

Attachment D

GROUNDWATER MONITORING

GROUNDWATER MONITORING

0.0 INTRODUCTION

During the Post-Closure Care Period (see Permit Condition II.A.3), the Permittee shall monitor plume containments, migration, and continue remediation until concentrations of all hazardous constituents are demonstrated to be below the regulatory levels contained in this permit.

1.0 HYDROGEOLOGIC SETTING

There are three aquifers in the Nogales area that are used for municipal, domestic and agricultural water supplies. They include the Younger Alluvium, the Older Alluvium, and the Nogales Formation. The Older Alluvium and Nogales Formation have not been developed extensively for water supply purposes, and therefore, less information is available concerning their aquifer characteristics.

The quaternary Younger alluvial aquifer is the most productive and is present along the major washes and riverbeds near the former CSI manufacturing facility. The unit is composed of unconsolidated gravel, sand, and silt, and ranges from a few feet to 100 feet thick. Depth to water in the Younger Alluvium ranges from land surface to 35 feet below ground surface (bgs). Reported aquifer characteristics include an average transmissivity of 413,000 gallons per day per foot (gpd/ft) and a hydraulic conductivity of about 10^{-3} cm/sec.

The site vicinity is underlain by slightly to moderately consolidated quaternary and tertiary alluvium. This Older Alluvium unconformably overlies both crystalline quartz monzonite bedrock and the Nogales Formation within the study area. The Older Alluvium consists of interbedded cobbles, gravel, sand, silt, and clay and is essentially flat lying.

The Nogales Formation consists of interbedded sandstone, conglomerate, fanglomerate, and silicic tuffs. It is defined; showing dips of between 5 and 15 degrees to the west or southwest.. Depth to the top of the Nogales Formation is approximately 200 to 230 feet bgs. The thickness of the unit is estimated to be as great as 5,000 feet.

The regional groundwater flow direction has been reported to be to the north-northwest (Cella Barr Associates, 1991). This direction is parallel to the general surface water flow direction of the Nogales Wash and Upper Santa Cruz River. However, depth-to-water measurements in the Permittee's groundwater monitoring wells indicate a variation in the local groundwater flow direction near the CSI facility. In the past, the local gradient in the vicinity of CSI was to the east. In more recent years, however, the local gradient has been shown to vary from northwest to south depending on the activity of the City of Nogales water supply wells (Potrero #1 and Potrero #2 (DWW-2)) south of the former manufacturing site. Due to a distinct cone of depression, the zone of influence of DWW-2 is large enough to reverse the groundwater gradient underneath the Permittee's former manufacturing facility and change the groundwater flow direction to the south.

2.0 DESCRIPTION OF CONTAMINANT PLUME

A total of 17 monitoring wells and two extraction wells have been installed by the Permittee from 1985 to 2004 to evaluate the extent of groundwater contamination associated with the former surface impoundment at the facility (Exhibits D-2 and D-3). The wells were installed during various phases of a hydrogeologic investigation.

During the initial phase of the investigation, UMW-1, DMW-1, DMW-2, and DMW-3, were installed for the purpose of detecting the presence of groundwater contaminants.

Sampling of the initial groundwater monitoring wells indicated the presence of volatile organic compounds (VOCs) at concentrations greater than ADEQ maximum contaminant levels (MCLs) for drinking water in wells DMW-1, DMW-2, and DMW-3. VOCs were identified in groundwater downgradient from the former surface impoundment. A soil gas investigation was conducted to provide screening information regarding the horizontal extent of VOCs in the groundwater. Soil gas was analyzed from 62 shallow borings located along transects both parallel and perpendicular to the former surface impoundment. Each sample was analyzed in the field for VOCs. Results of the investigation indicated the presence of a plume extending 600 feet north and east of the former surface impoundment. Details of the soil gas investigation were presented to ADEQ in the Phase II Plan of Investigation by Woodward-Clyde Consultants, 1986.

Based on the results of the initial groundwater investigation and soil gas evaluation, the Permittee installed 11 additional groundwater monitoring wells. Locations of these wells: DMW-4, DMW-5, DMW-5D, DMW-6, DMW-7, DMW-8, DMW-9, DMW-10, UMW-2, UMW-3, and UMW-3D were selected with the intent of defining the horizontal and vertical extent of VOC contamination in groundwater. Criteria for plume definition were Aquifer Water Quality Standards (AWQS) for VOCs in drinking water. Following well development, groundwater samples were obtained from each well and were analyzed for VOCs using EPA methods for evaluating water and wastewater.

On May 6, 2003 ADEQ agreed to place DMW-4 and DWW-1 on stand-by status, to be sampled only, pending positive results from DMW-8. Two additional monitoring wells, DMW-11 and DMW-12, were installed to further delineate plume boundaries in November 2004. Monitoring well DMW-11 was placed on the Bodega Drive right-of-way, north of the site. Monitoring well DMW-12 was placed on the city of Nogales' sewer easement, south of the site. Following well development, these wells were sampled for VOCs and analyzed using 40 CFR 136, EPA Method 624, a gas chromatograph with a mass spectrometer for analyte detection (GC/MS). Regulated target contaminants were not detected in either well.

Evaluation of groundwater elevation measurement data identifies a distinct cone of depression that is influencing the local groundwater flow direction. The Permittee's extraction well (EW-2) pumping at 50 to 75 gpm has caused a cone of depression that hydraulically contains the areas that have contaminants of concern exceeding established limits.

All monitoring and extraction wells were installed according to § 264.97(c) and are registered and meet the requirements of the Arizona Department of Water Resources (ADWR) A.A.C. Title 12, Chapter 15, Article 8. Construction details for all wells installed by the Permittee are provided in Exhibit D-6 and the ADWR website, www.azwater.gov.

2.1 Exceeding Concentration Limits

Investigations were conducted at the musical instrument manufacturing facility in the 1980s as required under § 265.91. Exceedances of Aquifer Water Quality Standards (AWQS) for regulated VOCs were noted. The Permittee began corrective measure studies and implementation of corrective action, in the early 1990s, as required under § 264.101, to mitigate the contamination. The Permittee's corrective action included a groundwater remediation system (GRS) consisting of extraction well(s), a network of monitoring/piezometer wells, pumps, collection and secondary containment systems in compliance with 40 CFR 264.193, and two air strippers in series. The GRS had been determined to be the most appropriate groundwater remediation alternative to ensure the protection of public health and the environment. In 1998, ADEQ authorized CSI to operate the GRS continuously. The Permittee has installed 17 monitoring/piezometer wells. The Permittee monitors their installed wells and three additional wells to evaluate the progress of the remediation system and to provide a safe window to monitor and contain plume migration. With ADEQ approval, the Permittee may modify the current monitoring well system based on results of plume boundary migration, field investigations, analytical methods and results, and remedial technology development. [A.A.C. R18-8-264.A (40 CFR 264.100)]

Sampling and analytical procedures for collecting and analyzing groundwater samples shall ensure applicable analyte or class detection and quantification limits corresponding to the regulatory levels specified in this permit. Analyte confirmational analyses meeting required practical quantification limits (PQL) may apply to final closure of the site.

