Knows that a potion of the Motorola site has been purchased Unsure if there are any new regulations/ordinances that would affect OU1

6. **In your opinion, have appropriate O&M and monitoring activities been implemented for OU1, in accordance with approved manuals and plans?**

   Not aware any issues outside of the plans Would like to get a better handle on the soil issues and what's clean and what's not

7. **Are you aware of any community concerns regarding the site or its operation and administration?**

   Vapor intrusion is an issue with the City, EPA and the community There aren't any standards and the guidance is controversial Would like to get appropriate guidance on how to handle this issue

8. **Do you feel that you were kept well informed about all phases of the projects?**

   Yes

9. **Do you have any comments, suggestions, or recommendations regarding the O&M and/or effectiveness of OU1 to be protective of human health and the environment?**

   Top 3 issues for City of Phoenix include
   - Vapor intrusion pathway
   - OU3
   - Water levels and restoration of the aquifer

INTERVIEW QUESTIONNAIRE
MOTOROLA 52ND STREET SUPERFUND SITE, 5-YEAR REVIEW

INTERVIEWER(S): Laura Malone (LFR)
DATE: May 30, 2006 **INTERVIEW METHOD:** In person at ADEQ

TOPIC: **SITE BACKGROUND INFORMATION, NEIGHBORS & CAB REPRESENTATIVE**

INTERVIEWEE: George Ring, Bob Frank and Phil Burke **TITLE:**
REPRESENTING: CH2MHill on behalf of Honeywell
ADDRESS: 2625 South Plaza Drive, Suite 300 **PHONE:** 480-966-8188
Tempe, Arizona 85285

1. **What is/was your understanding of the overall remedy (OU1) at the Site?**

OU1 is a pump and treat system designed to contain contamination from the Motorola 52nd Street facility now On Semiconductor Freescale is responsible for running the system System has been operating since 1986 and 1999 onsite and 1993 offsite Basically have been following the history of operations since 1997 and review of OU1 related documents since about 2002

2. **What is your impression of the completed remedy (OU1) at the Site?**

As in the last 5-year review, impression continues to be that the system is probably containing most, if not all of the contamination in the alluvium, but the data showing that the system was or is completely capturing the contamination in the bedrock really hasn't been provided Further analysis of the monitoring well network downgradient of the old crosscut canal system and in between the old cross cut canal extraction wells causes concern over the effectiveness of the system to contain contamination escaping OU1 Continued and supplemental monitoring of existing groundwater monitoring wells on the property, the 52nd Street property would be helpful in evaluating the system Because some of the very important monitoring wells in the courtyard area are not longer monitored, it's not clear as to the magnitude of the contamination for this site that needs to be cleaned up

In looking at the completed remedy, also under the impression that it's an extraction system for containment As far as taking a look at the actual remedy for contamination on-site, not really looking at that particular component nor is there a lot of information relating to on-site Mostly looking at the containment/extraction system itself

3. **Please describe your involvement or participation at the Site (if any).**

CH2M Hill and Hargis & Associates represent Honeywell Honeywell is a PRP in OU2 and the Honeywell facility is located downgradient from the former Motorola facility As a downgradient PRP, Honeywell is interested in the effective capture of contamination emanating from the 52nd Street facility The effectiveness of OU1 has major implications on the future operations of OU2

4. **Do your feel that you were kept well informed about all phases of the project?**

Initially, Honeywell was kept fairly well informed of the activities at OU1 and at one time was on the distribution list for OU1 documents However, Honeywell hasn't been as well informed on document submittals from Freescale over the last few years They have discussed this with Kris Paschall and the concern of the submittal of documents and how quickly they are turned over to the filing index

5. **What effects have the operation of OU1 had on you (or the surrounding community)?**

Operation of OU1 has kept high levels of VOC contamination from migrating downgradient to the Honeywell facility and OU2 The effectiveness has a great impact on the future operation and longevity of OU2 It's continued operation has an effect on any necessary hot spot treatment located downgradient of the facility, the hot spot being the areas on the east side of the bedrock rise and downgradient of the extraction system Based on recent monitoring information it's assumed that operation of OU1 will continue to have an effect on reducing the concentrations to the Honeywell facility from the 52nd Street facility, in addition to the contamination emanating from the 52nd Street facility that migrates onto the Honeywell facility

6. **During the past 5-years that OU1 has been in operation, were you aware (or informed) of any events, incidents, problems or activities that affected you (or the surrounding community)?**

Yes, CAB meeting in 2003, Tom Suriano from Freescale reported that the OU1 system was taken offline because of hairline cracks in the vapor phase carbon units Presentation made at the CAB meeting to request the vapor phase carbon be removed since the emissions were below the standards and ultimately Freescale did not do this based on the negative comments received from the CAB and community members Honeywell obtains information from the CAB meetings Effectiveness summaries are obtained by Honeywell indirectly since Honeywell is not on the cc list

7. **Are you aware of any other community concerns regarding the site, the operation of OU1, and administration that have not been resolved?**

Most recent concern is the vapor intrusion risk and they understand that a work plan has been submitted Also concerns over the dewatering of the alluvium and how that impacts the capture in the bedrock The only other concern they know of is the northern extent of the plume with some recent increases in concentrations Issue of characterization on the northern side

8. **Do you have any comment, suggestions, or recommendations regarding the effectiveness of OU1 in protecting human health or the environment?**

Honeywell plans to submit additional details in writing In summary, some of Honeywell's concerns over the effectiveness of OU1

- Current monitoring well network to show hydraulic capture is not adequate Some additional well proposed, one well proposed west of the extraction system, one well propose din between two of the extraction wells and one well to address the northern extent Honeywell does not believe these are sufficient for the purposes they are proposed for
- In looking at the historic data, the wells designed to address the downgradient extent and the west of the capture zone is too far to the north to address where the high concentrations are migrating
- In showing horizontal capture, they use the flownet method, which is an appropriate method, but they also use the extraction well water levels Issues with corrected data for pumped water levels, which is not the way to do things Honeywell recommended in the last 5-year review that piezometers be installed next to the extraction wells This recommendation was never implemented
- Well efficiency calculations used to correct the water levels is not applied correctly
- Is the dewatering the alluvium affecting the capture in the bedrock? Existing monitoring network inadequate to address this issue
- Declining water levels over time are affecting flow rates, potential capture zone, and the extent and degree of contamination and the overall system operation
- Even though it has been recognized that the water levels have been declining, the analysis hasn't been updated to take this information into affect and to look at the implications on the current system and the long term implications This is an important piece missing from their analysis
- The vertical extent delineation is a cause for concern – DNAPL out of one of the wells on their site and one well (DM601) its deepest port averages 80,000 – 100,000 ppm TCE Honeywell does not believe that the courtyard has complete vertical delineation
- Monitoring wells with known elevated concentrations in the source area that are not sampled anymore nor are those concentrations represented on the figures in the report Gives the appearance that the remedial system is more effective that it actually is and presents a wrong picture Extent of contamination seems to be

ignored when the discussion only focuses on the capture of the system Gives the idea that the remedy is successful when cleaning up the site when the remedy has nothing to do with cleaning up the site, it only has to do with capture From a protectiveness perspective if we just solely deal with the extraction system then everything looks like the site is being cleaned up, but in reality since they are dropping wells from the monitoring program that actually show the extent of contamination, it makes things look very different than if those wells were included It's a perception problem and the response has always been we don't need to talk about the extent of contamination if we're dealing with the extraction and containment system Honeywell believes from a protectiveness standpoint that people realize what is upgradient at the site and what is being captured and what is not

- Recommendation from the last 5-year review was that one well (MP3) be sampled annually, but the response has been that there is not need to sample this well because the concentrations were already known or predetermined The concentrations from this well are presented on any figures which paints a different picture of the site
- Regarding the Remedial Alternative Analysis Report – issue with the model in that there is a consistent bias with the water levels being too low This exaggerates the capture zone

9. Can you recommend any additional community members that we should talk to?

No

Honeywell

101 Columbia Turnpike
Meyer-3
Morristown, NJ 07962
(973) 455-4279
(973) 455-3082 Fax

June 12, 2006

Sent via Electronic and Postal Mail

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14201 N. 87th Street
Suite 135
Scottsdale, AZ 85260-3683

Subject. Supplemental Information to Honeywell's Five-Year Review Interview on Operable Unit 1

Dear Ms. Malone:

On May 30, 2006, representatives for Honeywell International Inc. (Honeywell) were interviewed as part of the third 5-year review of Operable Unit 1 (OU1). The attached document written by our consultants supplements the responses provided during the interview, and offers some additional details regarding Honeywell's concerns of the effectiveness of the OU1 system

As always, any questions or clarification can be directed through phone or email

Sincerely,

Troy J. Meyer
Honeywell – Health, Safety, Environment and Remediation
Remediation Portfolio Director

c: Kristina Paschall, ADEQ
Phil Burke, CH2M HILL

Supplemental Information to Honeywell's Operable Unit 1 Five-Year Review Interview

Comments, Suggestions, or Recommendations Regarding the Effectiveness of OU1 in Protecting Human Health or the Environment

1. **The current monitoring well network to show hydraulic capture is not adequate.**

   As indicated during the second 5-year review of OU1 (September 2001), Honeywell does not believe that the monitoring well network downgradient of the Old Cross-Cut Canal (OCC) extraction well field is adequate to determine hydraulic capture. ADEQ noted this deficiency as well in the *Second Five-Year Review Report, Operable Unit No. 1* (Harding ESE and ADEQ, 2001), reporting that there are no monitoring wells immediately downgradient and outside the capture zone to confirm plume containment and the location of the estimated capture zone. As indicated on Figure 2.2a of the *OU1 Effectiveness Report, 2005 Operations* (Clear Creek Associates, 2006), the distance from monitoring wells DM-602, DM-603, DM-604, DM-605, and DM-312 (all within the estimated hydraulic capture zone) to the next downgradient monitoring wells ranges from approximately 1,700 feet to approximately 2,700 feet. These downgradient monitoring wells are also located over 1,000 feet from the estimated capture zone. Given the importance of this area, Honeywell feels that the distance between monitoring points is too great and puts too much emphasis on professional judgement and estimating the lateral change in water levels to adequately determine the effectiveness of hydraulic capture in both alluvium and bedrock. While Honeywell acknowledges that complete dewatering of the alluvium indicates "capture" of the dissolved-phase contaminants in the alluvium, there are no data points to determine hydraulic control or evaluate VOC concentrations in the area immediately downgradient of the estimated capture zone.

   In addition to the lateral distance between monitoring wells at and downgradient of the OCC, given the nature of the dissolved-phase plume in this area, Honeywell feels that the spacing between the individual downgradient monitoring wells is too great to determine the effectiveness of the OU1 system. For example, as illustrated on Figure 2.2a of the *OU1 Effectiveness Report, 2005 Operations* (Clear Creek Associates, 2006), downgradient monitoring wells DM-119 and DM-120 are spaced approximately 2,000 feet apart and monitoring wells DM-120 and DM-502 are spaced approximately 1,200 feet apart The wide spacings between these monitoring wells could allow elevated concentrations of VOCs to migrate undetected into OU2.