Until modified as described in Part III. B.1. or D. of this Permit, the schedules of groundwater sample collection, analyses, and field measurements identified in Exhibit D-4, shall be maintained by the Permittee.

2.2 Compliance Monitoring

Samples collected from groundwater wells in the vicinity of the Permittee's former musical instrument manufacturing facility are to be analyzed for the following VOCs by methods accepted by the Arizona Department of Health Services (ADHS) (e.g., EPA 40 CFR 136, Standard Methods, SW-846). The following constituents were selected to be monitored during post-closure care based on hazards to human health and the environment, data and data quality evaluation from previous sampling events, and the inventory of chemicals used at the former musical instrument manufacturing facility and their degradation products. The following volatile organic and metal contaminants are to be monitored for compliance with the regulatory levels (MCLs or PRGs) for drinking water, at the frequency specified in Exhibit D-4, during site Post-Closure Care:

CONTAMINANT	CASRN	MCL /PRG (µg/L)
Trichloroethene (TCE)	78-01-6	5
1,1,1-Trichloroethane (1,1,1-TCA)	71-55-61	200
1,1-Dichloroethene (1,1-DCE)	75-35-4	7
cis-1,2-Dichloroethene (cis-1,2-DCE)	156-59-2	70
Trans-1,2-Dichloroethene (trans-1,2-DCE)	156-60-5	100
1,1-Dichloroethane (1,1-DCA)	75-34-3	12*
Vinyl Chloride (Chloroethene)	75-01-4	2
Cadmium (Cd)	7440-43-9	5
Chromium (Cr)	7440-47-3	100
Nickel (Ni)	7440-02-0	100
Silver (Ag)	7440-22-4	100

* This is the Region 9 preliminary remediation goal (SEP 2008) based on the fact that it is a suspected carcinogen. Normal hazard for ingestion is limited to 7,300 ug/l. 1,1-DCA was submitted in 2004 for consideration in establishing an MCL under the SDWA

2.3 Groundwater Monitoring System

Groundwater monitoring will be conducted in accordance with the pertinent requirements of A.A.C. R18-8-270.A and 40 CFR 270.14(c). Based on results of changes in plume migration and hydrology, the Director may request that additional monitoring wells may be added to the groundwater monitoring system.

2.4 Sampling and Analysis Procedures

Well installations will follow the procedures outlined in the approved *Final Well Installation and Groundwater Monitoring Plan* (MACTEC, 03/01/2004). Sampling protocol will follow the plan for the use of passive diffusion bags (PDBs) described in Exhibit D-7. The PDB technique is an alternative method promoted by the Interstate Technology Resource Council (ITRC) and the Environmental Council of the States (ECOS) for collection and analysis of groundwater samples for VOCs, metals, field parameters, and characteristic ion analyses. Sample collection using PDBs was recommended to CSI, by ADEQ in 2003. PDBs are used for groundwater sample collection as an alternative to purging, to better assess in situ groundwater quality related to area hydrogeology.

2.5 Reporting

Each year, the Permittee shall submit to ADEQ i) an annual report summarizing the performance of the GRS and ii) two reports on groundwater monitoring. The report for the GRS shall be referred to as the “*GRS Summary Report*”. The groundwater monitoring reports shall be

referred to as the “Comprehensive Groundwater Monitoring Report” and the “Abbreviated Groundwater Monitoring Report.” There are potentially four differences between the annual and the semi-annual monitoring events; 1) number of wells sampled, 2) analytical methods, 3) analytes reported, and 4) reporting format. Each of the reports will follow content requirements outlined in sections 2.5.1. The content of the GRS Summary Report shall include but is not limited to items identified in 2.5.2.

2.5.1 Content of the Groundwater Monitoring Reports (minimum requirement)

The groundwater monitoring reports shall include the following:

- Sample collection logs for each well sampled (Chain of Custody, well location coordinates, sampler, date and time of sampler implementation and retrieval, depth to water, pH, temperature, and conductivity);
- Sample analytical results, sample collection and analysis date and time showing PDB implementation and extraction dates and times and the resulting sampling run-times
- PDB type, length of PDB system
- Quality Control data (field instrument serial numbers, model numbers, and daily pre- and post-calibration records);
- Data for the compounds listed in Exhibit D-1 shall be tabulated for each well, including the prior five (5) years (past results shall be from the same seasonal period). All exceedances of groundwater protection levels (e.g., MCLs and PRGs – see Exhibit D-1) shall be highlighted. A discussion of concentrations of tetrachloroethylene shall be included in the text.
- Description of maintenance requirements, problems encountered, and corrective action implemented.

The Comprehensive Groundwater Monitoring Report must be submitted by April 15 of each calendar year. The Abbreviated Groundwater Monitoring Report shall be submitted by no later than October 15 of each calendar year. If due to unforeseen events, Permittee is unable to meet these deadlines, Permittee may request an extension. The request must describe the unforeseen events that prevented the Permittee from meeting the deadlines. This request may be in written or electronic format, and must be submitted to ADEQ no later than the reporting deadline.

2.5.2 Contents of the GRS Summary Report

Monthly volumes extracted from Potrero Well No. 2. (for the 12-month reporting period) with graphical comparison to the previous year. Summarize potential impact to treatment.

- Description of maintenance requirements and problems encountered.
- Monthly volume pumped from the Permittee's extraction well(s) and pump rate. Summarize impact to the groundwater remediation system and relation of installation depth, 150 bgs, to current surface water level and extraction efficacy.
- Quarterly groundwater level data with trends in elevations plotted comparing reporting year to previous year. Include any additional pertinent data and comments.
- GRS down-time; date(s), duration, reason, and corrective action taken, if appropriate.
- Isopleths for each of the groundwater contaminants listed in Permit Attachment D, Exhibit D-1 for the reporting period and the previous year. The isopleths for each contaminant of the reporting year and the previous year, shall be presented in the same figure by different colors, if possible.
- Summary of maintenance activities. Provide date(s), reason(s) and describe impact to the GRS.
- Summary and evaluation of plume status regarding control, mitigation, and potential impact to drinking water systems.
- Recommendations regarding the GRS and description of future activity.

Copies of other miscellaneous reports, logs, and data (i.e. inspection reports, drilling logs, maintenance, laboratory data, etc.) will be made available to the Director upon request.

The GRS Summary Report may be submitted separately or it may be included as an addendum to the Comprehensive Groundwater Monitoring Report. In no event shall it be submitted to ADEQ later than April 15 of each calendar year.

2.5.3 ADEQ Contact

All notifications and reports required by this permit shall be sent to:

Arizona Department of Environmental Quality
Hazardous Waste Permits Unit
1110 West Washington Street
Phoenix, Arizona 85007

[602-771-4123]

3.0 GROUNDWATER MONITORING REQUIREMENTS

3.1 Post-Closure Care Monitoring and Frequency

During post-closure, the Permittee shall follow the sampling procedures of Attachment D, Exhibit D-7.

During post-closure, the Permittee shall follow the monitoring schedule specified in Attachment D, Exhibit D-4 (note that reporting of results must be made to ADEQ within 60 calendar days after the last day of sampling for the groundwater monitoring event or April 15 (/October 15), whichever date is earlier).