   Therefore, Honeywell believes that to properly evaluate the effectiveness of OU1 for containing elevated levels of VOCs east of the OCC, additional downgradient monitoring wells are needed in the area roughly east of 44th Street and between McDowell Road to the north and SR202 (Red Mountain Freeway) to the south. Honeywell understands that Freescale has proposed one additional monitoring well in this area based on comments provided in 2001, however this one monitoring well, which to Honeywell's knowledge has not been installed as of the date of this letter, is not

sufficient to adequately address the issue of hydraulic capture downgradient of the OCC.

2. **The number of additional monitoring wells proposed to be installed is not sufficient for their intended purposes.**

   As stated above, based on comments provided in 2001 during the second 5-year review, Freescale proposed to install one monitoring well downgradient of the OCC to aid in the OU1 effectiveness evaluation. In addition, Freescale proposed to install one monitoring well between extraction wells DM-308 and DM-309 to help evaluate the accuracy of their calculation to correct pumped water levels for well efficiency.

   Honeywell does not believe that the installation of one monitoring well in an area approximately 150 acres in size is adequate to address the issue of hydraulic capture downgradient of the OCC. As stated above, additional monitoring wells are necessary to determine the effectiveness of OU1 at hydraulically containing elevated VOC concentrations east of the OCC, and addressing the potential for elevated concentrations to be located immediately downgradient of the estimated capture zone.

   In its previous comments on the effectiveness of OU1 in 2001, Honeywell noted that Freescale used water levels from the extraction wells to determine hydraulic capture, and recommended that additional monitoring wells be placed between the extraction wells to determine actual drawdown in the aquifer. Freescale has since revised their approach by correcting the pumped water levels for well efficiency. While the use of water level contour maps and flow nets is appropriate to evaluate hydraulic capture, because pumped water levels are used (corrected or not), there is excessive and unnecessary uncertainty with the groundwater contours around the extraction wells. Honeywell maintains that the correct approach is to install piezometers between each extraction well to determine the true drawdown outside the effect of wellbore losses on the water levels. Freescale has proposed one monitoring well, located between extraction wells DM-308 and DM-309 to evaluate the accuracy of their pumped water level correction. While Honeywell believes this may be a useful monitoring point, installing one monitoring point between the extraction wells will not adequately address the problem and uncertainty with correcting water levels for well efficiency. As with the proposed downgradient monitoring well, to Honeywell's knowledge this monitoring well has not been installed as of the date of this letter.

3. **The proposed location of the single downgradient well is too far to the north to address potential high concentrations west of the estimated capture zone.**

   As described above, Honeywell feels that one additional monitoring well downgradient of the OCC is not adequate to address the uncertainty of hydraulic capture in this area. In addition, based on historic water quality data from existing and abandoned monitoring wells in the area, the proposed location of this downgradient monitoring well is too far to the north to address the potential high concentrations of VOCs west of the estimated capture zone. Historically, TCE concentrations exceeding 10,000 µg/L

were detected in alluvium in abandoned monitoring well MP-49B (21,000 µg/L - 10/18/83), in bedrock in existing monitoring well DM-603-170 (22,000 µg/L - 12/5/96) and in bedrock/alluvium in the inactive Turnage monitoring well (12,000 µg/L - 3/1/84). Concentrations of TCE were also detected above 4,000 µg/L in alluvium in abandoned monitoring well DM-106-101 (4,910 – 5/8/85). These existing and abandoned monitoring wells form a line oriented approximately 50 degrees south of west (220 degree azimuth). If elevated concentrations were historically or are currently located downgradient along this line, then the proposed location of the new monitoring well near 44th Street and E. Willetta is located over 1,000 feet too far to the north to address this contamination A monitoring well located along 44th Street just north of SR202 (Red Mountain Freeway) may provide more useful information regarding the potential for elevated concentrations downgradient of the estimated hydraulic capture zone. As stated above though, one additional monitoring well is not adequate to address the uncertainty of hydraulic capture in this area.

4. **Well efficiency calculation to "correct" pumped water levels is not correctly applied; efficiency values have not changed despite varying pumping rates.**

Following comments submitted during the second five-year review of OU1, Freescale began correcting the pumped water levels for well efficiency when creating their flow nets to determine hydraulic capture. Honeywell's concerns regarding the use of pumped water levels, corrected or not, have been documented previously and summarized above. While Honeywell is concerned with the use of a calculated water level based on a calculated well efficiency to determined hydraulic capture of elevated levels of VOCs, we would like to point out that based on at least the 2004 and 2005 OU1 Effectiveness Reports, the efficiency calculation is not being applied correctly.

Simply put, a well's efficiency is directly related to its pumping rate. Freescale stated that the efficiencies were calculated during well testing conducted in January 2002 for a range of pumping rates (Clear Creek Associates, 2006). However while the extraction well pumping rates have changed over time, the associated wells' efficiency has not changed. For example, based on Table 2.2 in both the 2004 and 2005 OU1 Effectiveness Reports (Clear Creek Associates 2005 and 2006), the extraction rates changed, but the well efficiencies remained the same (Table 1). Because a well's efficiency decreases with an increase in extraction rate, the efficiency of extraction wells DM-307, DM-308, DM-309, and DM-310 all would have decreased, resulting in a different depiction of water levels contours, and perhaps a different conclusion regarding the effectiveness of OU1. In fact, the extraction rates from wells DM-309 and DM-310 have increased dramatically (from 58 to 92 gpm, and from 49 to 78 gpm, respectively) since the well efficiencies were calculated in 2002, resulting in much lower efficiencies than those used for the current water level correction and assessment of effectiveness.

TABLE 1
OU1 OCC Extraction Well Efficiencies and Extraction Rates, 2004 and 2005 Operations
Source Table 2 2, Clear Creek, 2005 and Clear Creek, 2006

	2004 Operations		2005 Operations	
Well	Extraction Rate (gpm)	Well Efficiency (%)	Extraction Rate (gpm)	Well Efficiency (%)
DM-305	11	82.0	10	82.0
DM-306	4	78.0	3	78.0
DM-307	30	53.0	39	53.0
DM-308	30	85.0	34	85.0
DM-309	63	66.0	92	66.0
DM-310	61	67.0	78	67 0

Honeywell still believes that to conclusively address the issue of hydraulic capture around the extraction well network in the future, additional monitoring points should be installed between or adjacent to the extraction wells. However, to address the issue of hydraulic capture with historic and current data, the well efficiencies used to correct pumped well water levels need to be adjusted accordingly based on the associated well's extraction rate.

5. **Dewatering the alluvium decreases the extraction rate and may decrease the extent of vertical capture in the bedrock. The existing monitoring well network cannot address the extent to which this has occurred.**

Honeywell has concerns regarding the effectiveness of OU1 in hydraulically capturing contamination in the bedrock as the alluvium becomes dewatered. Freescale has indicated that pressure changes in the alluvium are transmitted to great depth in the bedrock, causing groundwater in fractures to migrate upwards and be captured by the extraction wells. However, as the alluvium becomes dewatered, less and less water can be supplied by the alluvium, thus decreasing the pressure gradient and potentially causing less of an effect in the bedrock. This concern regarding dewatering of the alluvial aquifer reducing the effectiveness of capture in the bedrock was shared by ADEQ in the *Second Five-Year Review Report, Operable Unit No. 1* (Harding ESE and ADEQ, 2001).

Furthermore, the current monitoring well network is not adequate to evaluate the effect of alluvial aquifer dewatering on deep vertical capture because contamination is known to exist below the deepest monitoring points both in the Courtyard (source) area and between the Courtyard and the OCC.

Other Issues and Concerns Assocated with Operable Unit 1

Related to the operation of OU1, Honeywell has additional concerns that should be considered by ADEQ during the five-year review process.

- Existing monitoring wells located in the Courtyard (source area) with known elevated VOC concentrations are no longer sampled, and their representative concentrations are not presented on contaminant concentration figures. This gives the appearance that the remedial system has been more effective in cleaning up onsite contamination than it actually has been.

  ADEQ recommended that source area monitoring well MP-03 be sampled annually, however this has not been done. Freescale indicated that it does not feel that this well should be sampled because they continue to remove free product (DNAPL) from the well, and thus the results are predetermined. While it is true that DNAPL is consistently removed from MP-03D (deepest sampling port), and the water quality results would likely be very high, the fact that these levels of contamination are not presented on concentration figures presents a misleading and inaccurate depiction of the true magnitude of contamination beneath the site to the public.

- Given the consistent results on the order of 100,000 µg/L TCE in monitoring well DM-601-200 (deepest sampling port), which is located on the western boundary of the 52nd Street Facility, and the historical results on the order of 1,000,000 µg/L in monitoring well MP-03D (deepest sampling port, contains DNAPL), Freescale's plan to abandon deep monitoring wells in the Courtyard (source area) is not appropriate at this time. These wells should instead be considered for water quality sampling to try to address the issue of elevated concentrations detected in deep bedrock ports.

- Freescale presented their proposed area for a Technical Impracticability (TI) Waiver in *Addendum to Groundwater Remedial Alternatives Analysis Report, Evaluation of Technical Impracticability of Groundwater Restoration at the Motorola 52nd Street OU1, Phoenix, Arizona* (Figure 5.1) (Geotrans, 2005a) The proposed area for the TI Waiver was described as a geographic area of approximately 536 acres, including both the alluvial and bedrock aquifers, from Palm Lane on the north, the Red Mountain Freeway on the south, 52nd Street on the east, and 44th Street on the west. Honeywell acknowledges that specific comments on the TI Waiver should be reserved for the waiver application process, however, presentation of the areal extent to which the TI Waiver would be proposed does warrant a comment at this time.

  A review of the example sites used by Freescale in their evaluation indicated that while these example sites have contamination beyond their source zones similar to the OU1 area, the TI Waivers were generally only applied to the source zones. Therefore, based on other sites where TI Waivers have been granted, the TI Waiver area proposed by Freescale is too large and should be limited to the source area on the 52nd Street Facility.

- A quick review of Freescale's OU1 model presented in the Groundwater Remedial Alternative Analysis Report (Geotrans, 2005b) indicated a consistent bias towards predicted water levels that are too low (about 10 feet) in the alluvium. This has an effect of exaggerating the hydraulic capture zone due to an increased number of dry cells. The model is a key element in documenting horizontal and vertical containment, and any

systematic bias in the model should either be corrected or accounted for in the use of the results.

References

Clear Creek Associates, 2005. Operable Unit No. 1 Effectiveness Report 2004 Operations, 52nd Street Superfund Site, and OU1 System Evaluation for Motorola Inc., March 31.