Data specified in Section 2.5.1 shall be submitted to ADEQ within 60 calendar days after the last day of sampling for the groundwater monitoring event or April 15 (/October 15), whichever date is earlier.

If results above the regulatory levels (MCL or PRG) are detected for any of the target analytes (Exhibit D-1) in DMW-8, UMW-3, or UMW-3D, the ADEQ shall be notified within 48 hours of the Permittee becoming aware of the exceedance. Wells shall be resampled within fifteen (15) days of knowledge of analytical exceedance of the regulatory level (MCL or PRG). Upon confirmation of the exceedance of the regulatory level (MCL or PRG) specified in this permit, samples shall then be collected within fifteen (15) days from DWW-2 (city-owned irrigation well), and the down-gradient groundwater wells: DMW-4, DWW-1 (private drinking water well), and DMW-11.

3.2 Final Closure Well Monitoring and Frequency

The Permittee may request final closure at any time during the post-closure care period. To demonstrate final closure, the Permittee must complete three years of sampling (see Exhibit D-5) with analytical results of target compounds (Exhibit D-1) below the regulatory levels (MCLs or PRGs) specified in this permit at all wells of concern (Exhibit D-2) from which samples can be collected.

The Permittee shall follow the sampling procedures in Attachment D, Exhibit D-7 and the monitoring schedule specified in Attachment D, Exhibit D-5.

Data specified in Section 2.5.1 shall be submitted to ADEQ within 60 calendar days following the last day of sampling for the groundwater monitoring event. Analytical data shall be submitted as a Level 2 data package.

If results are above any of the regulatory levels (MCL or PRG) specified in this permit for any of the target analytes specified in Table D-1b of Exhibit D-1 in DMW-8, UMW-3, or UMW-3D, ADEQ shall be notified within 48 hours of the Permittee becoming aware of the exceedance. Resampling of wells exceeding those regulatory levels (MCLs or PRGs) shall be conducted within fifteen (15) days. If exceedances are confirmed, samples shall be collected, within thirty (30) days, from DWW-2 (city-owned irrigation well), and the potentially affected down-gradient groundwater well(s): DMW-4, DWW-1, and DMW-11.

If all wells show contaminant concentrations below the levels specified in Exhibit D-1, the Permittee may apply to ADEQ for a permit modification for the cessation of post-closure care and termination of the permit. The Permit modification request shall be submitted in accordance with Permit Condition I.I.

.3.3 Sample Collection and Analysis

3.3.1 Monitoring Requirements [A.R.S. § 49-243(K)(1), A.A.C. R18-9-A206(A)]

All monitoring required in this permit shall continue for the duration of the permit, regardless of the status of the facility or landownership. All samples shall be collected and analyzed according to the ADEQ-approved Sampling and Analysis Plan submitted by CSI and contained in Exhibit D-7.

3.3.2 Analytical Methodology

Analytical methods the Permittee is to use for various parameters are identified in Exhibits D-4 and D-5. VOCs shall be analyzed by either SW-8260 or SW-8021. Total metals analysis will be run for cadmium, chromium, nickel, and silver by EPA 200.7 or 200.8. If total chromium is detected above 100 ug/l, the well will be resampled within 15 days and analyzed for hexavalent chrome by either SW-7196A or EPA 318.6. Laboratories performing the analyses must be certified by the Arizona Department of Health Services (ADHS). Certified labs can be found at the ADHS web page at www.azdhs.gov.

If the Permittee finds that a method is no longer available the Permittee shall advise ADEQ. An alternate method to those listed in this permit must be justified by the Permittee and approved by ADEQ.

Exhibit D-1

**CONSTITUENTS OF CONCERN
AND CONCENTRATION LEVELS FOR
COMPLIANCE**

Table D-1a

CONSTITUENTS OF CONCERN AND CONTAMINATION LIMITS **FOR THE ABBREVIATED MONITORING EVENT**

(The comprehensive monitoring event requires analysis for all 40 CFR 265
Appendix IX VOCs and metals and parameters specified in Exhibit D-4)

CONSTITUENT OF CONCERN ¹	CAS NUMBER	MCL/PRG ² (µg/l) ³
Trichloroethene (TCE)	78-01-6	5
1,1,1-Trichloroethane (1,1,1-TCA)	71-55-61	200
1,1-Dichloroethene (1,1-DCE)	75-35-4	7
cis-1,2-Dichloroethene (cis-1,2-DCE)	156-59-2	70
trans-1,2-Dichloroethene (trans-1,2-DCE)	156-60-5	100
1,1-Dichloroethane (1,1-DCA)*	75-34-3	12
Vinyl Chloride (Chloroethene)	75-01-4	2

* Submitted in 2004 for consideration in establishing an MCL. The PRG will be in effect pending promulgation of an MCL.

1; Constituents of concern include chemicals listed in the inventory and their degradation products.

2; MCL/PRG, Maximum Contaminant Level per the Safe Drinking Water Act ((SDWA) and the Preliminary Remediation Goal for groundwater in EPA Region 9

3 µg/l; micrograms per liter, parts per billion, PPB.

Table D-1b

**CONSTITUENTS OF CONCERN AND CONTAMINATION LIMITS
FOR COMPREHENSIVE MONITORING AND FINAL CLOSURE**

CONSTITUENT OF CONCERN ¹	CAS NUMBER	MCL/PRG ² (µg/l) ³
Trichloroethene (TCE)	78-01-6	5
1,1,1-Trichloroethane (1,1,1-TCA)	71-55-61	200
1,1-Dichloroethene (1,1-DCE)	75-35-4	7
cis-1,2-Dichloroethene (cis-1,2-DCE)	156-59-2	70
trans-1,2-Dichloroethene (trans-1,2-DCE)	156-60-5	100
1,1-Dichloroethane (1,1-DCA)*	75-34-3	12
Vinyl Chloride (Chloroethene)	75-01-4	2
Cadmium (Cd)	7440-43-9	5
Chromium (Cr)	7440-47-3	100**
Nickel (Ni) [†]	7440-02-0	100
Silver (Ag) [†]	7440-22-4	100

CAS; Chemical Abstract Society unique registry number.

* Submitted in 2004 for consideration in establishing an MCL. EPA Region 9 PRG is used pending an MCL.

** Samples exceeding 100ppb shall also be analyzed for CrVI

1; Constituents of concern include chemicals listed in the inventory and degradation products.

2; MCL/PRG, Maximum Contaminant Level per the Safe Drinking Water Act ((SDWA) and the Preliminary Remediation Goal for groundwater in EPA Region 9

3 µg/l; micrograms per liter, parts per billion, PPB.

[†] Ni and Ag concentrations will be analyzed annually for three consecutive years from the effective date of this permit. If concentrations are measured below the MCL, either or both elements may be removed from the post-closure Comprehensive Annual Monitoring event list. Request(s) for removal of either or both of these constituents will be made as a Class 1 permit modification, requiring Director's prior approval (i.e. a Class 1* permit modification request), in accordance with Permit Part I.I. However, Ni and Ag will be analyzed during final closure monitoring, even if either or both constituents are deleted from comprehensive groundwater monitoring.

Exhibit D-2

**GROUNDWATER
WELLS-OF-INTEREST**

WELLS OF INTEREST IN THE AREA OF THE CSI REMEDIATION UNIT
Nogales, Arizona

Well	Depth (feet)	Latitude	Longitude	Owner
DMW-1	140	31° 23' 31.46" N	110° 57' 46.32" W	CSI
DMW-2	140	31° 23' 31.74" N	110° 57' 45.09" W	CSI
DMW-3	136	31° 23' 32.99" N	110° 57' 41.34" W	CSI
DMW-4	128.5	31° 23' 36.43" N	110° 57' 25.73" W	CSI
DMW-5	140	31° 23' 33.19" N	110° 57' 37.64" W	CSI
DMW-5D	180	31° 23' 33.05" N	110° 57' 37.58" W	CSI
DMW-6	130	31° 23' 34.39" N	110° 57' 38.17" W	CSI
DMW-7	152.6	31° 23' 31.47" N	110° 57' 39.33" W	CSI
DMW-8	118	31° 23' 35.13" N	110° 57' 31.30" W	CSI
DMW-9	170	31° 23' 37.17" N	110° 57' 47.73" W	CSI
DMW-10	200	31° 23' 37.46" N	110° 57' 53.76" W	CSI
DMW-11	187	31° 23' 37.34" N	110° 57' 41.06" W	CSI
DMW-12	153	31° 23' 22.90" N	110° 57' 39.75" W	CSI
DWW-1	NA	31° 23' 32.39" N	110° 57' 26.24" W	YUBETA
DWW-2	NA	31° 23' 14.63" N	110° 57' 45.42" W	CON
EW-1	148	31° 23' 30.85" N	110° 57' 45.07" W	CSI
EW-2	200	31° 23' 30.68" N	110° 57' 44.74" W	CSI
NGW-13	153	31° 23' 26.49" N	110° 57' 34.85" W	ADEQ
UMW-1	150	31° 23' 30.19" N	110° 57' 48.93" W	CSI
UMW-2	190	31° 23' 26.76" N	110° 57' 47.09" W	CSI
UMW-3	160	31° 23' 20.13" N	110° 57' 45.38" W	CSI
UMW-3D	320	31° 23' 20.22" N	110° 57' 45.36" W	CSI

Ft bgl; Feet below ground level.

YUBETA; A private well on the Yubeta Ranch. The well is approximately 3,200 feet northeast of the former musical instrument manufacturing facility (site).

CON; City of Nogales well, Potrero #2, south of the site.

NA Not Available.

Note: Well depth information has not been verified.

Barancas Engineering, Tucson, Arizona

Exhibit D-3

WELL LOCATIONS

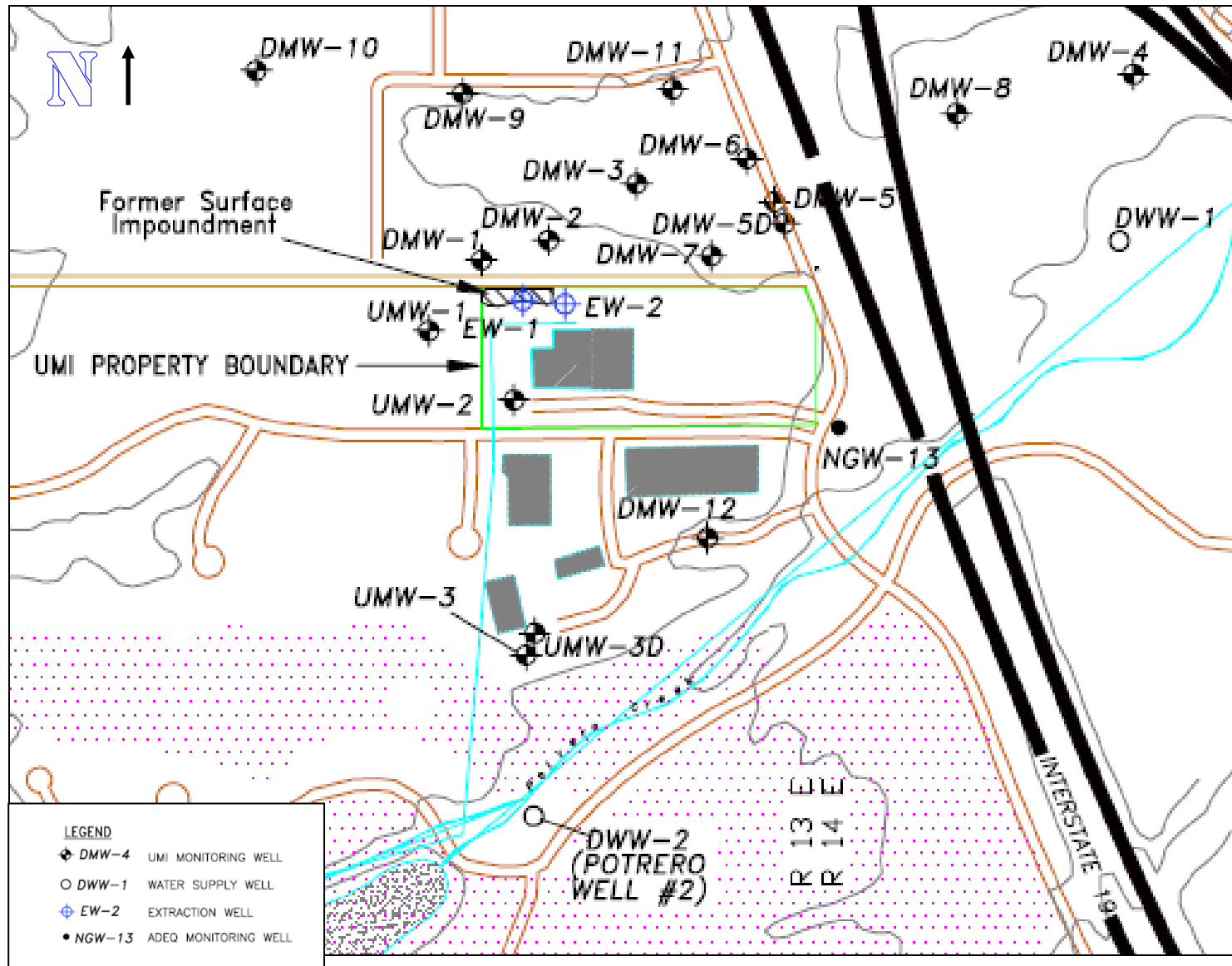


Exhibit D-3. Location of wells at the CSI Nogales remediation site.

 Palo Duro Creek Golf Course.