Clear Creek Associates, 2006. Operable Unit No. 1 Effectiveness Report 2005 Operations, 52nd Street Superfund Site, and OU1 System Evaluation for Motorola Inc., March 31.

Geotrans, Inc., 2005a. Addendum to Groundwater Remedial Alternatives Analysis Report, Evaluation of Technical Impracticability of Groundwater Restoration at the Motorola 52nd Street OU1, Phoenix, Arizona, December.

_____, 2005b Groundwater Remedial Alternatives Analysis, Motorola 52nd Street OU1,Phoenix, Arizona, September 30.

Harding ESE and ADEQ, 2001. Second Five-Year Review Report, Operable Unit No. 1, Motorola 52nd Street Superfund Site, Phoenix, Arizona, September 27.

INTERVIEW QUESTIONNAIRE
MOTOROLA 52ND STREET SUPERFUND SITE, 5-YEAR REVIEW

INTERVIEWER(S): Laura Malone (LFR)
DATE: May 23, 2006 **INTERVIEW METHOD:** Via phone

TOPIC: **SITE BACKGROUND INFORMATION, NEIGHBORS & CAB REPRESENTATIVE**

INTERVIEWEE: Martha Breitenbach **TITLE:** Citizen and CAB member
REPRESENTING: _____
ADDRESS: _____; **PHONE:**_____
_____

1. **What is/was your understanding of the overall remedy (OU1) at the Site?**

   Meant to pump the groundwater, treat the water and was told the treated water is disposed of in a legal manner Understands that the water is sold back to On Semiconductor and that it is "super clean"

2. **What is your impression of the completed remedy (OU1) at the Site?**

   Calls it the "Dragon" and that it's defined by wells Looking at recent data the dragon is growing She is extremely upset and disappointed and that is it unforgiveable that the agencies haven't been more aggressive in getting things cleaned up Too much time has passed to be in this shape Doesn't understand why the soil hasn't been excavated to stop the source

3. **Please describe your involvement or participation at the Site (if any).**

   CAB Member and participates in meetings

4. **Do your feel that you were kept well informed about all phases of the project?**

   Came into the process late (last 4-5 years) Certainly would not have signed off on OU1 Concerned that the water table is declining and that the sludge/slime in the bedrock is contaminated Since she has been involved, she has been kept well informed

5. **What effects have the operation of OU1 had on you (or the surrounding community)?**

   Not much positive affect when you look at the dimensions of the plume Not seeing much done about the plume growing.

6. **During the past 5-years that OU1 has been in operation, were you aware (or informed) of any events, incidents, problems or activities that affected you (or the surrounding community)?**

Have only been involved in the last 5 years Knows that Motorola shut down the plant which was a galvanizer of the community

Soil gas testing was supposed to be done within 6 months and it still hasn't been done – Status?

7. **Are you aware of any other community concerns regarding the site, the operation of OU1, and administration that have not been resolved?**

Doesn't talk to other people in the community – when she does they yawn Wishes more people would take interest

8. **Do you have any comment, suggestions, or recommendations regarding the effectiveness of OU1 in protecting human health or the environment?**

More aggressive in getting this cleaned up Would like to see the groundwater pumped back into the ground, since we're in a drought rather than it being sold to On-Semiconductor

9. **Can you recommend any additional community members that we should talk to?**

- Other CAB Members
- Rena – head of community watch – no contact information
- Mary
- Understands that everyone received the flyer about the 5-year review

INTERVIEW QUESTIONNAIRE
MOTOROLA 52ND STREET SUPERFUND SITE, 5-YEAR REVIEW

INTERVIEWER(S): Laura Malone - LFR
DATE: May 10, 2006 **INTERVIEW METHOD:** In person at ADEQ

TOPIC: **STATE & LOCAL CONSIDERATION, STATE AGENCIES & LOCAL AUTHORITIES**

INTERVIEWEE: Nadia Hollan **TITLE:** Project Manager
REPRESENTING: Environmental Protection Agency (EPA)
ADDRESS: USEPA Region IX **PHONE:** 415-972-3187
75 Hawthorne Street, Mail Code SFD-2
San Francisco, CA 94105

1. **What is/was your understanding of implementation of the remedy (OU2) at the Site?**

   EPA is lead for OU2 and is overseeing the implementation and operations There is a unilateral Admin order with Honeywell and Freescale OU2 is an interim groundwater containment remedy

2. **What is your impression of the implemented remedy (OU2) at the Site?**

   OU2 has been doing was intended to do There are questions on capture which need to be resolved and have resulted from
   - Groundwater levels have declined which has decreased pumping – rate of cleanup is slower
   - South side of system with unknown areas of contamination

   Currently evaluation the capture within OU2 on the south side of the system OU2 working well with the exception of the south side

3. **Have there been routine communications or activities conducted by your office related to the site?**

   - Fact Sheets
   - Public Meetings
   - Phone calls
   - Working with Arizona Department of Environmental Quality (ADEQ)
   - Communications with companies

4. **Have there been any complaints or other incidents related to the site requiring any response by your office?**

   Not that required a response from EPA Aware of the system shut down due to elevated TCE discharge EPA reviews the monthly operations reports

5. **Are you aware of any current or planned changes to your regulations/ordinances, or current/future land development that may impact the operations or remedies that the site?**

   Haven't heard of any new regulations or guidance Land use has seen typical development

6. **In your opinion, have appropriate O&M and monitoring activities been implemented for OU2, in accordance with approved manuals and plans?**

   For the most part yes Any issues are reflected in the public record

7. **Are you aware of any community concerns regarding the site or its operation and administration?**

   Yes, general concerns on water resources and whether the treated levels are safe Capture remains an issue The public record reflects community concerns

8. **Do you feel that you were kept well informed about all phases of the projects?**

   EPA is lead Companies are keeping EPA informed Always working on continual improvement on communications

9. **Do you have any comments, suggestions, or recommendations regarding the O&M and/or effectiveness of OU2 to be protective of human health and the environment?**

   - Potential for new COCs – 1,4 Dioxane may be an issue
   - Follow up on vapor intrusion assessment
   - Comments in Effectiveness Report outlines comments/suggestions before the 5-year review period

APPENDIX H

SITE INSPECTION DOCUMENTATION

FIVE-YEAR REVIEW MOTOROLA 52ND STREET OU1
SITE INSPECTION CHECKLIST

I. GENERAL SITE INFORMATION

Site Name	Motorola 52nd Street Superfund Site	**Date of Inspection**	June 8-9, 2006
Location and Region	Phoenix, Arizona	**EPA I D**	
Agency and Consultant Conducting Five-Year Review	ADEQ & LFR, Inc	**State I D**	
		Weather Condition	Hot & sunny

Remedy Includes (Check all that apply)

- ☐ Soil Vapor Extraction
- ☑ Groundwater Pump and Treatment
- ☐ Air Sparging (voluntary)
- ☐ Institutional Controls
- ☐ Security Access Controls
- ☐ Surface Water Collection and Treatment
- ☑ Groundwater Monitoring
- ☑ Treated Effluent Monitoring
- ☑ Other Beneficial reuse of treated effluent via process water by ON™ semiconductor

Attachments ☑ Inspection Team ☑ Site Map (Figure A)

II. INTERVIEWS

1. Project Manager Tom Suriano (Name) | Remediation, Program Manager (Title) | May 10, 2006 (Date)

Interviewed ☐ at Site ☑ at Office ☐ by Phone Phone No (480) 413-5182

Interview Summary ☑ Interview Summary Report/Questionnaire Attached

2 O & M Supervisor Larry Rodriguez (Name) | Operations Supervisor (Title) | June 1, 2006 (Date)

Interviewed ☐ at Site ☑ at Office ☐ by Phone Phone No (602) 244-6317

Interview Summary ☑ Interview Summary Report/Questionnaire Attached

FIVE-YEAR REVIEW MOTOROLA 52ND STREET OU1
SITE INSPECTION CHECKLIST

II INTERVIEWS (Continued)

3 O & M On-Site Staff

Leo Willson	Operator	June 1, 2006
Name	Title	Date

Interviewed ☐ at Site ☑ at Office ☐ by Phone Phone No (602) 244-6317

Interview Summary ☑ Interview Summary Report/Questionnaire Attached

4 Regulatory Agencies and Local Authorities

(i e , ADEQ, EPA, City of Phoenix, Maricopa County Department of Environmental Services, etc) Fill in all that apply

Agency EPA Region 9

Contact	Nadia Hollan	Project Manager	May 10, 2006	(415) 972-3187
	Name	Title	Date	Phone No

Interview Summary ☑ Interview Summary Report/Questionnaire Attached

Representing City of Phoenix

Contact	Karen O'Regan	Env Programs Manager	May 25, 2006	(602) 256-5654
	Name	Title	Date	Phone No

Interview Summary ☑ Interview Summary Report/Questionnaire Attached

Agency

Contact				
	Name	Title	Date	Phone No

Interview Summary ☐ Interview Summary Report/Questionnaire Attached

FIVE-YEAR REVIEW MOTOROLA 52ND STREET OU1
SITE INSPECTION CHECKLIST

II INTERVIEWS (Continued)

4 Regulatory Agencies and Local Authorities (Continued)

Agency _____

Contact _____

Name	Title	Date	Phone No

Interview Summary ☐ Interview Summary Report/Questionnaire Attached

_____

_____

_____

_____

5 The Community (i e , Community Advisory Board, Surrounding Residence, Environmental Conservation Groups)

Fill in all that apply

Representing On-Semiconductor

Contact

Name	Title	Date	Phone No
Bob Atkinson	Director Health & Safety	May 8, 2006	

Interview Summary ☑ Interview Summary Report/Questionnaire Attached

_____

_____

_____

Representing CH2MHill on behalf of Honeywell

Contact

Name	Title	Date	Phone No
George Ring, Bob Frank and Phil Burke		May 30, 2006	(480) 966-8188

Interview Summary ☑ Interview Summary Report/Questionnaire Attached

_____

_____

_____

Representing Community Advisory Board and Surrounding Residents

Contact

Name	Title	Date	Phone No
Martha Breitenbach	CAB member	May 23, 2006	

Interview Summary ☑ Interview Summary Report/Questionnaire Attached

_____

FIVE-YEAR REVIEW MOTOROLA 52ND STREET OU1
SITE INSPECTION CHECKLIST

III ONSITE DOCUMENT AND RECORDS VERIFICATION

1 On-Site Documents

☑ IGWTP System O & M Manual	☑ Readily Available	☑ Up to Date	☐ N/A
☐ Courtyard SVE System O & M Manual	☐ Readily Available	☐ Up to Date	☑ N/A
☐ SWPL SVE System O & M Manual	☐ Readily Available	☐ Up to Date	☑ N/A
☑ Groundwater Monitoring Plan (SAP)	☑ Readily Available	☑ Up to Date	☐ N/A
☑ Treated Effluent Monitoring Plan (SAP)	☑ Readily Available	☑ Up to Date	☐ N/A
☑ Health and Safety Plan	☑ Readily Available	☑ Up to Date	☐ N/A
☐ Ambient Air Monitoring Plan	☐ Readily Available	☑ Up to Date	☐ N/A
☑ Storm Water Pollution Prevention Plan	☑ Readily Available	☑ Up to Date	☐ N/A
☑ Contingency/Emergency Response Plan	☑ Readily Available	☑ Up to Date	☐ N/A
☑ As-Built Drawings	☑ Readily Available	☑ Up to Date	☐ N/A

Remarks _____

2 Permits and Service Agreements

☐ Air Permit	☐ Readily Available	☐ Up to Date	☑ N/A
☑ PQGWWP Permit	☑ Readily Available	☐ Up to Date	☐ N/A
☐ Others _____	☐ Readily Available	☐ Up to Date	☐ N/A

Remarks _____

3 Operations, Maintenance, and Inspection Logs

☑ IGWTP Daily Activities Logs	☑ Readily Available	☑ Up to Date	☐ N/A
☑ IGWTP Monthly Operations Logs	☑ Readily Available	☑ Up to Date	☐ N/A
☑ IGWTP Pump Maintenance Logs	☑ Readily Available	☑ Up to Date	☐ N/A
☑ IGWTP Blower Maintenance Logs	☑ Readily Available	☑ Up to Date	☐ N/A
☑ IGWTP Instrumentation Calibration Logs	☑ Readily Available	☑ Up to Date	☐ N/A
☑ Peripheral Equipment Maintenance Logs	☑ Readily Available	☑ Up to Date	☐ N/A
☑ IGWTP Vent Scrubber Valve Sequence Logs	☑ Readily Available	☑ Up to Date	☐ N/A
☑ Extraction Wells Maintenance Logs	☑ Readily Available	☑ Up to Date	☐ N/A
☑ Carbon Regeneration Logs	☑ Readily Available	☑ Up to Date	☐ N/A
☑ GW Monitoring Well Maintenance Logs	☑ Readily Available	☑ Up to Date	☐ N/A
☑ Solvent Recovery and Disposal Logs	☑ Readily Available	☑ Up to Date	☐ N/A
☑ Liquid Phase Carbon Changeout Logs	☑ Readily Available	☑ Up to Date	☐ N/A
☑ Vapor Phase Carbon Changeout Logs	☑ Readily Available	☑ Up to Date	☐ N/A
☐ SWPL SVE/AS Maintenance Logs	☐ Readily Available	☐ Up to Date	☑ N/A
☐ Courtyard SVE Maintenance Logs	☐ Readily Available	☐ Up to Date	☑ N/A
☑ SWPPP Inspection Logs	☑ Readily Available	☑ Up to Date	☐ N/A
☑ SWPPP Discrepancy Logs	☑ Readily Available	☑ Up to Date	☐ N/A

Remarks _____

FIVE-YEAR REVIEW MOTOROLA 52ND STREET OU1
SITE INSPECTION CHECKLIST

III ONSITE DOCUMENT AND RECORDS VERIFICATION (Continued)

4 Records

☑ Employee O & M Training Records	☑ Readily Available	☑ Up to Date	☐ N/A
☑ Employee OSHA Certification Records	☑ Readily Available	☑ Up to Date	☐ N/A
☑ Site Incident Records	☑ Readily Available	☑ Up to Date	☐ N/A
☑ IGWTP Effluent Monitoring Records	☑ Readily Available	☑ Up to Date	☐ N/A
☑ Air Emissions Records/Inventories	☑ Readily Available	☐ Up to Date	☐ N/A
☐ SWPL SVE Effluent Monitoring Records	☐ Readily Available	☐ Up to Date	☑ N/A
☐ Courtyard SVE Effluent Monitoring Records	☐ Readily Available	☐ Up to Date	☑ N/A
☑ Recovered Solvent Disposal Records	☑ Readily Available	☑ Up to Date	☐ N/A
☑ Liquid Phase Carbon Changeout Records	☑ Readily Available	☑ Up to Date	☐ N/A
☑ Vapor Phase Carbon Changeout Records	☑ Readily Available	☑ Up to Date	☐ N/A

Remarks

5 Monitoring Data

☑ Groundwater Monitoring Data	☑ Readily Available	☐ Up to Date	☐ N/A
☑ Treated Groundwater Effluent Data	☑ Readily Available	☐ Up to Date	☐ N/A
☑ IGWTP Air Emissions Data	☑ Readily Available	☐ Up to Date	☐ N/A
☐ SVE Effluent Emissions Data	☐ Readily Available	☐ Up to Date	☑ N/A
☑ Ambient Air Monitoring Data	☑ Readily Available	☐ Up to Date	☐ N/A
☑ Waste Analysis/Characterization Data	☑ Readily Available	☐ Up to Date	☐ N/A

Remarks

IV O & M COST EVALUATION

1 O & M Implementation Organization

☐ Agency	☐ Agency Contractor
☑ PRP	☑ PRP Contractor
☐ Other	

FIVE-YEAR REVIEW MOTOROLA 52ND STREET OU1
SITE INSPECTION CHECKLIST

IV O & M COST EVALUATION (Continued)

2 O & M Cost Records

☑ Readily Available ☐ Up to Date ☐ Funding Mechanism/Agreement in Place
Original O & M Cost _____ ☐ Breakdown Attached

Actual Annual O & M Costs for Review Period

2001	See Table 2	☑ Breakdown Attached	☐ Not Available
2002	See Table 2	☑ Breakdown Attached	☐ Not Available
2003	See Table 2	☑ Breakdown Attached	☐ Not Available
2004	See Table 2	☑ Breakdown Attached	☐ Not Available
2005	See Table 2	☑ Breakdown Attached	☐ Not Available

3 Identification of Unanticipated or Unusually High/Low O & M Cost During Review Period

Describe Applicable Cost(s) and Reason(s) for Each Year ☐ None Provided

Year 2001 _____

Year 2002 Increased costs associated with the ON Semiconductor separation and represented the accrual of land and utility costs not previously captured since the remedy was integrated into the manufacturing operations at the former 52nd Street facility

Year 2003 Similar to 2002

Year 2004 Similar to 2002

Year 2005 Similar to 2002

FIVE-YEAR REVIEW MOTOROLA 52ND STREET OU1
SITE INSPECTION CHECKLIST

V GENERAL SITE CONDITIONS INSPECTION

1 **Access Restrictions** ☑ Applicable ☐ Not Applicable

Perimeter Fencing ☑ Good Condition ☐ Bad Condition

Remarks _____

Access Gates ☑ Good Condition ☐ Bad Condition

Remarks _____

Perimeter Signs ☑ Good Condition ☐ Bad Condition

Remarks _____

Evidence of Vandalism/Trespassing ☑ No ☐ Yes

Remarks _____

2 **Institutional Controls** ☐ Applicable ☑ Not Applicable

Deed Restrictions in Place ☐ No ☐ Yes ☑ Not Applicable

Remarks _____

Evidence of Land Use Changes On-Site ☐ No ☐ Yes ☑ Not Applicable

Remarks _____

Evidence of Land Use Changes Off-Site ☐ No ☐ Yes ☑ Not Applicable

Remarks _____

FIVE-YEAR REVIEW MOTOROLA 52ND STREET OU1
SITE INSPECTION CHECKLIST

VI IGWTP VISUAL INSPECTION (Refer to Figures A & B)

1 Overall Control/Monitoring System

Was system in operation?	☐ No	☑ Yes	☐ Not Applicable
Were all control/monitoring systems functioning properly?	☐ No	☑ Yes	☐ Not Applicable

Remarks _____

2. Transfer Pumps Station

Are pumps in good condition?	☐ No	☑ Yes	☐ Not Applicable
Are pump seals intact and free of leaks?	☐ No	☑ Yes	☐ Not Applicable
Are pumps operating smoothly (no excessive vibration)?	☐ No	☑ Yes	☐ Not Applicable
Are pumps operating quietly (no excessive noise)?	☐ No	☑ Yes	☐ Not Applicable
Are all piping connections and valves free of leaks?	☐ No	☑ Yes	☐ Not Applicable
Are pumps' operating controls functioning properly?	☐ No	☑ Yes	☐ Not Applicable
Is pumps' instrumentation functioning properly?	☐ No	☑ Yes	☐ Not Applicable
Has secondary containment been provided?	☐ No	☑ Yes	☐ Not Applicable

Remarks _____

3 Blowers

Are blowers in good condition?	☐ No	☑ Yes	☐ Not Applicable
Are blower seals intact and free of leaks?	☐ No	☑ Yes	☐ Not Applicable
Are blowers operating smoothly (no excessive vibration)?	☐ No	☑ Yes	☐ Not Applicable
Are blowers operating quietly (no excessive noise)?	☐ No	☑ Yes	☐ Not Applicable
Are all blower connections and valves free of leaks?	☐ No	☑ Yes	☐ Not Applicable
Are blowers' operating controls functioning properly?	☐ No	☑ Yes	☐ Not Applicable
Is blowers' instrumentation functioning properly?	☐ No	☑ Yes	☐ Not Applicable

Remarks _____

4. Feed Water Storage Tanks T-101 and T-102

Tank Capacity 17,000 Gallons Construction Material Fiberglass

Are tanks in good condition?	☐ No	☑ Yes	☐ Not Applicable
Are tanks free of leaks?	☐ No	☑ Yes	☐ Not Applicable
Are all flanges and valve stem seals free of leaks?	☐ No	☑ Yes	☐ Not Applicable
Is all piping connected to the tanks free of leaks?	☐ No	☑ Yes	☐ Not Applicable
Are water levels monitored at each tank?	☐ No	☑ Yes	☐ Not Applicable

FIVE-YEAR REVIEW MOTOROLA 52ND STREET OU1
SITE INSPECTION CHECKLIST

VI IGWTP VISUAL INSPECTION (Continued)

Are tanks' control systems functioning properly?	☐ No	☑ Yes	☐ Not Applicable
Is tanks' instrumentation functioning properly?	☐ No	☑ Yes	☐ Not Applicable
Do tanks have secondary containment?	☐ No	☑ Yes	☐ Not Applicable
Do tanks have leak detection systems?	☑ No	☐ Yes	☐ Not Applicable
Does tanks' piping have secondary containment?	☐ No	☑ Yes	☐ Not Applicable
Does tanks' piping have leak detection system?	☑ No	☐ Yes	☐ Not Applicable
Do tanks have appropriate signs?	☐ No	☑ Yes	☐ Not Applicable
Are fugitive VOC emissions from the tanks controlled?	☐ No	☑ Yes	☐ Not Applicable