Exhibit D-4

**POST-CLOSURE CARE
MONITORING FREQUENCY**

POST-CLOSURE CARE GROUNDWATER MONITORING REQUIREMENTS

Event	Wells to be Sampled	Parameter	Method	Frequency
COMPREHENSIVE	EW-1, EW-2, DMW-1, DMW-2, DMW-3, DMW-5, DMW-5D, DMW-6, DMW-7, DMW-8, DMW-9, DMW-10, DMW-11, DMW-12, UMW-1, UMW-2, UMW-3, UMW-3D, NGW-13, and DWW-2.	Hazardous VOCs and total metals (Exhibit D-1b) <i>Analyze for Chrome VI when total chrome is greater than 100 µg/l</i>	SW-8021 or SW-8260; EPA 200.7, and 200.8. <i>SW-7196A or EPA 218.6</i>	Annually
		<u>Field Measurements:</u> pH Temperature Specific Conductance Depth to groundwater Length of PDB system	Field Instruments	During sample collection.
ABBREVIATED	EW-2 (SP-1), DMW-3, DMW-5, DMW-5D, DMW-6, DMW-8, UMW-3, UMW-3D.	Hazardous VOCs (Exhibit D-1a)	SW-8021 or SW-8260.	Annually
		<u>Field Measurements:</u> pH Temperature Specific Conductance Depth to groundwater Length of PDB system	Field Instruments	During sample collection.

NOTE: Sampling shall be conducted using methods approved by ADEQ and described in CSI's Groundwater Monitoring Plan (Exhibit D-7). Sample collection and analytical methods used shall be identified in Groundwater Monitoring Reports.

Exhibit D-5

**FINAL CLOSURE MONITORING
REQUIREMENTS AND FREQUENCY**

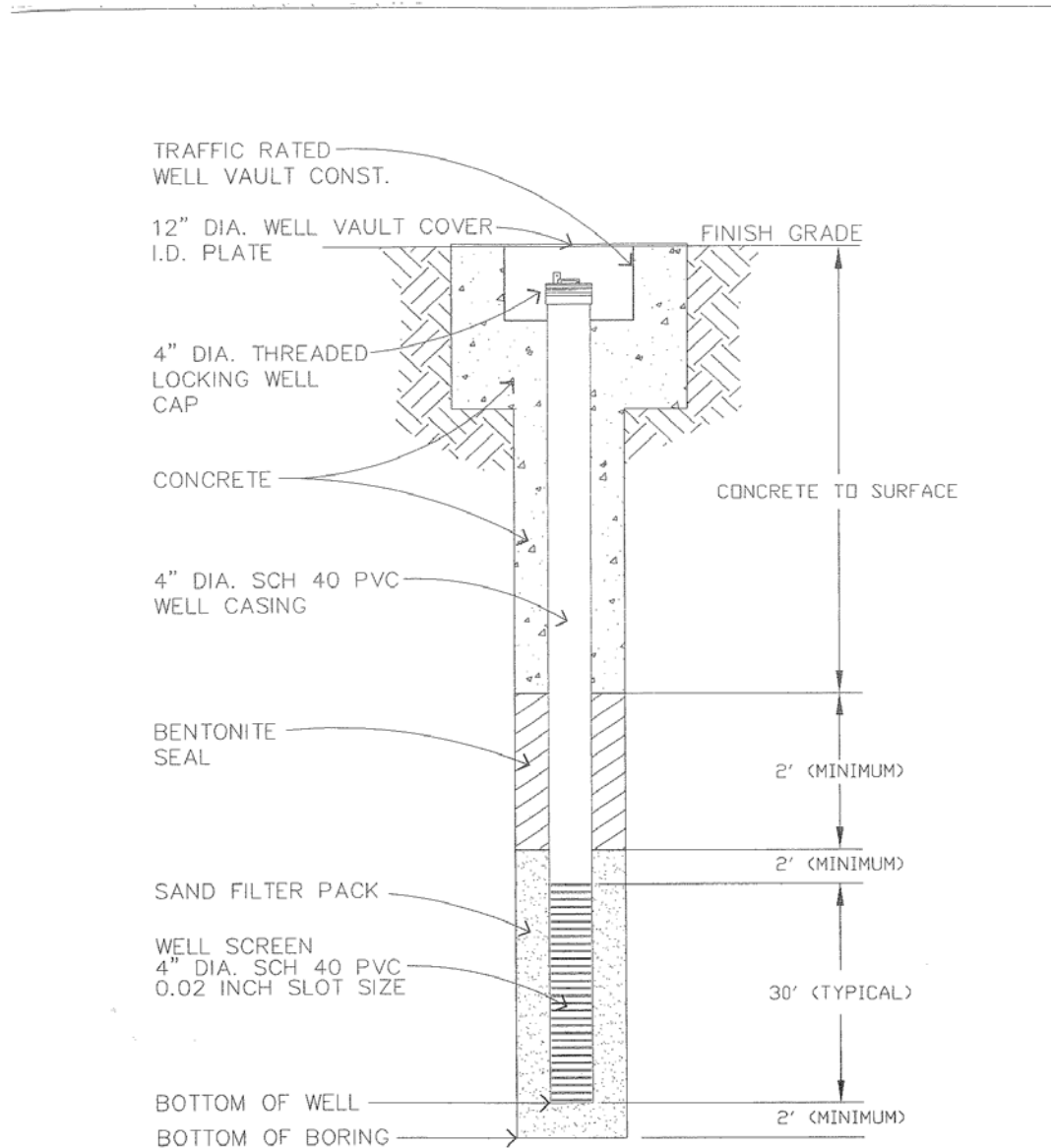
FINAL CLOSURE GROUNDWATER MONITORING REQUIREMENTS

Wells to be Sampled	Parameter	Method	Frequency
EW-1, EW-2, DMW-1, DMW-2, DMW-3, DMW-4, DMW-5, DMW-5D, DMW-6, DMW-7, DMW-8, DMW-9, DMW-10,	Applicable 40 CFR264 Appendix IX volatile organic compounds and metals (Exhibit D-1b). <i>Analyze for Chrome VI when total chrome is greater than 100 µg/l</i>	SW-8021 or SW-8260; EPA 200.7, and 200.8 <i>SW-7196 or EPA 218.6</i>	Annually for three years with results below MCLs/PRGs (see Exhibit D-1)
DMW-11, DMW-12, UMW-1, UMW-2, UMW-3, UMW-3D, NGW-13, DWW-1, and DWW-2.	<u>Field Measurements:</u> pH Temperature Specific Conductance Depth to groundwater Length of PDB system	Field Instruments	During sample collection.

NOTE: Sampling shall be conducted using methods approved by ADEQ in the SAP i.e., purging/sampling, passive diffusion bag samplers, or equivalent method approval from ADEQ.