Remarks

5 Static Mixer

Is mixer in good condition?	☐ No	☑ Yes	☐ Not Applicable
Is mixer free of leaks?	☐ No	☑ Yes	☐ Not Applicable
Are all flanges and valve stem seals free of leaks?	☐ No	☑ Yes	☐ Not Applicable
Is all piping connected to the mixer free of leaks?	☐ No	☑ Yes	☐ Not Applicable
Is mixer's control system functioning properly?	☐ No	☐ Yes	☑ Not Applicable
Is mixer's instrumentation functioning properly?	☐ No	☐ Yes	☑ Not Applicable
Does mixer have secondary containment?	☐ No	☑ Yes	☐ Not Applicable

Remarks

6 Acid Feed System

Tank Capacity 2,500 Gallons Construction Material Steel

Is acid bulk tank in good condition?	☐ No	☐ Yes	☑ Not Applicable
Is acid bulk tank free of leaks?	☐ No	☐ Yes	☑ Not Applicable
Are all flanges and valve stem seals free of leaks?	☐ No	☐ Yes	☑ Not Applicable
Is all piping connected to the acid bulk tank free of leaks?	☐ No	☐ Yes	☑ Not Applicable
Is acid bulk tank's control system functioning properly?	☐ No	☐ Yes	☑ Not Applicable
Is acid bulk tank's instrumentation functioning properly?	☐ No	☐ Yes	☑ Not Applicable
Does acid bulk tank have secondary containment?	☐ No	☐ Yes	☑ Not Applicable
Does acid unloading area have secondary containment?	☐ No	☐ Yes	☑ Not Applicable
Does acid piping have secondary containment?	☐ No	☐ Yes	☑ Not Applicable

Remarks Acid feed system no longer in use

FIVE-YEAR REVIEW MOTOROLA 52ND STREET OU1
SITE INSPECTION CHECKLIST

VI. IGWTP VISUAL INSPECTION (Continued)

7 Liquid Chlorine Feed System

Tank Capacity: 60 Gallons — Construction Material: Poly Tank

Is chlorine bulk tank in good condition?	☐ No	☑ Yes	☐ Not Applicable
Is chlorine bulk tank free of leaks?	☐ No	☑ Yes	☐ Not Applicable
Are all flanges and valve stem seals free of leaks?	☐ No	☑ Yes	☐ Not Applicable
Is all piping connected to the tank free of leaks?	☐ No	☑ Yes	☐ Not Applicable
Is tank's control system functioning properly?	☐ No	☐ Yes	☑ Not Applicable
Is tank's instrumentation functioning properly?	☐ No	☐ Yes	☑ Not Applicable
Does tank have secondary containment?	☐ No	☑ Yes	☐ Not Applicable
Secondary containment at chlorine unloading area?	☐ No	☑ Yes	☐ Not Applicable
Does chlorine piping have secondary containment?	☑ No	☐ Yes	☐ Not Applicable

Remarks: Controls/instrumentation not evaluated because feed system not operational during inspection

8 Air Strippers

Are air strippers in good condition?	☐ No	☑ Yes	☐ Not Applicable
Are air strippers free of leaks?	☐ No	☑ Yes	☐ Not Applicable
Are all flanges and valve stem seals free of leaks?	☐ No	☑ Yes	☐ Not Applicable
Is all piping connected to the air strippers free of leaks?	☐ No	☑ Yes	☐ Not Applicable
Are control systems functioning properly?	☐ No	☑ Yes	☐ Not Applicable
Are instrumentation systems functioning properly?	☐ No	☑ Yes	☐ Not Applicable
Is strippers' vapor recovery system functioning properly?	☐ No	☑ Yes	☐ Not Applicable
Do air strippers have secondary containment?	☐ No	☑ Yes	☐ Not Applicable
Do air strippers have leak detection systems?	☐ No	☐ Yes	☑ Not Applicable
Does air strippers' piping have secondary containment?	☐ No	☑ Yes	☐ Not Applicable

Remarks: System changed from closed-loop to single-pass atmospheric injection, which increases carbon dioxide loading and change the water chemistry causing increased scaling The need to add sodium hexametaphosphate $(NaPO_3)_6$ to reduce scaling in liquid-phase carbon demonstrates cause and effect

9 Liquid Phase GAC Units

Are vessels in good condition?	☐ No	☑ Yes	☐ Not Applicable
Are vessels free of leaks?	☐ No	☑ Yes	☐ Not Applicable
Are all flanges and valve stem seals free of leaks?	☐ No	☑ Yes	☐ Not Applicable
Is all piping connected to the vessels free of leaks?	☐ No	☑ Yes	☐ Not Applicable
Is carbon breakthrough monitored at each tank?	☐ No	☑ Yes	☐ Not Applicable
Are vessels' control systems functioning properly?	☐ No	☑ Yes	☐ Not Applicable
Is vessels' instrumentation functioning properly?	☐ No	☑ Yes	☐ Not Applicable
Do vessels have secondary containment?	☐ No	☑ Yes	☐ Not Applicable
Do vessels have leak detection systems?	☑ No	☐ Yes	☐ Not Applicable
Does vessels' piping have secondary containment?	☐ No	☑ Yes	☐ Not Applicable

FIVE-YEAR REVIEW MOTOROLA 52ND STREET OU1
SITE INSPECTION CHECKLIST

VI IGWTP VISUAL INSPECTION (Continued)

Does vessels' piping have leak detection system?	☐ No	☐ Yes	☑ Not Applicable
Are sample ports provided at each vessel?	☐ No	☑ Yes	☐ Not Applicable

Remarks _____

10 Drainage Collection Tank T-501

Tank Capacity 5,000 Gallons Construction Material Fiberglass

Is tank in good condition?	☐ No	☑ Yes	☐ Not Applicable
Is tank free of leaks?	☐ No	☑ Yes	☐ Not Applicable
Are all flanges and valve stem seals free of leaks?	☐ No	☑ Yes	☐ Not Applicable
Is all piping connected to the tank free of leaks?	☐ No	☑ Yes	☐ Not Applicable
Is the water level monitored at the tank?	☐ No	☑ Yes	☐ Not Applicable
Is tank's control system functioning properly?	☐ No	☑ Yes	☐ Not Applicable
Is tank's instrumentation functioning properly?	☐ No	☑ Yes	☐ Not Applicable
Does tank have secondary containment?	☐ No	☑ Yes	☐ Not Applicable
Does tank have leak detection system?	☑ No	☐ Yes	☐ Not Applicable
Does tank piping have secondary containment?	☐ No	☑ Yes	☐ Not Applicable
Does tank piping have leak detection system?	☐ No	☐ Yes	☑ Not Applicable
Does tank have appropriate signs?	☐ No	☑ Yes	☐ Not Applicable
Are fugitive VOC emissions from the tank controlled?	☐ No	☑ Yes	☐ Not Applicable

Remarks _____

11 Process Piping (Liquid)

Is piping in good condition?	☐ No	☑ Yes	☐ Not Applicable
Is piping free of leaks?	☐ No	☑ Yes	☐ Not Applicable
Are all flanges and valve stem seals free of leaks?	☐ No	☑ Yes	☐ Not Applicable
Does piping have secondary containment?	☐ No	☑ Yes	☐ Not Applicable
Does piping have leak detection systems?	☐ No	☐ Yes	☑ Not Applicable

Remarks _____

FIVE-YEAR REVIEW MOTOROLA 52ND STREET OU1
SITE INSPECTION CHECKLIST

VI IGWTP VISUAL INSPECTION (Continued)

12 Dehumidifier D-601

Is system in good condition?	☐ No	☑ Yes	☐ Not Applicable
Is system free of leaks?	☐ No	☑ Yes	☐ Not Applicable
Are all flanges and valve stem seals free of leaks?	☐ No	☑ Yes	☐ Not Applicable
Are chilled water and steam line valves opened?	☐ No	☑ Yes	☐ Not Applicable
Is the steam line pressure 15 psig?	☑ No	☐ Yes	☐ Not Applicable

Remarks _____

13. Vapor Phase GAC Units

Are vessels in good condition?	☐ No	☑ Yes	☐ Not Applicable
Are vessels free of leaks?	☐ No	☑ Yes	☐ Not Applicable
Are all flanges and valve stem seals free of leaks?	☐ No	☑ Yes	☐ Not Applicable
Is all piping connected to the vessels free of leaks?	☐ No	☑ Yes	☐ Not Applicable
Is carbon breakthrough monitored at each vessel?	☐ No	☑ Yes	☐ Not Applicable
Are vessels' control systems functioning properly?	☐ No	☑ Yes	☐ Not Applicable
Is vessels' instrumentation functioning properly?	☐ No	☑ Yes	☐ Not Applicable
Is air pressure available to all actuated valves?	☐ No	☑ Yes	☐ Not Applicable
Is the steam pressure to the vessels 10 psig?	☐ No	☐ Yes	☑ Not Applicable
Are sample ports provided at each vessel?	☐ No	☑ Yes	☐ Not Applicable

Remarks _____

14 Vent-Scrub Carbon System

Are vessels in good condition?	☐ No	☐ Yes	☐ Not Applicable
Are vessels free of leaks?	☐ No	☐ Yes	☐ Not Applicable
Are all flanges and valve stem seals free of leaks?	☐ No	☐ Yes	☐ Not Applicable
Is all piping connected to the vessels free of leaks?	☐ No	☐ Yes	☐ Not Applicable
Is carbon breakthrough monitored at each vessel?	☐ No	☐ Yes	☐ Not Applicable
Are vessels' control systems functioning properly?	☐ No	☐ Yes	☐ Not Applicable
Is vessels' instrumentation functioning properly?	☐ No	☐ Yes	☐ Not Applicable
Are sample ports provided at each vessel?	☐ No	☐ Yes	☐ Not Applicable

Remarks _____

FIVE-YEAR REVIEW MOTOROLA 52ND STREET OU1
SITE INSPECTION CHECKLIST

VI IGWTP VISUAL INSPECTION (Continued)

15 Transfer Tank T-6D1

Tank Capacity 500 Gallons Construction Material Steel

Is tank in good condition?	☐ No	☑ Yes	☐ Not Applicable
Is tank free of leaks?	☐ No	☑ Yes	☐ Not Applicable
Are all flanges and valve stem seals free of leaks?	☐ No	☑ Yes	☐ Not Applicable
Is all piping connected to the tank free of leaks?	☐ No	☑ Yes	☐ Not Applicable
Is the water level monitored at the tank?	☐ No	☑ Yes	☐ Not Applicable
Is tank's control system functioning properly?	☐ No	☑ Yes	☐ Not Applicable
Is tank's instrumentation functioning properly?	☐ No	☑ Yes	☐ Not Applicable
Does tank have secondary containment?	☐ No	☑ Yes	☐ Not Applicable
Does tank have leak detection system?	☐ No	☑ Yes	☐ Not Applicable
Does tank piping have secondary containment?	☐ No	☑ Yes	☐ Not Applicable
Does tank piping have leak detection systems?	☐ No	☑ Yes	☐ Not Applicable
Does tank have appropriate signs?	☐ No	☑ Yes	☐ Not Applicable
Are fugitive VOC emissions from the tank controlled?	☐ No	☑ Yes	☐ Not Applicable

Remarks

16 Collection Sumps

For each collection sump, where does the collected liquid go?
Sump 501 pumps to Tank 501 back to system

Are sumps in good condition?	☐ No	☑ Yes	☐ Not Applicable
Are pumps functioning properly?	☐ No	☐ Yes	☑ Not Applicable
Is leak detection system provided?	☐ No	☐ Yes	☑ Not Applicable

Remarks Sump pumps were not in operation during inspection

FIVE-YEAR REVIEW MOTOROLA 52ND STREET OU1
SITE INSPECTION CHECKLIST

VI IGWTP VISUAL INSPECTION (Continued)

17 Electrical Enclosures and Panels

Are system(s) in good condition?	☐	No	☑	Yes	☐	Not Applicable
Are system(s) properly rated?	☐	No	☑	Yes	☐	Not Applicable
Are system(s) functional?	☐	No	☑	Yes	☐	Not Applicable

Remarks _____

VII CARBON REGENERATION SYSTEM

1 Regeneration Condensate Separator T-603

Is separator in good condition?	☐	No	☐	Yes	☑	Not Applicable
Is separator free of leaks?	☐	No	☐	Yes	☑	Not Applicable
Are all flanges and valve stem seals free of leaks?	☐	No	☐	Yes	☑	Not Applicable
Is all piping connected to the separator free of leaks?	☐	No	☐	Yes	☑	Not Applicable
Is separator functioning properly?	☐	No	☐	Yes	☑	Not Applicable
Is separator's control system functioning properly?	☐	No	☐	Yes	☑	Not Applicable
Is separator's instrumentation functioning properly?	☐	No	☐	Yes	☑	Not Applicable
Does separator have secondary containment?	☐	No	☐	Yes	☑	Not Applicable
Does separator have leak detection systems?	☐	No	☐	Yes	☑	Not Applicable
Are fugitive VOC emissions from separator controlled?	☐	No	☐	Yes	☑	Not Applicable

Remarks Separator off line Product recovery completed by decanting
Steam process equipment not used for regeneration (valved off), only used for pre-heating vapor

2 Recovered Solvent Filling and Decanting Area

Are all transfer lines and connections in good condition?	☐	No	☑	Yes	☐	Not Applicable
Are all transfer lines and connections free of leaks?	☐	No	☑	Yes	☐	Not Applicable
Are all flanges and valve stem seals free of leaks?	☐	No	☑	Yes	☐	Not Applicable
Is all piping connected to the tank free of leaks?	☐	No	☑	Yes	☐	Not Applicable
Are system's operating controls functioning properly?	☐	No	☑	Yes	☐	Not Applicable
Is system's instrumentation functioning properly?	☐	No	☑	Yes	☐	Not Applicable
Does system have secondary containment?	☐	No	☑	Yes	☐	Not Applicable
Does system have leak detection?	☐	No	☑	Yes	☐	Not Applicable
Does system piping have secondary containment?	☐	No	☑	Yes	☐	Not Applicable
Does system piping have leak detection system?	☐	No	☑	Yes	☐	Not Applicable
Are fugitive VOC emissions from system controlled?	☐	No	☑	Yes	☐	Not Applicable

Remarks _____

FIVE-YEAR REVIEW MOTOROLA 52ND STREET OU1
SITE INSPECTION CHECKLIST

VII CARBON REGENERATION SYSTEM (Continued)

3. Recovered Solvent Storage

How many full drums were present during inspection? One

Drum type and capacity 55-gallon Steel (40 gallon capacity)

Are all drums in good condition?	☐ No	☑ Yes	☐ Not Applicable
Are all drums free of leaks?	☐ No	☑ Yes	☐ Not Applicable
Are all drums appropriately labeled?	☐ No	☑ Yes	☐ Not Applicable
Does storage area have secondary containment?	☐ No	☑ Yes	☐ Not Applicable
Does storage area have leak detection?	☐ No	☑ Yes	☐ Not Applicable

Remarks

VIII COURTYARD SVE SYSTEM INSPECTION (Refer to Figures C & D)

1. Overall Control/Monitoring System

Was system in operation?	☐ No	☐ Yes	☑ Not Applicable
Were all control/monitoring systems functioning properly?	☐ No	☐ Yes	☑ Not Applicable

Remarks System not inspected

2 Blower

Is blower in good condition?	☐ No	☐ Yes	☑ Not Applicable
Is blower seal intact and free of leaks?	☐ No	☐ Yes	☑ Not Applicable
Is blower operating smoothly (no excessive vibration)?	☐ No	☐ Yes	☑ Not Applicable
Is blower operating quietly (no excessive noise)?	☐ No	☐ Yes	☑ Not Applicable
Are blower connection and valve free of leaks?	☐ No	☐ Yes	☑ Not Applicable
Are blower's operating controls functioning properly?	☐ No	☐ Yes	☑ Not Applicable
Is blower's instrumentation functioning properly?	☐ No	☐ Yes	☑ Not Applicable

Remarks System not inspected

3 Knockout Drum

Amount of liquid present in the drum during inspection _____ Gal

Is drum in good condition?	☐ No	☐ Yes	☑ Not Applicable
Is drum free of leaks?	☐ No	☐ Yes	☑ Not Applicable
Is drum connection and valve free of leaks?	☐ No	☐ Yes	☑ Not Applicable

Remarks System not inspected

FIVE-YEAR REVIEW MOTOROLA 52ND STREET OU1
SITE INSPECTION CHECKLIST

VIII COURTYARD SVE SYSTEM INSPECTION (Continued)

4 SVE Piping

Is piping in good condition?	☐ No	☐ Yes	☑ Not Applicable
Is piping free of leaks?	☐ No	☐ Yes	☑ Not Applicable
Are all flanges and valve stem seals free of leaks?	☐ No	☐ Yes	☑ Not Applicable
Are all in-line meters functioning properly?	☐ No	☐ Yes	☑ Not Applicable

Remarks: System not inspected

5 SVE Wells (See Figure C for Well Locations)

List wells inspected: _____

Vaults in place?	☐ No	☐ Yes	☑ Not Applicable
Properly secured?	☐ No	☐ Yes	☑ Not Applicable
Vault in good condition?	☐ No	☐ Yes	☑ Not Applicable
Wellhead in good condition?	☐ No	☐ Yes	☑ Not Applicable
Wellhead plumbing in good condition?	☐ No	☐ Yes	☑ Not Applicable
System piping, valves, and valve boxes in good condition?	☐ No	☐ Yes	☑ Not Applicable
Spare parts and equipment readily available?	☐ No	☐ Yes	☑ Not Applicable

Remarks: System not inspected

6 Electrical Enclosures and Panels

System(s) in good condition?	☐ No	☐ Yes	☑ Not Applicable
System(s) properly rated?	☐ No	☐ Yes	☑ Not Applicable
System(s) functional?	☐ No	☐ Yes	☑ Not Applicable

Remarks: System not inspected

IX SWPL SVE/AS SYSTEM INSPECTION (Refer to Figures E & F)

1 Overall Control/Monitoring System

Was system in operation?	☐ No	☐ Yes	☑ Not Applicable
Were all control/monitoring systems functioning properly?	☐ No	☐ Yes	☑ Not Applicable

Remarks: System not inspected

FIVE-YEAR REVIEW MOTOROLA 52ND STREET OU1
SITE INSPECTION CHECKLIST

IX. SWPL SVE/AS SYSTEM INSPECTION (Continued)

2 Air Compressor and Receiver

Is compressor in good condition?	☐ No	☐ Yes	☑ Not Applicable
Is compressor seal intact and free of leaks?	☐ No	☐ Yes	☑ Not Applicable
Compressor operating smoothly (no excessive vibration)?	☐ No	☐ Yes	☑ Not Applicable
Is compressor operating quietly (no excessive noise)?	☐ No	☐ Yes	☑ Not Applicable
Is compressor operating as designed?	☐ No	☐ Yes	☑ Not Applicable
Is compressor connection and valve free of leaks?	☐ No	☐ Yes	☑ Not Applicable
Are compressor operating controls functioning properly?	☐ No	☐ Yes	☑ Not Applicable
Is compressor instrumentation functioning properly?	☐ No	☐ Yes	☑ Not Applicable

Remarks System not inspected

3 Oil/Water Separator

Is separator in good condition?	☐ No	☐ Yes	☑ Not Applicable
Is separator free of leaks?	☐ No	☐ Yes	☑ Not Applicable
Are all flanges and valve stem seals free of leaks?	☐ No	☐ Yes	☑ Not Applicable
Is all piping connected to the separator free of leaks?	☐ No	☐ Yes	☑ Not Applicable
Is separator functioning properly?	☐ No	☐ Yes	☑ Not Applicable
Is separator control system functioning properly?	☐ No	☐ Yes	☑ Not Applicable
Is separator instrumentation functioning properly?	☐ No	☐ Yes	☑ Not Applicable

Remarks System not inspected

4 Air Dryer

Is dryer in good condition?	☐ No	☐ Yes	☑ Not Applicable
Are all flanges and valve stem seals free of leaks?	☐ No	☐ Yes	☑ Not Applicable
Is all piping connected to the dryer free of leaks?	☐ No	☐ Yes	☑ Not Applicable
Is dryer functioning properly?	☐ No	☐ Yes	☑ Not Applicable
Is dryer control system functioning properly?	☐ No	☐ Yes	☑ Not Applicable
Is dryer instrumentation functioning properly?	☐ No	☐ Yes	☑ Not Applicable

Remarks System not inspected

FIVE-YEAR REVIEW MOTOROLA 52ND STREET OU1
SITE INSPECTION CHECKLIST

IX. SWPL SVE/AS SYSTEM INSPECTION (Continued)

5 AS Piping

Is piping in good condition?	☐ No	☐ Yes	☑ Not Applicable
Is piping free of leaks?	☐ No	☐ Yes	☑ Not Applicable
Are all flanges and valve stem seals free of leaks?	☐ No	☐ Yes	☑ Not Applicable
Are all in-line meters functioning properly?	☐ No	☐ Yes	☑ Not Applicable

Remarks System not inspected

6 Blower

Is blower in good condition?	☐ No	☐ Yes	☑ Not Applicable
Is blower seal intact and free of leaks?	☐ No	☐ Yes	☑ Not Applicable
Is blower operating smoothly (no excessive vibration)?	☐ No	☐ Yes	☑ Not Applicable
Is blower operating quietly (no excessive noise)?	☐ No	☐ Yes	☑ Not Applicable
Are blower connection and valve free of leaks?	☐ No	☐ Yes	☑ Not Applicable
Are blower operating controls functioning properly?	☐ No	☐ Yes	☑ Not Applicable
Is blower instrumentation functioning properly?	☐ No	☐ Yes	☑ Not Applicable