Exhibit D-6

**GROUNDWATER
WELL CONSTRUCTION
DETAILS**



 MACTEC <small>3630 E. WIER STREET PHOENIX, ARIZONA 85040</small>	TYPICAL WELL CONSTRUCTION DIAGRAM	CONN-SELMER, INC. NOGALES, ARIZONA	DATE	2/5/2003	SCALE	NTS
			DRAWN BY:	DLK	FIGURE	
			PROJECT No.	661029		

WELL CONSTRUCTION DETAILS POST-CLOSURE PLAN

Well ID	Arizona State Plane Coordinates		ADWR Well Registration	Top of Casing Elevation (ft amsl)	Depth of Well (ft bgl)	Well Diameter (inches)	Top of Screen		Bottom of Screen***		Length of Screen (ft)
	X	Y					Depth (ft bgl)	Elevation (ft amsl)	Depth (ft bgl)	Elevation (ft amsl)	
Monitoring Wells											
UMW-1	997380	143764	55-510646	3687.76	150	2	130	3557.76	150	3537.76	20
UMW-2	997542	143419	55-542011	3716.18	190	4	155	3561.18	190	3526.18	35
UMW-3	997696	142751	55-543707	3695.11	160	4	130	3565.11	160	3535.11	30
UMW-3D	997698	142760	55-543708	3695.21	320	4	300	3395.21	320	3375.21	20
DMW-1	997605	143895	55-510636	3682.18	140	2	120	3562.18	140	3542.18	20
DMW-2	997711	143924	55-510644	3679.22	140	2	120	3559.22	140	3539.22	20
DMW-3	997949	144052	55-510645	3670.25	136	2	116	3554.25	136	3534.25	20
DMW-4	999385	144412	55-515103	3648.86	128.5	4	108.5	3540.36	128.5	3520.36	20
DMW-5	998356	144076	55-515433	3666.33	140	4	110	3556.33	140	3526.33	30
DMW-5D	998361	144062	55-517178	3666.02	180	4	160	3506.02	180	3486.02	20
DMW-6	998309	144197	55-517179	3667.34	130	4	110	3557.34	130	3537.34	20
DMW-7	998211	143901	55-516091	3675.63	152.6	4	122.6	3553.03	152.6	3523.03	30
DMW-8	998904	144277	55-515105	3658.63	118	4	98	3560.63	118	3540.63	20
DMW-9	997478	144471	55-542012	3689.44	170	4	135	3554.44	170	3519.44	35
DMW-10	996955	144495	55-547382	3689.06	200	4	180	3509.06	200	3489.06	20
DMW-11	998056	144493	55-205287	3679.38	187	4	120	3559.38	165	3514.38	45
DMW-12	998182	143035	55-205286	3676.15	153	4	175	3504.38	185	3494.38	10
NGW-13	998604	143401	55-554080	3679.31	153	4**	113	3566.31	151	3525.15	30
Extraction Wells											
EW-1*	997714	143834	55-519766	3680.27	148	6	104	3576.27	144	3536.27	40
EW-2	997743	143817	55-530147	3685.64	200	6	125	3560.64	195	3490.64	70

Notes:

1. * = Extraction Well 1 (EW-1) is not operational.
2. ** = Well diameter was measured
3. *** = Bottom of Screen is the original measurement and the actual depth may be different.
4. Top of Casing Elevation for EW-2 was originally 3679.71 (NAVD 29); 3 feet of casing was added April 2000.
5. Drilling method = dual-wall reverse air circulation; perforations = 0.02-inch slot at 0.25 spacing for depth of screen.
6. Top of casing elevation for DMW-10 was originally 3689.69 (NAVD 29); 5 feet of casing was removed January 2012.
7. Elevation datum = NAVD 88; horizontal datum = NAD 83

Abbreviations:

- ft = feet
ft amsl = feet above mean sea level
ft bgl = feet below ground level
ADWR = Arizona Department of Water Resources

Note: Well depth information has not been verified.

Exhibit D-7

**GROUNDWATER
MONITORING PLAN**

CONN-SELMER, INC.

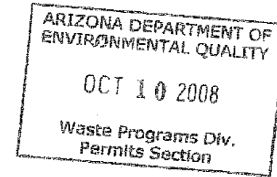
www.conn-selmer.com

P.O. Box 310 Elkhart, IN 46515 TEL: (574) 522-1675 FAX: (574) 295-5405

VIA FEDERAL EXPRESS 8656 4043 7795

October 7, 2008

Mr. Anthony Leverock
ADEQ-WP Permits Section
1110 West Washington Street
Phoenix, Arizona 85007
Mail Code 4415 C-1


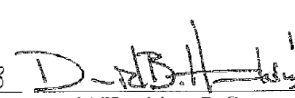
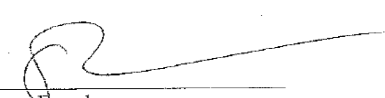


RE: Letter Sampling Plan, Conn-Selmer, Inc., EPA ID NO. AZT006121135

Dear Mr. Leverock:

Enclosed find a letter sampling plan that we propose to implement for the fourth quarter 2008 and first quarter 2009 sampling events at the Conn-Selmer/Nogales CAMU. We are seeking ADEQ's approval of this interim measure to facilitate changes in our sampling methods for the upcoming sampling event, while we continue development of a sampling plan to replace the *Final Well Installation and Groundwater Monitoring Plan* (March 2004) and *Passive Diffusion Bag Letter Sampling Plan* (July 2005) previously prepared by MACTEC.

Your earliest response to this proposal will be greatly appreciated. If you have any questions or concerns, please contact Tim Bock at the address listed above, or by e-mail at tbock@conn-selmer.com, or by telephone (direct line) at 574-523-0693.

 10/7/08 Timothy M. Bock Corp. Environmental Mgr. Conn-Selmer Inc.	 10/9/08 David Hawkins, R.G. Barranca Group LLC	 Geno Poushee Verdad Group LLC
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ATTACHMENTS

Figure 1 Site Vicinity Map
Table 1 Summary of Contaminants of Concern in Selected Wells vs. Depth
Table 2 PDB Installation Summary

ARMSTRONG • ARTLEY • BACH • BENGE • C.G. COHN • EMERSON • GLAUSSEL • KING • HOLTON • LEBLANC
LUDWIG • MARTIN • MUSSER • NOBLET • SCHERL & ROTH • SELMER PARIS • SELMER U.S.A. • WM. LEWIS & SON • YAHAGISAWA

A subsidiary of Steinway Musical Instruments, Inc.

Monitoring Well Sampling Proposal

In preparation for the next sampling event, we propose the installation of one passive diffusion bag (PDB), for each analytical protocol, in the following monitoring wells, at the depths noted:

Well	PDB Depth	Well	PDB Depth	Well	PDB Depth
UMW-1	148	DMW-5D	176	DMW-12	149
UMW-2	188	DMW-6	123	NGW-13	138
UMW-3	158	DMW-7	148	EW-1	143
UMW-3D	318	DMW-8	116		
DMW-2	139	DMW-9	166		
DMW-3	130	DMW-10	199		
DMW-5	136	DMW-11	180		

These depths have been chosen following careful review of the data collected using the PDBs at various depths the past four years. The data revealed that there is little variability in the vertical distribution of contaminants (**Table 1**), and that in several cases the upper PDBs are above the static water level during the summer months. The existing distribution of PDBs is presented in **Table 2**, along with the proposed settings.

We will purchase the pre-filled PDBs and a small percentage of spares from Columbia Analytical Services for each sampling event (i.e. they will not be reused). Approximately four (4) weeks after PDB installation, Verdad will retrieve the PDBs from the monitoring wells. The enclosed water will be collected in appropriate containers and submitted to an ADHS-approved laboratory (e.g. Columbia Analytical Services (CAS), Tucson) for analysis of volatile organic compound (VOC) concentrations by SW-8260B. This analytical method has been chosen because the EPA Method 601 analysis prescribed in Consent Order Z-10-98, which governs Conn-Selmer's (CSI) work at the site, is no longer being performed by any Arizona licensed labs (601 was replaced by the more accurate 8260B). After sample collection, the PDBs will be discarded.

In addition, during the fourth quarter sampling event, inorganic samples will be collected for analysis by EPA method 200.7. The fourth quarter inorganic sampling will necessitate the installation of Rigid Porous Polyethylene (RPP) samplers in addition to the PDBs. The deployment of RPPs is described in *Protocol for Use of Five Passive Samplers to Sample a Variety of Contaminants in Groundwater* (February 2007), published by the Interstate Technology and Regulatory Council Diffusion/Passive Sampler Team.

The RPPs will be installed immediately above the PDBs, and will be used only for the fourth quarter event. The RPPs will also be obtained from CAS, field ready, and will be used only once and then disposed of in exactly the same way as the PDBs.

No purge water will be collected. Excess water from the PDBs/RPPs will be used to measure field parameters (pH, Conductivity (μ ohms), and temperature), containerized and placed into the CSI remediation system for treatment. We expect a low amount of excess water to be left in the bags after sampling. The following field QC samples will be collected:

- One (1) field duplicate for each sampling protocol (PDB type)
- One (1) field blank for each sampling protocol (PDB type)
- One (1) set of field duplicate samples for matrix spike/matrix spike duplicate analysis for each analytical protocol e.g., SW-8260B, EPA 200.7)
- One (1) trip blank for VOC analysis.

The general term "sample bag" will be used here to denote either low density polyethylene-based (for VOCs) or the RPPs. Sample bag installation will be as follows:

1. One month prior to the quarterly sampling event, prefilled sample bags will be obtained from the vendor e.g., CAS and installed in the wells. Each installation is composed of a weight, a tether, a snap ring to connect the sample bag to the tether, and a stainless steel clip to connect the tether to the well cap. The tether is pre-measured so that the weight rests on the bottom of the well when the sample bag is at the correct depth. The tether is kept taut from the surface to maintain sampler position.
2. Attach the sample bag to the split ring with a tie loop at the desired depth.
3. The sample bag is attached to the tether and lowered down the monitoring well. The end of the tether is clipped to the well cap and the well cap is then placed on the well and secured.
4. The sample bags shall remain in the monitoring well for one month, prior to the next sampling event, when they are retrieved and samples are collected from the bags.

Samples will be collected and managed in the following method:

1. At each sampling event, the sampler measures and records the static water level on the field sheet.
2. The sampler dons disposable inert gloves and retrieves the sample bag.
3. The fill cap is removed from the sample bag and the contained water is poured into HCL -preserved 40-milliliter (mL) vials for VOC analysis or into a nitric acid- preserved 250ml HDPE container for inorganic analysis.
4. Excess water is used to measure field parameters which are recorded on the field sheet. The bottles are capped, labeled, and stored in a cooler containing ice at 4°Celsius (C) \pm 2°C. A temperature blank is included by the laboratory for each cooler.

5. If delivering samples in person, the samples will be iced to temperature before delivering to the lab. If sending the samples via UPS/FED EX, the samples will be properly iced to ensure they are received at the proper temperature. Previously frozen blue ice and/or frozen water containers are typically used for this purpose.
6. If delivering samples in person, ensure that the lab records the sample temperature at time of receipt and signs receipt of the sample, with time and date. If sending the samples via UPS/FED EX, follow up with the lab to ensure they record the sample temperature at time of receipt and signs receipt of the sample, with time and date.

Each well cap will be sealed water-tight before closing the vault.

Extraction Well and Drinking Water Well Sampling Proposal

Because EW-2 is an active extraction well for the CSI groundwater remediation system, and DWW-2 is an active well for the City of Nogales/Palo Duro Creek Golf Course, sample bags cannot be installed. Samples will continue to be collected directly from the spigot following the procedures specified in the March 2004 *Final Well Installation and Groundwater Monitoring Plan*.

AHWMA Post-Closure Permit
EPA ID No. AZT 000 612 135
Conn-Selmer, Inc.

Attachment D
Groundwater Monitoring
FINAL PERMIT
Rev 0

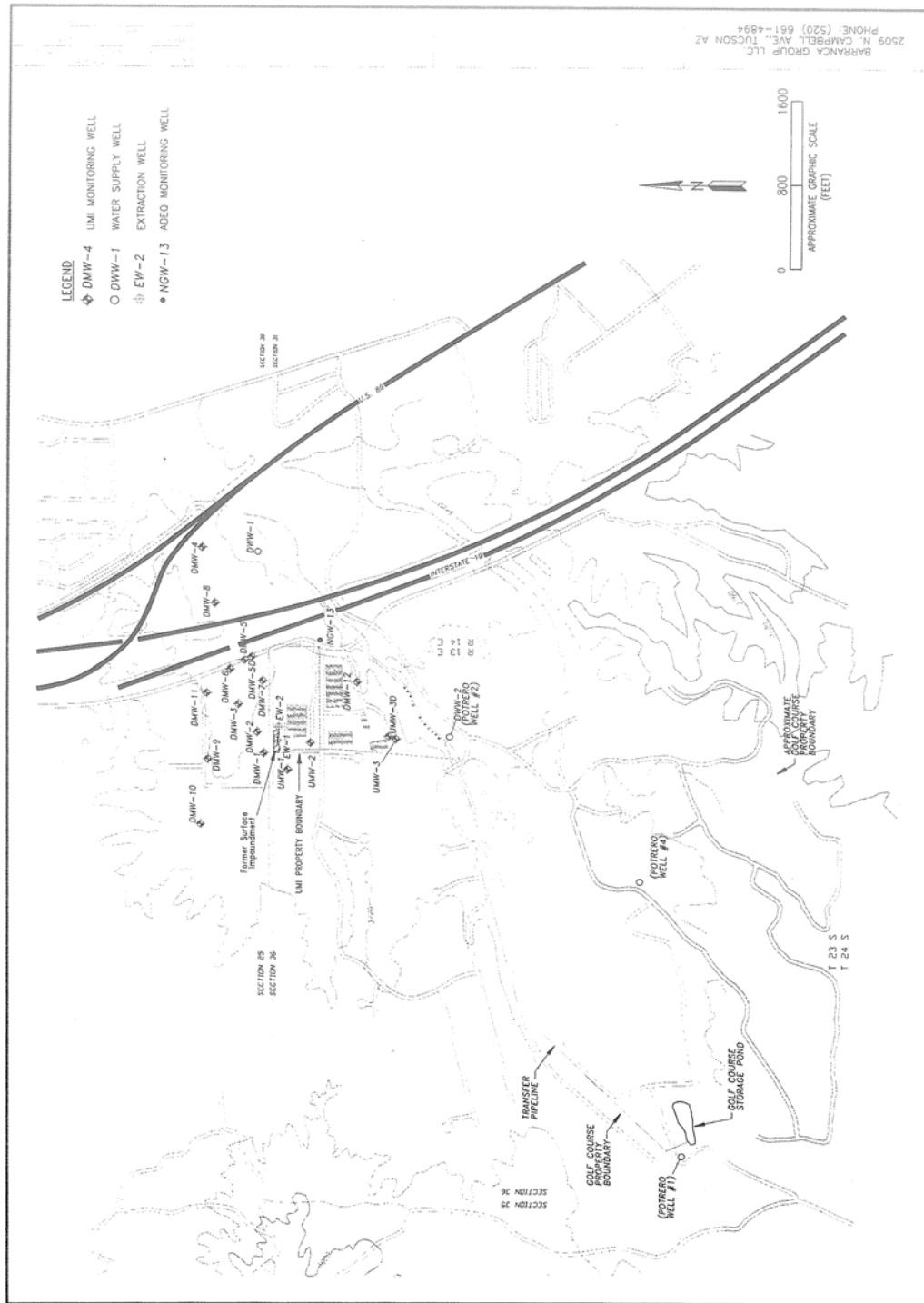


Table 1
Conn-Selmer, Nogales, AZ
Summary of Contaminants of Concern for Wells with Multiple PDB's