Remarks System not inspected

7 Knockout Drum

Amount of liquid present in the drum during inspection _____ Gal

Is drum in good condition?	☐ No	☐ Yes	☑ Not Applicable
Is drum free of leaks?	☐ No	☐ Yes	☑ Not Applicable
Is drum connection and valve free of leaks?	☐ No	☐ Yes	☑ Not Applicable

Remarks System not inspected

8. SVE Piping

Is piping in good condition?	☐ No	☐ Yes	☑ Not Applicable
Is piping free of leaks?	☐ No	☐ Yes	☑ Not Applicable
Are all flanges and valve stem seals free of leaks?	☐ No	☐ Yes	☑ Not Applicable
Are all in-line meters functioning properly?	☐ No	☐ Yes	☑ Not Applicable

Remarks System not inspected

FIVE-YEAR REVIEW MOTOROLA 52ND STREET OU1
SITE INSPECTION CHECKLIST

IX SWPL SVE/AS SYSTEM INSPECTION (Continued)

9 GAC Absorber Units

Are vessels in good condition?	☐ No	☐ Yes	☑ Not Applicable
Are vessels free of leaks?	☐ No	☐ Yes	☑ Not Applicable
Are all flanges and valve stem seals free of leaks?	☐ No	☐ Yes	☑ Not Applicable
Is all piping connected to the vessels free of leaks?	☐ No	☐ Yes	☑ Not Applicable
Is carbon breakthrough monitored at each vessel?	☐ No	☐ Yes	☑ Not Applicable
Are vessels' control systems functioning properly?	☐ No	☐ Yes	☑ Not Applicable
Is vessels' instrumentation functioning properly?	☐ No	☐ Yes	☑ Not Applicable
Is air pressure available to all actuated valves?	☐ No	☐ Yes	☑ Not Applicable
Is the steam pressure to the vessels 10 psig?	☐ No	☐ Yes	☑ Not Applicable
Are sample ports provided at each vessel?	☐ No	☐ Yes	☑ Not Applicable

Remarks System not inspected

10 SVE Wells (See Figure E for Well Locations)

List wells inspected

Vaults in place?	☐ No	☐ Yes	☑ Not Applicable
Properly secured?	☐ No	☐ Yes	☑ Not Applicable
Vault in good condition?	☐ No	☐ Yes	☑ Not Applicable
Wellhead in good condition?	☐ No	☐ Yes	☑ Not Applicable
Wellhead plumbing in good condition?	☐ No	☐ Yes	☑ Not Applicable
System piping, valves, and valve boxes in good condition?	☐ No	☐ Yes	☑ Not Applicable
Spare parts and equipment readily available?	☐ No	☐ Yes	☑ Not Applicable

Remarks *System not inspected*

FIVE-YEAR REVIEW MOTOROLA 52ND STREET OU1
SITE INSPECTION CHECKLIST

IX SWPL SVE/AS SYSTEM INSPECTION (Continued)

11. AS Wells (See Figure E for Well Locations)

List wells inspected _____

Vaults in place?	☐ No	☐ Yes	☑ Not Applicable
Properly secured?	☐ No	☐ Yes	☑ Not Applicable
Vault in good condition?	☐ No	☐ Yes	☑ Not Applicable
Wellhead in good condition?	☐ No	☐ Yes	☑ Not Applicable
Wellhead plumbing in good condition?	☐ No	☐ Yes	☑ Not Applicable
System piping, valves, and valve boxes in good condition?	☐ No	☐ Yes	☑ Not Applicable
Spare parts and equipment readily available?	☐ No	☐ Yes	☑ Not Applicable

Remarks System not inspected

12 Electrical Enclosures and Panels

System(s) in good condition?	☐ No	☐ Yes	☑ Not Applicable
System(s) properly rated?	☐ No	☐ Yes	☑ Not Applicable
System(s) functional?	☐ No	☐ Yes	☑ Not Applicable

Remarks System not inspected

FIVE-YEAR REVIEW MOTOROLA 52ND STREET OU1
SITE INSPECTION CHECKLIST

X GROUNDWATER EXTRACTION WELLS INSPECTION

See Figure G for Extraction Well Locations

List of Wells Inspected Vaults for DM-310 and MP-16 were opened and components were inspected and photographed Well DM-306 has been modified with a telescoping sleeve Well DM-304 is experiencing nitrate fouling due to its proximity to a nearby septic system

Vaults in place?	☐ No	☑ Yes	☐ Not Applicable
Properly secured?	☐ No	☑ Yes	☐ Not Applicable
Vault in good condition?	☐ No	☑ Yes	☐ Not Applicable
Wellhead in good condition?	☐ No	☑ Yes	☐ Not Applicable
Wellhead plumbing in good condition?	☐ No	☑ Yes	☐ Not Applicable
System piping, valves, and valve boxes in good condition?	☐ No	☑ Yes	☐ Not Applicable
Spare parts and equipment readily available?	☐ No	☐ Yes	☑ Not Applicable

Remarks

FIVE-YEAR REVIEW MOTOROLA 52ND STREET OU1
SITE INSPECTION CHECKLIST

XI GROUNDWATER MONITORING WELLS INSPECTION

See Figure G for Groundwater Monitoring Well Locations

List of Wells Inspected

Vaults in place?	☐ No	☑ Yes	☐ Not Applicable
Vaults properly secured?	☐ No	☑ Yes	☐ Not Applicable
Vaults in good condition?	☐ No	☑ Yes	☐ Not Applicable
Wells in good condition?	☐ No	☑ Yes	☐ Not Applicable
Bollards present?	☐ No	☑ Yes	☐ Not Applicable
Routinely monitored?	☐ No	☑ Yes	☐ Not Applicable

Remarks

FIVE-YEAR REVIEW MOTOROLA 52ND STREET OU1
SITE INSPECTION CHECKLIST

XII OVERALL OBSERVATIONS

1 **Adequacy of Remedy**

IGWTP and Extraction Wells — All components of the IGWTP are weathered and aged and likely nearing the end of their serviceable life, such that replacement rather than routine maintenance should be evaluated on a lifecycle basis

Courtyard SVE System — System not inspected

SWPL SVE/AS System — System not inspected

Groundwater Monitoring

FIVE-YEAR REVIEW MOTOROLA 52ND STREET OU1
SITE INSPECTION CHECKLIST

XII OVERALL OBSERVATIONS (continued)		
1	**Adequacy of Remedy (Continued)**	
	Treated Effluent Monitoring	
2	**Adequacy of O & M**	
	IGWTP and Extraction Wells	
	Courtyard SVE System	System not inspected

FIVE-YEAR REVIEW MOTOROLA 52ND STREET OU1
SITE INSPECTION CHECKLIST

XII. OVERALL OBSERVATIONS (continued)

2 **Adequacy of O & M (Continued)**

SWPL SVE/AS System — System not inspected

Groundwater Wells — System not inspected

Effluent Monitoring Systems — System not inspected

FIVE-YEAR REVIEW MOTOROLA 52ND STREET OU1
SITE INSPECTION CHECKLIST

XII OVERALL OBSERVATIONS (continued)		
3	**Early Indicators of Potential Remedy Failure**	
IGWTP and Extraction Wells	Downsizing and frequent cycling of groundwater extraction pumps due to significantly lower water production rates is an early indicator of improper well construction and/or drought, which could result in failure of the remedy to perform adequate capture	
Courtyard SVE Systems	System not inspected	

FIVE-YEAR REVIEW MOTOROLA 52ND STREET OU1
SITE INSPECTION CHECKLIST

XII OVERALL OBSERVATIONS (continued)

3. Early Indicators of Potential Remedy Failure (Continued)

SWPL SVE/AS System — System not inspected

Groundwater Wells — System not inspected

Effluent Monitoring Systems — System not inspected

FIVE-YEAR REVIEW MOTOROLA 52ND STREET OU1
SITE INSPECTION CHECKLIST

XII OVERALL OBSERVATIONS (continued)

4 **Opportunities for Optimization of O & M/Monitoring Activities**

IGWTP and Extraction Wells — Changing the type, size and configuration of packing within the air stripper columns has the most potential to provide significant increases in treatment operational efficiencies However, a lifecycle cost analysis should be performed to determine if optimization of the existing system versus replacing the existing treatment system is preferable

New extraction well and/or extraction pump design/specificaitons should be evaluated against long-term groundwater capture/remedial objectives

Courtyard SVE System — System not inspected

FIVE-YEAR REVIEW MOTOROLA 52ND STREET OU1
SITE INSPECTION CHECKLIST

XII OVERALL OBSERVATIONS (continued)

4. Opportunities for Optimization of O & M/Monitoring Activities (Continued)

SWPL SVE/AS System — System not inspected

Groundwater Monitoring — System not inspected

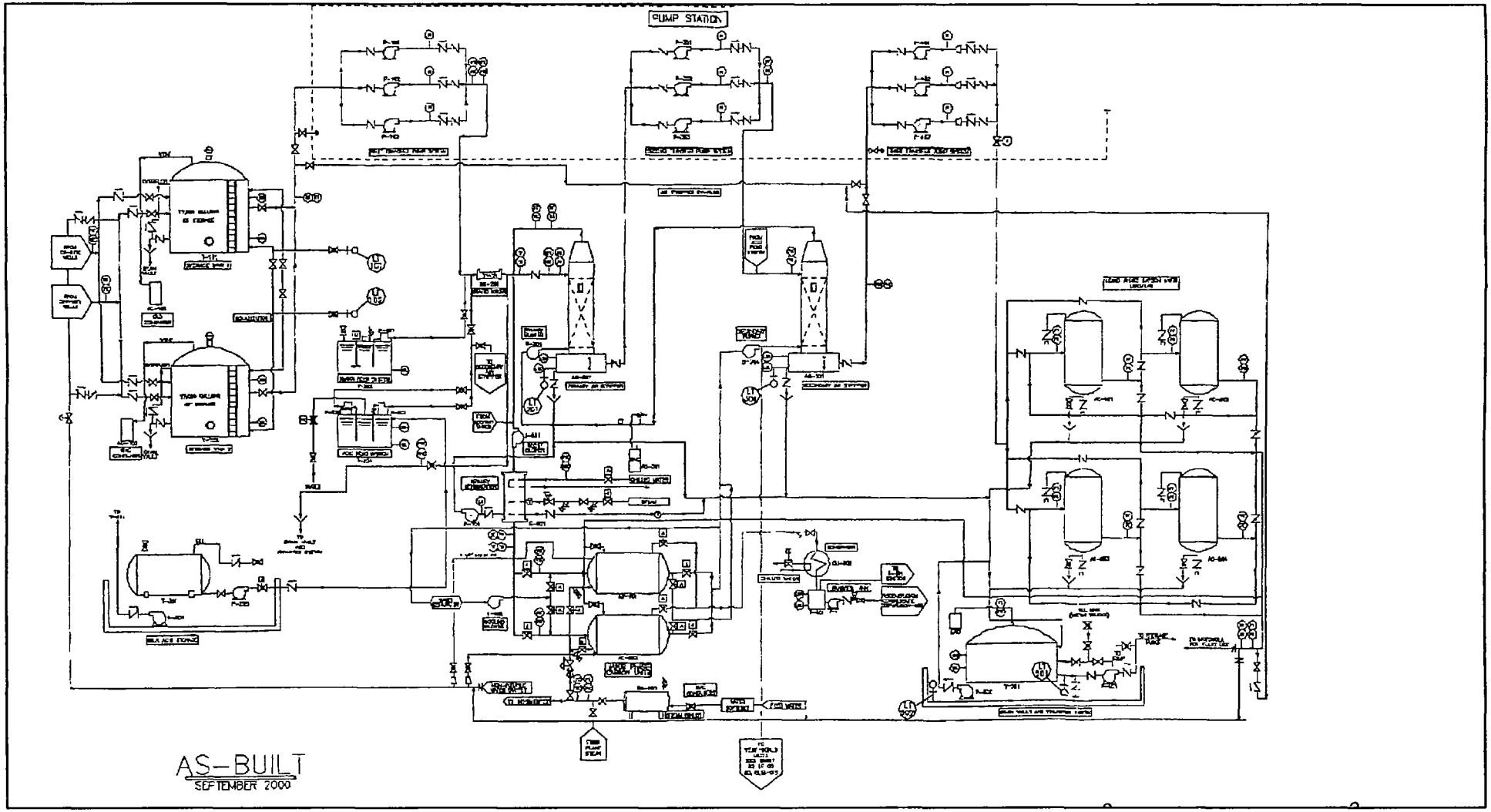
Effluent Monitoring Systems — System not inspected