Well ID	PDB Depth (ft)	Date Sampled	VOC Contaminants of Concern (µg/l)		
			1,1 DCE	cis 1,2-DCE	TCE
UMW-2	178	8/30/06	2.9	<0.5	4.1
	183		4.5	<0.5	3.8
	188		0.0	<0.5	2.8
	178	11/21/06	18.0	<0.5	12.0
	183		19.0	<0.5	12.0
	188		18.0	<0.5	11.0
	178	3/6/07	12.0	<0.5	12.0
	183		17.0	<0.5	17.0
	188		19.0	<0.5	18.0
	178	6/5/07	11.0	<0.5	14.0
	183		20.0	<0.5	20.0
	188		20.0	<0.5	20.0
UMW-3D	309	8/31/2006	<0.5	<0.5	<0.5
	318		<0.5	<0.5	<0.5
	309	11/21/06	<0.5	<0.5	<0.5
	318		<0.5	<0.5	<0.5
	309	3/7/07	<0.5	<0.5	<0.5
	318		<0.5	<0.5	<0.5
	309	6/5/07	<0.5	<0.5	<0.5
DMW-5	123	8/29/06	11.0	86.0	45.0
	129		11.0	86.0	45.0
	136		12.0	81.0	44.0
	123	11/21/07	6.8	230.0	41.0
	129		7.5	180.0	39.0
	136		6.3	200.0	38.0
	123	3/6/07	6.3	100.0	37.0
	129		7.3	110.0	39.0
	136		7.6	120.0	41.0
	123	6/5/07	6.1	140.0	41.0
	129		6.7	160.0	40.0
	136		6.7	170.0	40.0
DMW-5D	163	8/29/06	<0.5	6.6	2.7
	169		0.6	6.4	2.5
	176		0.6	9.0	3.2
	163	11/21/06	1.2	5.6	1.9

Barranca Group LLC
Tucson, AZ.

Table 1
Conn-Selmer, Nogales, AZ
Summary of Contaminants of Concern for Wells with Multiple PDB's

	169		0.5	5.1	1.7
	176		0.5	4.9	1.6
	163	3/6/07	1.1	14.0	4.3
	169		1.3	14.0	4.5
	176		1.4	14.0	4.3
	163	6/5/07	3.0	130.0	31.0
	169		2.8	120.0	30.0
	176		3.0	130.0	31.0
DMW-7	137	8/30/06	19.0	7.1	3.4
	148		19.0	6.8	3.1
DMW-7 cont.	137	11/21/06	14.0	7.1	2.8
	148		11.0	6.6	2.6
	137	3/7/07	16.0	11.0	4.7
	148		16.0	11.0	4.7
	137	6/5/07	17.0	29.0	12.0
	148		18.0	17.0	8.5
DMW-9	148	8/29/06	<0.5	<0.5	<0.5
	166		<0.5	<0.5	<0.5
	148	11/21/06	<0.5	<0.5	<0.5
	166		<0.5	<0.5	<0.5
	148	3/6/07	<0.5	<0.5	<0.5
	166		<0.5	<0.5	<0.5
	148	6/5/07	<0.5	<0.5	<0.5
DMW-11	166		<0.5	<0.5	<0.5
	139	8/29/06	<0.5	<0.5	<0.5
	146		<0.5	<0.5	<0.5
	154		<0.5	<0.5	<0.5
	161		<0.5	<0.5	<0.5
	180		<0.5	<0.5	<0.5
	139	11/21/06	<0.5	<0.5	<0.5
	146		<0.5	<0.5	<0.5
	154		<0.5	<0.5	<0.5
	161		<0.5	<0.5	<0.5
	180		<0.5	<0.5	<0.5
	139	3/6/07	<0.5	<0.5	<0.5
	146		<0.5	<0.5	<0.5
	154		<0.5	<0.5	<0.5
	161		<0.5	<0.5	<0.5

Table 1
Conn-Selmer, Nogales, AZ
Summary of Contaminants of Concern for Wells with Multiple PDB's

	180		<0.5	<0.5	<0.5
	139	6/5/07	<0.5	<0.5	<0.5
	146		<0.5	<0.5	<0.5
	154		<0.5	<0.5	<0.5
	161		<0.5	<0.5	<0.5
	180		<0.5	<0.5	<0.5
DMW-12	137	8/31/06	<0.5	<0.5	<0.5
	149		<0.5	<0.5	<0.5
	137	8/31/06	<0.5	<0.5	<0.5
	149		<0.5	<0.5	<0.5
	137	3/7/07	<0.5	<0.5	<0.5
	149		<0.5	<0.5	<0.5
	137	3/7/07	<0.5	<0.5	<0.5
EW-1	136	8/31/06	220.0	12.0	35.0
	141		610.0	170.0	56.0
	136	11/21/06	15.0	2.1	3.1
	141		570.0	160.0	59.0
	136	3/6/07	30.0	10.0	7.3
	141	5/18/07	600.0	180.0	66.0
	136	6/5/07	27.0	30.0	8.5
	141		49.0	36.0	14.0

Table 2 - Conn-Selmer, Inc. - Nogales, Arizona
PDB Installation Summary

WELL ID	EXISTING PDB DEPTH (feet below land surface)	PROPOSED PDB/RPP DEPTH (feet below land surface)
UMW-1	148	148
UMW-2	178	188
	183	
	188	
UMW-3	158	158
UMW-3D	309	318
	318	
DMW-1	No PDB installed. DMW-1 is dry.	
DMW-2	139	139
DMW-3	130	130
DMW-4	No PDB installed. DMW-4 is not routinely sampled.	
DMW-5	123	136
	129	
	136	
DMW-5D	163	176
	169	
	176	
DMW-6	123	123
DMW-7	137	148
	148	
DMW-8	116	116
DMW-9	148	166
	166	
DMW-10	199	199
DMW-11	139	180
	146	
	154	
	161	
	180	
DMW-12	137	149
	149	
NGW-13	138	138
EW-1	136	143
	141	
EW-2	Extraction well. No PDB installed.	
DWW-2	Extraction well. No PDB installed.	

Note: PDBs will be installed in the wells at the proposed depths. Additionally, for the fourth quarter sampling event of each year, an RPP will be installed immediately above the PDB to allow for inorganic sampling. Fresh, lab-filled PDBs and RPPs will be obtained from Columbia Analytical Services and installed one month prior to each sampling event.