FIVE-YEAR REVIEW MOTOROLA 52ND STREET OU1
SITE INSPECTION CHECKLIST

SUPPLEMENTAL COMMENTS SHEETS (Attach to Appropriate Sections)

FIVE-YEAR REVIEW MOTOROLA 52ND STREET OU1
SITE INSPECTION CHECKLIST

HAND DRAWN DIAGRAM SHEET (Attach to Appropriate Section of Checklist)



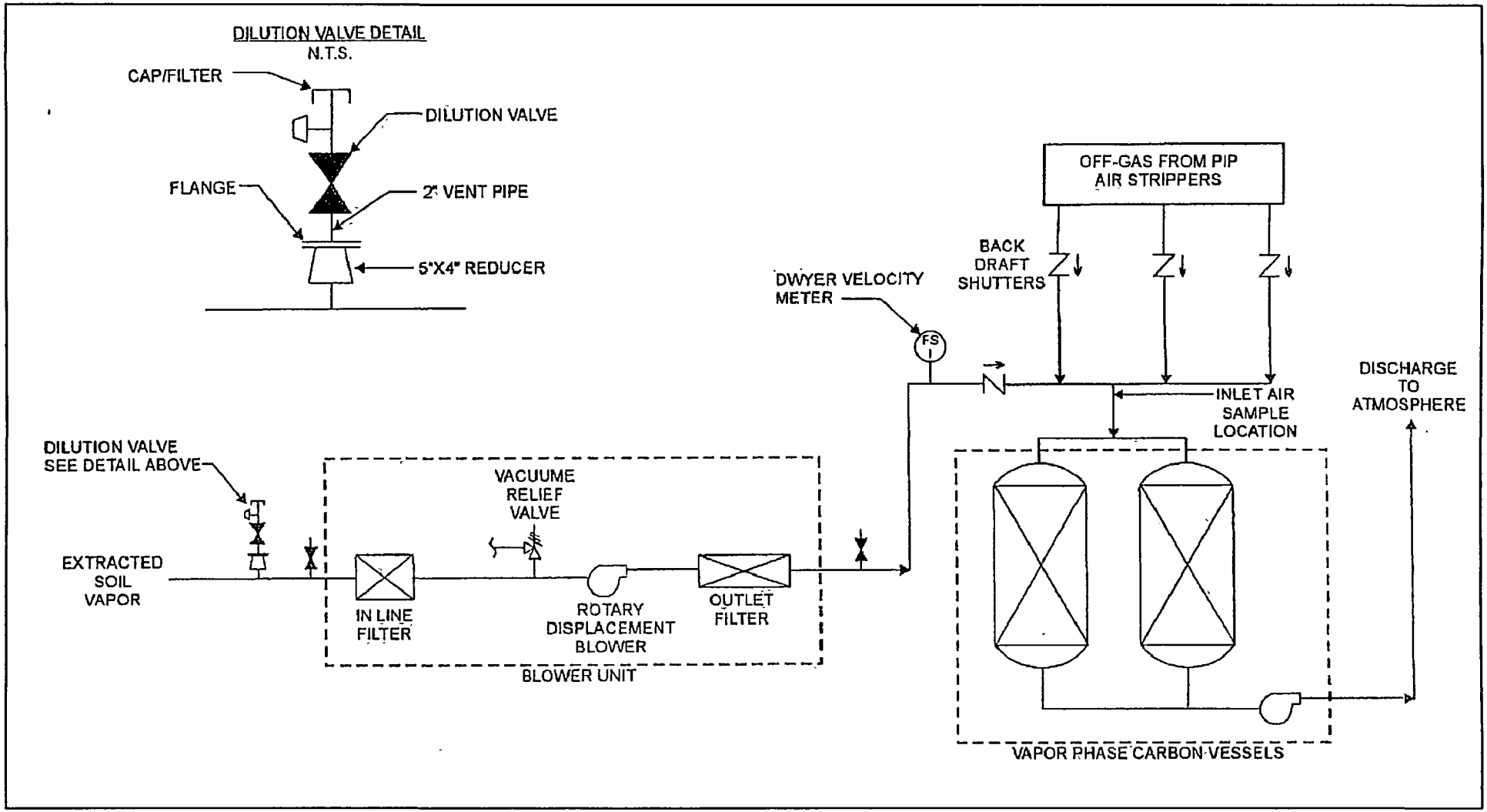
MOTOROLA 52ND STREET SUPERFUND SITE
PHOENIX, ARIZONA

Figure 3

OU1 Process and Instrumentation Diagram

LFR

Original drafting and design electronically transferred from Dames & Moore, Design Service Group
Job No 09448-083-022, Drawing No 5164-001, Rev No 8, Date 1/4/90
Frank Stephenson, Arizona Professional Registration No 23580

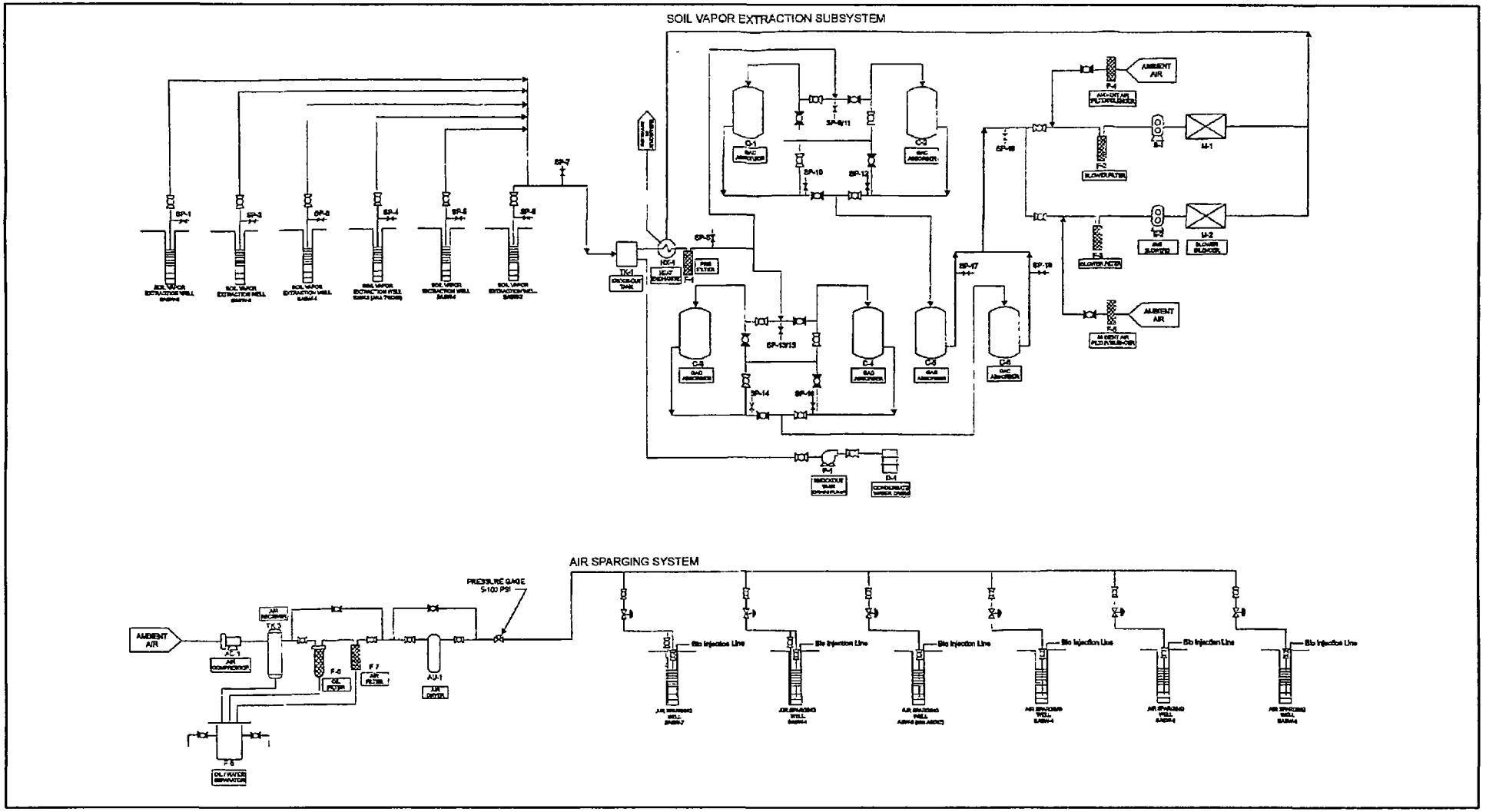


MOTOROLA 52ND STREET SUPERFUND SITE
PHOENIX, ARIZONA

Figure 4

OU1 Courtyard SVE Process Flow Diagram

LFR



MOTOROLA 52ND STREET SUPERFUND SITE
PHOENIX, ARIZONA

Figure 5

OU1 SWPL SVE Process Flow Diagram

LFR